

# Digitalization as the link between sustainability and competitiveness

## A case study of Europe

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*Abstract:* We are confronting a climate emergency and environmental degradation that demand immediate attention. The European Union has played a proactive role in establishing ambitious targets to address these urgent challenges. However, the approach taken, characterised by excessive regulation, has led to a phenomenon known as 'greenlash', where sustainability is perceived as an impediment to competitiveness. This perception is misplaced; competitiveness and sustainability share common objectives and are highly compatible. To fully realise the synergies between both, digitalisation serves as a crucial lever. Digital solutions promote efficiency, energy transition, and the circular economy, among others, thereby accelerating the decarbonisation of the economy while maximising economic benefits. Nevertheless, despite the European Union having coined the concept of the 'twin transition', it has not yet unlocked its full potential, limiting the enabling effect of digitalisation and Europe's competitiveness.

Introduction: Why Is It Important to Discuss Sustainability?

We are currently facing a climate crisis. The year 2023 has been confirmed as the hottest year on record, with global temperatures 1.48°C above 1850-1900 pre-industrial levels (Copernicus Climate Change Service, 2024a). More recently, in July 2024, the global daily average temperature reached a new all-time high, surpassing the previous record set in July 2023 (Copernicus Climate Change Service, 2024b). Given this trend in rising temperatures, the Paris Agreement target of limiting the temperature increase to below 1.5°C relative to pre-industrial levels is projected to be missed by 2025.

Rising global temperatures are associated with rising sea levels, melting polar ice caps and glaciers, extreme weather events, and the extinction of various species of flora and fauna (Intergovernmental Panel on Climate Change, 1992). Europe is already beginning to experience these consequences. For instance, parts of Europe's coasts have seen a sea level rise of more than 10 cm (European Environment Agency, 2024). Additionally, European glaciers are estimated to have lost around 10% of their remaining volume by 2023 compared to 1976 levels (Copernicus Climate Change Service, 2024c). In terms of extreme weather events, increased precipitation and more intense heatwaves have been observed. Much of Europe endured heatwaves during the prolonged summer, with 41% of Southern Europe experiencing at least "severe heat stress." Increased precipitation caused one-third of Europe's river network to exceed the "high" flood threshold, with 16% surpassing the "severe" flood threshold (Copernicus Climate Change Service, 2024c). Lastly, ecosystem changes now threaten at least 1,677 of the 15,060 species assessed in Europe with extinction (International Union for Conservation of Nature, n.d.).

In addition to climate change, we are confronted with the problem of waste pollution resulting from the predominantly linear economic model of past decades. More than 2 billion tonnes of municipal solid waste are generated worldwide each year (United Nations Environment Programme, 2024). Pollution from the management of this waste adversely affects the health of land, water, and air. Improperly disposed waste often ends up in landfills or other areas, where it decomposes and contaminates the land. There are currently an estimated 2.8 million potentially contaminated landfill sites in the EU (European Environment Agency, 2022). Furthermore, waste, particularly plastic, frequently ends up in rivers and oceans, where it degrades and pollutes the water, harming marine life (Organisation for Economic Co-operation and Development, 2022). Finally, waste generates greenhouse gas (GHG) emissions both in landfills and during incineration. In Europe, in 2022, incinerated waste caused 63.2 million tonnes of CO<sub>2</sub> emissions, while landfilled waste generated 19.8 million tonnes of CH<sub>4</sub> emissions (European Environment Agency, 2019).

## The European Union as a Leader in the Green Transition

The European Union (EU) has been a proactive leader in combating climate change and promoting a circular economy. In 2019, the European Commission (EC) launched the European Green Deal, a comprehensive roadmap for transitioning to a circular economy, reversing biodiversity loss, reducing pollution, and achieving climate neutrality by 2050. To implement the Green Deal, the EU has adopted six key initiatives, each targeting different areas: the EU Climate Law, the EU Biodiversity Strategy for 2030, the Farm to Fork Strategy, the Circular Economy Action Plan, the Green Deal Industrial Plan, and the REPowerEU Plan.

