



The EU's twin transitions towards sustainability and digital leadership: a coherent or fragmented policy field?

Xinchuchu Gao

To cite this article: Xinchuchu Gao (28 Jun 2024): The EU's twin transitions towards sustainability and digital leadership: a coherent or fragmented policy field?, *Regional Studies*, DOI: [10.1080/00343404.2024.2360053](https://doi.org/10.1080/00343404.2024.2360053)

To link to this article: <https://doi.org/10.1080/00343404.2024.2360053>



© 2024 The Author(s). Published by Informa UK Limited, trading as Taylor & Francis Group



Published online: 28 Jun 2024.



[Submit your article to this journal](#)



Article views: 190



[View related articles](#)



[View Crossmark data](#)

The EU's twin transitions towards sustainability and digital leadership: a coherent or fragmented policy field?

Xinchuchu Gao^{a,b} 

ABSTRACT

In order to achieve the goal of climate neutrality, while also enhancing Europe's industrial competitiveness on the global stage, the acceleration of the twin – green and digital – transitions has been among the top priorities for the European Union (EU). Given the multiplicity of policy areas involved in these twin transitions as well as the nature of the EU as a multilevel organisation, coherence is the key requirement for the twin transitions to be successful. Drawing on the concept of coherence, this article explores whether the EU can be considered a coherent actor when pursuing the twin transitions. It understands coherence as a process to reduce contradictions across different policy domains rather than as a status where no contradictions exist. It also challenges previous views centred solely on coherence during policy implementation, and proposes a broader assessment that begins by framing different policy domains as mutually beneficial and aligned towards common goals. This perspective introduces two dimensions of coherence – conceptual and operational – along horizontal and vertical levels. By examining how policies are framed and interconnected across different levels of governance and policy agendas, this study reveals that while the link between the green and digital transitions and the need for coordination across different governance levels has been widely accepted, conceptual coherence varies across governance levels and policy areas. Furthermore, the study argues that operational coherence – putting ideas into practice – lags behind conceptual coherence, which highlights the challenges of implementing the twin transitions effectively.

KEYWORDS

European Union; coherence; green and digital twin transitions; digitalisation; climate neutrality

JEL N, N4, N43

HISTORY Received 7 October 2022; in revised form 16 May 2024

1. INTRODUCTION

The European Union (EU) has long promoted the transition to digital technology as a way to enhance its international competitiveness. However, the EU has also recognised that in the effort to achieve the transition to sustainability, digitalisation can be a double-edged sword. On the one hand, digital transformation is key to reaching the Green Deal's objectives and the United Nations' Sustainable Development Goals (SDGs), as this transformation will improve energy and resource efficiency (European Commission, 2019c). On the other hand, the digital transition may create new environmental problems. A report released by the European Parliament noted that the high energy and resource requirements of digital technologies may accelerate social and ecological problems, thus undermining the EU's sustainability efforts (European

Parliament, 2021). Therefore, accelerating both the green and digital transitions – the twin transitions – is now among the EU's policy priorities. The New Industrial Strategy for a Globally Competitive, Green and Digital Europe, for instance, emphasises 'the need for new ways of thinking and working to lead the twin transitions' (European Commission, 2020c). Similarly, the Horizon Europe Framework Programme has issued a series of funding calls to promote the two transitions (European Commission, 2021b).

However, when we consider the nature of the EU as a multilevel organisation and the significant number of EU institutions involved in the process of twin transitions, a question arises: Is the EU a coherent actor when it comes to pursuing these transitions? This question is particularly important given the wide range of policy areas that are crucial to achieving environmental sustainability and digitalisation. Therefore, achieving these transitions

CONTACT Xinchuchu Gao  gaoxinchuchu@gmail.com

^aEuropean Institute, London School of Economics and Political Science (LSE), London, UK

^bSchool of Social and Political Science, University of Lincoln, Lincoln, UK

will require coordination among different policy domains at the EU and national levels.

This article uses the concept of coherence to assess whether the EU acts as a coherent actor in pursuing the twin transitions. The article aims to enrich the literature on the digital and green transitions and on coherence. Regarding the former literature, adopting a coherence-based perspective offers analytical tools to understand the EU's actions in this field. This perspective allows us to trace the EU's efforts to reach the twin transitions, identify obstacles and explore possible solutions. Therefore, the study's empirical analysis will advance our understanding of the EU's agency in the field of twin transitions and shed new light on the burgeoning policy discussion around the EU's sustainability and digital leadership. In terms of the literature on coherence, this study makes both theoretical and empirical contributions. Concerning theory, this article challenges the conventional understanding of coherence as a static state. Instead, it redefines coherence as a process aimed at mitigating contradictions across diverse policy domains, rather than a status where no contradictions exist. Furthermore, this study challenges previous views centred solely on coherence during policy implementation, and it proposes a comprehensive approach that begins by framing different policy domains as mutually beneficial and aligned towards common and shared objectives. Empirically, the study expands the literature by using coherence as an analytical tool to examine the nexus between environmental sustainability and digitalisation, an area that remains under-researched. Scholars have mostly focused on coherence within an individual EU policy area, such as cybersecurity (Carrapico & Barrinha, 2017), commercial policy (Smith, 2001) and foreign policy (Portela & Raube, 2009). Only a few studies have explored the links between two policy areas, such as the trade–foreign policy nexus (Bossuyt et al., 2020) and the trade–development nexus (Carbone & Orbie, 2014). The twin transitions have only recently become a policy priority for the EU, tracing coherence in this field offers an opportunity to investigate the EU's agency in a relatively new policy domain.

This article is structured as follows. The next section examines the concept of coherence as a key organisational principle in the EU and presents the study's analytical framework. This framework is designed to analyse two dimensions of coherence – conceptual coherence (different policy areas have been effectively framed as synergistic) and operational coherence (synergistic policy tools have been adopted to achieve the goals of different policy areas) – in horizontal relations (those between two policy areas at a specific level of governance) and vertical relations (those among different levels of governance). The third section deals with conceptual coherence and discusses how the green and digital transitions have been framed as synergistic policy areas at different levels of governance and whether there has been a rhetorical focus on the perceived need for an EU-wide policy response to achieve the twin transitions. The fourth section addresses operational coherence and explores whether a synergistic policy

framework has been developed to achieve the twin transitions. The article ends with a summary of the findings.

2. COHERENCE AS A KEY ORGANISATIONAL PRINCIPLE AND THE STUDY'S ANALYTICAL FRAMEWORK

Coherence has long been a key organisational principle of the EU. In 1970, the European Political Cooperation (EPC) framework was created to enhance consultation among member states on foreign policy issues, thereby maintaining coherence. In 1987, the EPC was formally enshrined in the Single European Act (SEA). The SEA introduced the coherence requirement, which stipulated that the external policies of the European Community shall align with the policies adopted by the EPC (European Communities, 1987). The SEA, however, did not introduce supporting institutional arrangements, which meant that the coherence requirement was little more than a first step in the configuration of coherence in the EU. Subsequent revisions to the treaties of Maastricht and Amsterdam introduced relevant sets of instruments, but these revisions provided only partial solutions to the coherence problem. The Treaty of Nice emphasised that the European Council and the European Commission should fulfil their responsibilities to ensure coherence in the EU's external policies in accordance with its respective powers (Gebhard, 2017). Still, in the intergovernmental conference that led to said treaty, the member states focused more on the 'Amsterdam leftovers'; as a result, limited attention was paid to the development of concrete solutions to the coherence problem. The coherence issue was not tackled constitutionally until the Treaty of Lisbon, which introduced a set of institutional innovations designed to maintain coherence across the EU's policy domains. This treaty gave the high representative the task of assisting the Council and the Commission in their duty to ensure the consistency of the EU's external action and established the European External Action Service to support the high representative (European Union, 2012).