In parallel with the development of these initiatives, the EU Council adopted conclusions in December 2020 that highlighted the dual societal challenges of Europe's digital transformation

and green transition, alongside a proposal for actions to enhance their synergies (Council of the European Union, 2020). At that time, the concept of the twin transition gained momentum, with Europe aspiring to transform into a green, digital, and resilient economy (European Commission, Joint Research Centre, Muench, S. et al, 2022; European Commission, 2022).

## Over-Regulation: The EU's Approach to Achieving Green Goals

Despite the EU's commendable commitment to combating climate change, fostering sustainable development, and promoting the twin-track transition, Europe appears to have struggled to strike a balance between regulation and the successful implementation of its green transition. Under the Green Deal, Europe has adopted 68 pieces of legislation and is in the process of adopting 15 more. Additionally, 46 new legislative proposals have been announced or submitted (European Parliament, 2024).

### *The Pitfalls of Over-Regulation: The Case of the Digital Sector*

Among the initiatives introduced as part of the Green Deal, this study has identified 11 legislative measures<sup>1</sup> impacting the digital sector. This wave of regulation has resulted in several adverse consequences, including increased reporting obligations, a disregard for private sector initiatives aligned with European objectives, and diminished interest from investors and entrepreneurs.

Firstly, the EU has enacted several pieces of legislation that impose new reporting obligations, such as the Corporate Sustainability Reporting Directive (Directive (EU) 2022/2464), the Due Diligence Directive (Directive 2024/1760), or the Revised Energy Efficiency Directive (Directive (EU) 2023/1791). These reporting obligations entail higher costs related to the implementation of new systems to capture data, the training of staff to adapt to the new requirements, or the hiring of external professionals such as auditors, consultants, or lawyers. Besides, these additional costs do not offer any added value from a consumer perspective.

Secondly, some regulations introduce new sustainability standards that may undermine the work companies have already undertaken and the resources they have allocated to these efforts. For example, the Eco Rating initiative, launched by Telefónica, Deutsche Telekom, Orange, Telia Company, and Vodafone, was designed to help customers make more informed and sustainable choices when purchasing mobile devices, as well as to encourage suppliers to reduce the environmental impact of their products. This initiative follows a rigorous methodology, taking into account international standards and involving specialists in sustainability and product life cycle analysis (Eco Rating, n.d.). However, despite this industry effort, the Green Claims Directive introduces new requirements for eco-labelling that could undermine such an ambitious and comprehensive industry-driven initiative as Eco Rating. The lack of recognition for the industry's

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<sup>1</sup> Proposal for a Directive "Empowering Consumers for the Green Transition"; Proposal for a Directive amending Directive 2012/19/EU on Waste Electrical and Electronic Equipment; Right to Repair Directive (Directive (EU) 2024/1799); Zero Net Industry Act (Regulation (EU) 2024/1735); Critical Raw Materials Act (Regulation (EU) 2024/1252); Sustainable Product Eco-Design Regulation (Regulation (EU) 2024/1781); Due Diligence Directive (Directive 2024/1760); Revised Energy Efficiency Directive (Directive (EU) 2023/1791); Corporate Sustainability Reporting Directive (Directive (EU) 2022/2464); Directive (EU) 2022/2380 amending Directive 2014/53/EU on Radio Equipment; and Taxonomy Regulation (Regulation (EU) 2020/852).

efforts may discourage future voluntary actions to advance European green objectives, as investments may be rendered obsolete by subsequent regulations.

Finally, excessive regulation creates administrative hurdles and legal restrictions that generate uncertainty for firms regarding the viability of new products or services. This uncertainty reduces the availability of private capital for innovation activities, as it becomes unclear whether a firm will be able to successfully bring its product or service to market. Moreover, investors are often reluctant to engage with over-regulated sectors due to the risk that regulatory changes could negatively affect the profitability of their investments. For instance, the latest European Round Table (2024) benchmarking report revealed that 60.7% of companies consider regulation to be an obstacle to making long-term investment decisions.

## The Consequences of Over-Regulation: The Greenlash

The EU's extensive regulatory efforts to achieve ambitious green targets have fostered the perception that Europe's green transformation is a negative force, diminishing the competitiveness of the EU and its industries. This backlash has been termed "greenlash."

A recent example of this backlash is the farmers' revolt. As part of the Farm to Fork strategy, the European Commission proposed the Sustainable Use of Pesticides Regulation in 2020, setting a target to reduce pesticide use and associated risks by 50% by 2030 (Wax, E. and Brzezinski, B., 2024). This proposal sparked protests from farmers across Europe, who argued that the stringent environmental requirements for agriculture were economically unfeasible due to increased costs, the power of large retailers, and competition from cheap foreign imports (Henley, J. and Jones, S., 2024). These protests ultimately led to a revision of the proposed regulation by the Commission, resulting in a relaxation of the environmental objectives.

Another example is the controversy surrounding the planned ban on internal combustion engines by 2035, a measure intended to reduce car emissions. Italy's Transport Minister, Matteo Salvini, voiced his opposition to the ban, highlighting that Italy's infrastructure for electric vehicles (EVs) is not yet fully developed, that there are insufficient subsidies to make EVs accessible to the general population, and that thousands of jobs could be lost as a result (Brambilla, A., 2022). Similarly, Germany's Transport Minister, Volker Wissing, argued that the ban could devastate Germany's manufacturing industry, which might, in the future, offer viable, climate-neutral fuels as an alternative to purely battery-powered electric vehicles (Oltermann, P., 2023). This opposition led to the 2035 ban exempting vehicles that run exclusively on e-fuels, a nascent technology that combines hydrogen and carbon dioxide to produce synthetic fuels.

The greenlash has not only influenced the perspectives of policymakers and businesses but has also impacted society's view of the importance of transitioning to a green Europe. The latest Eurobarometer survey published by the European Commission (2023) showed a 3% decline in support for the EU's net-zero target for 2050 between 2019 and 2023.

## Debunking the Myth of the Incompatibility between Competitiveness and Sustainability

Despite the counter-reactions generated by the "greenlash," the reality is that sustainability and competitiveness are highly compatible. Environmental sustainability, among other objectives,

seeks to promote decarbonisation through strategies such as energy efficiency, energy transition, and circularity. These strategies often result in lower costs, which in turn enable companies to increase their profits or allocate more resources to innovation.

Firstly, energy efficiency measures reduce GHG emissions, including both direct emissions from the combustion of fossil fuels and indirect emissions from electricity generation. Increased efficiency also leads to cost savings through reduced resource consumption. At the micro level, these savings can lead to increased revenues or, in the case of the private sector, enhanced investment in innovation. At the macroeconomic level, it is estimated that the EU's GDP could increase by up to 2% under the most ambitious scenario for improved energy efficiency (European Commission, Directorate-General for Energy, Pollitt, H. et al, 2017).

Secondly, the transition to renewable energy sources results in lower GHG emissions and reduced water usage in cooling systems for energy production. This transition also decreases Europe's energy dependence and vulnerability to external shocks. For instance, the Russia-Ukraine war significantly increased the EU's energy import bill to €604 billion in 2022, up from an all-time low of €163 billion in 2020, and raised the total household energy budget from 7.8% in 2020 to 12% in 2022 (European Commission, 2024).

Thirdly, the reuse of products, equipment, or components reduces emissions associated with the extraction of raw materials and the production process, which are the two most polluting stages in the life cycle of electronic devices. Moreover, shifting Europe's linear economy, which is heavily dependent on external resources, towards a circular model could increase resource productivity by up to 3% per year (McKinsey, 2015).

## Digitalisation as a Key Lever to Exploit the Synergies between Sustainability and Competitiveness

Considering the current commitments made by governments, businesses, and non-profit organisations, a reduction in GHG emissions of 7.5% is expected by 2030. However, to meet the targets set by the Paris Agreement, the world needs to reduce GHG emissions by 55%. To move closer to this ambitious goal, connectivity and digital technologies are essential, as they have the potential to reduce GHG emissions by 20% (George, M., O' Regan, K., and Holst, A., 2022).

Regarding the contribution of digitalisation to the economy, digital transformation drives economic growth and enhances countries' competitiveness. In Europe, it is estimated that achieving the Digital Decade targets could unlock more than €2.8 trillion in economic value, equivalent to 21% of the EU's GDP in 2022 (Public First, 2023).

Putting the focus on the three aforementioned aspects of the synergies between sustainability and competitiveness, connectivity and digital solutions play a crucial role in maximising energy efficiency, accelerating the energy transition, and promoting the circular economy.