In addition to being established as a key organisational principle in the EU, the notion of coherence has generated numerous academic debates in the field of EU studies. After the failure of the Common Foreign and Security Policy in the Western Balkans in the early 1990s, the focus of the literature on coherence has been on capability–expectation gaps. As Hill (1993) noted, the EU finds it difficult to match its foreign policy goals to capabilities that allow the implementation of such goals. Other scholars have conducted studies in keeping with Hill's focus on the EU's coherent approach to external actions. For instance, Cremona (2008) explored the fundamental role of the EU legal order in ensuring coherence in EU foreign policy. Koenig (2011) investigated the coherence of the EU's response to the Libyan crisis, while Lurweg (2011) examined whether the EU is a coherent development and security actor in the east of the Democratic Republic of Congo. Some scholars have

focused on the incoherence between the European Commission and member states in the policy fields of trade (da Conceição-Heldt, 2011; Meunier & Nicolaidis, 2006) and development (Gänzle et al., 2012). In their study of the trade–development and trade–security nexuses in the EU, Pilegaard (2009) have observed the tension between the EU's trade and security policies. Before them, Nuttall (1992) examined the incoherence between the Common Agricultural Policy (CAP) and the EU's development policy.

These studies look at coherence/incoherence as the independent variable that explains the effectiveness/ineffectiveness of the EU's foreign policy (Nilsson et al., 2012, p. 413). As explained by Missiroli (2001, p. 4), 'the assumption is ... that, by acting unitarily and with a common purpose, the EU ... becomes also, *ipso facto*, more efficient and effective'. In contrast, this article understands coherence as a dependent variable and a guiding principle that EU institutions and actors aim to follow. It is important to note that while coherence is considered as an ultimate goal pursued by the EU, this article acknowledges that there is no absolute coherence across policy domains because they are structured to serve different purposes and interests and there often are diverging and sometimes irreconcilable priorities. As Jordan and Halpin (2006, p. 38) have rightly pointed out, 'it is necessary to accept the existence of competing interest demands rather than assume the conflict away'. In other words, this article understands coherence as a process to reduce contradictions across different policy domains rather than as a status with no contradictions.

The existing coherence literature also tends to focus on the implementation phase of policies, and it looks exclusively at 'the synergic and systematic support towards

the achievement of common objectives within and across individual policies' (Den Hertog & Stroß, 2013, p. 377). For instance, when scholars investigate the coherence between EU energy and climate policies, they take as the starting point of their analyses the (assumed) synergies between these two policy agendas (Dupont, 2015; Dupont & Oberthür, 2012), while the conflicts are largely overlooked. However, this article questions the conventional understanding of policy coherence that tends to take for granted common objectives across different policy domains. Instead, it argues that the process of discursively framing different policy areas as synergistic and working towards common objectives should be the starting point for assessing policy coherence. As May et al. (2006, p. 384) put it, a diverse set of policy components can cohere if those components are linked by a common set of ideas or objectives. Policy frames act as a glue that bonds together different policy domains. Furthermore, these frames redefine the conflicts and synergies among different policy domains (Bocquillon, 2018). Therefore, it is necessary to open up the analysis to discursive dynamics by considering the process of framing synergies across policy domains.

Based on the above discussion and the insights of Gebhard (2017) and Carrapico and Barrinha (2017), this article adopts two dimensions of coherence (Table 1): conceptual and operational. Conceptual coherence refers to the process by which EU, national and private actors use frames to tie together different policy domains and discursively construct synergies across them. Operational coherence can be understood as the process by which coordinated policies are adopted. Each of these dimensions of coherence can be analysed horizontally and vertically. Horizontal coherence takes place across different

Table 1. The analytical framework.

	Horizontal level	Vertical level
Conceptual coherence	<ul style="list-style-type: none"> Do EU institutions use policy frames to bond the green and digital transitions together and discursively construct them as synergetic? Do member states use policy frames to bond the green and digital transitions together and discursively construct them as synergetic? Do private actors use policy frames to bond the green and digital transitions together and discursively construct them as synergetic? 	<ul style="list-style-type: none"> Do the EU, member states and private actors agree that the coordination between different levels of governance is needed to achieve the twin transitions goal?
Operational coherence	<ul style="list-style-type: none"> Do EU institutions adopt coordinated policies to achieve the twin transitions goal? Do member states' institutions adopt coordinated policies at the national level to achieve the twin transitions goal? Do private actors from different areas adopt coordinated policies to achieve the twin transitions goal? 	<ul style="list-style-type: none"> Do EU institutions and member states adopt coordinated policies to achieve the twin transitions goal? Do European institutions and private actors adopt coordinated policies to achieve the twin transitions goal?

policy areas at the same level of governance, while vertical coherence happens among different governance levels.