Firstly, IoT devices and AI are pivotal technologies for collecting data on activities and environmental conditions, interpreting this information, and generating scenarios that promote more efficient resource use. A notable example is public lighting in Santiago de Compostela, where the installation of over 10,000 nodes with NB-IoT connectivity in the municipality's luminaires has enabled data collection and transmission to a central platform for analysis and

advanced management (Telefónica Tech, 2024). This innovation has led to significant improvements in the efficiency and energy savings of public lighting.

In terms of circularity, digital solutions based on IoT and AI enable predictive maintenance of facilities, allowing timely intervention in the event of breakdowns and accurate detection of failing components. This facilitates equipment repairs, extends their lifespan, and reduces potential e-waste. Furthermore, digitalisation can be applied to specific circular economy projects, such as recycling. For instance, Ecoembes, a non-profit organisation dedicated to coordinating recycling and eco-design of packaging in Spain, has implemented a digital reward system for plastic recycling. The system's containers, equipped with 5G Narrowband connectivity, recognise the barcode on the deposited items and identify the type of waste. The data collected is then analysed, and citizens are rewarded through the RECICLOS Return and Reward System (Telefónica Tech, 2021).

Finally, digitalisation supports the energy transition by enabling the design of a transport and distribution model adapted to the new realities of the energy sector. Traditionally, energy flowed in a single direction, from producer to consumer. However, with the rise of self-generation, which promotes the installation of renewable energy sources in homes and other facilities, some consumers have become small-scale producers, feeding excess energy back into the grid. This shift necessitates a redesign of the electricity grid. In this context, the adoption of digital solutions has become a key element in the energy sector, allowing for the management of energy flows and facilitating real-time communication between traditional producers, self-generation producers, and consumers. It also enhances grid planning, real-time management, and advanced fault detection (Aghahadi, M. et al, 2024).

## From "Twin Transitions" to "Parallel Transitions": A Decoupled Implementation of the Digital-Green Transition

Despite the pivotal role of digitalisation in advancing green ambitions and aligning them with business and regional competitiveness and economic growth, the EU has not adequately promoted the dual digital-green transition. Instead, the twin transition is being implemented as "parallel transitions."

In the case of the Green Deal, there is no specific action point aimed at promoting digitalisation to maximise its enablement effect across the various economic sectors targeted by the initiative. The only mention of the digital ecosystem within the Green Deal's framework is in the Green Deal Industrial Plan, which focuses solely on technologies, products, and solutions essential for achieving net zero, such as photovoltaic cells, wind turbines, batteries, and carbon capture, among others (European Commission, 2023). Similarly, the Digital Decade 2030, guided by the Digital Compass, does not place sustainability at its core. Sustainability is addressed only within the infrastructure pillar, overlooking opportunities such as fostering research and development of more energy-efficient algorithms or codecs.

Moreover, despite numerous statements and speeches advocating for the twin transition, as well as reports from the Joint Research Centre, there is no official webpage on the European Commission's website that provides a comprehensive vision and concrete objectives for the digital-green transition, unlike other initiatives discussed throughout this essay.

These gaps highlight a significant missed opportunity to fully integrate digital innovation into the broader sustainability agenda. As a result, the potential synergies between the digital and green transitions remain untapped.

## Recommendations

*Strengthen the digital-green transition.* An integrated approach that leverages the synergies between digitalisation and environmental goals is crucial to aligning the green and digital transitions to truly achieve a twin transition. This approach should involve the establishment of concrete targets and the rigorous monitoring of the progress.

*Foster innovation.* Innovation is essential for companies to maximise efficiency and meet consumer demands, leading to the creation of more sustainable and competitive products and services. The EU should avoid regulatory initiatives that may deter new entrants, entrepreneurs, or investors from engaging in and promoting innovation.

*Adopt a more balanced approach.* Over-regulation has proven to be detrimental to achieving environmental objectives. Regulatory efforts should be targeted at specific issues that genuinely require public sector intervention.

*Enhance collaboration with the private sector.* The private sector possesses a deep understanding of the challenges it faces and the advancements it has made. When establishing new targets or regulatory initiatives, it is vital that the public sector maintains an open and ongoing dialogue with the private sector to communicate challenges and objectives, as well as to identify joint solutions that contribute to the shared goal of creating a green, digital, competitive, and prosperous Europe.

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