To apply this framework to the case of the green and digital transitions, this article combines process tracing with discourse analysis, drawing on the existing literature and a wide range of official documents, initiatives and speeches. The article uses process tracing to reconstruct the process by which the twin transitions are framed as synergistic and working towards common objectives as well as coordinated policies adopted to achieve the goal of their realisation. Discourse analysis is used to identify the policy frames that bond together the green and digital transitions and construct them as synergistic at different levels of governance.

3. FRAMING COHERENCE: THE CONCEPTUAL COHERENCE OF THE GREEN AND DIGITAL TRANSITIONS

The EU has long played an important role in tackling the climate crisis. As part of its goal to achieve climate neutrality by 2050 (European Commission, 2020e), the EU has called for a green transition, which will introduce a fundamental shift in the bloc's production and consumption patterns. In 2019, the European Commission presented the European Green Deal, which set out a new sustainable development strategy (European Commission, 2019b). Following this blueprint, the EU has released several laws and initiatives in support of its environmental targets, such as, the Communication on the Annual Sustainable Growth Strategy 2020 (European Commission, 2019a), the Communication on the Green Deal Investment Plan (European Commission, 2020g), the Sustainable Blue Economy Strategy (European Commission, 2021c), the Climate Adaptation Strategy (European Commission, 2021f) and the new Circular Economy Action Plan (European Commission, 2020d). More recently, in response to the COVID-19 pandemic and the energy crisis caused by Russia's invasion of Ukraine, the green transition goal has been maintained through the Recovery and Resilience Facility (RRF) (European Commission, 2021f) and REPowerEU (European Commission, 2022d).

In addition to its climate ambition, the EU has also promoted the digital transition as a means to enhance its industrial competitiveness in the global economy (European Commission, 2020b). In the past decade, a range of technical innovations, such as artificial intelligence (AI), 5G and cloud computing, have become major growth factors for the EU. While the bloc has strong assets, some indicators show that it is lagging behind other international actors in the global race to achieve the digital transition. For instance, the United States and China are making significant investments in quantum technologies, while the EU's investment in blockchain technologies is relatively low (Kalff & Renda, 2019). The level of adoption of AI technologies in the EU is low compared with that of the United States (European Commission, 2018). Against this backdrop, EU policymakers have prioritised

digitalisation as a means of promoting European leadership and strategic autonomy (European Parliament, 2020). Furthermore, the COVID-19 pandemic has shown the essential role of the digital sector in ensuring the continuity of social life and recovery from the pandemic. The European Commission (2021f) has stressed that investing in digital capacity, infrastructure and technology will be a key element of the EU's efforts to fuel the recovery and modernise its economy. In a similar vein, the European Parliament (2020) has noted that the pandemic exposed Europe's urgent need to foster digitalisation in a variety of sectors, 'ranging from health to retail and from manufacturing to education' (p. 2).

After adopting climate neutrality and digitalisation as two major policy goals, the EU has increasingly acknowledged the importance of linking the two agendas. The following subsections discuss conceptual coherence from a horizontal and a vertical perspective.

3.1. Horizontal conceptual coherence

At the EU level, considerable rhetorical emphasis has been placed on the significant link between the green and digital transitions. The EU's Green Deal, which was presented in 2019, states that the digital transformation and its related tools are essential enablers of the delivery of such a deal (European Commission, 2019b). The EU's Industrial Strategy, adopted in March 2020 and updated in May 2021, stresses that the twin transitions will 'affect every part of our economy, society and industry' and that their acceleration is critical to the EU's recovery after the COVID-19 pandemic (European Commission, 2020c, 2021d). In December 2020, the Council adopted the conclusions of Digitalisation for the Benefit of the Environment, which addresses the interplay between the European Digital Strategy and the objectives of the European Green Deal (The Council, 2020). More recently (March and July 2022), the European Commission published two communications that strategically reflect on the interaction between the green and digital transitions in the new geopolitical context (European Commission, 2022c, 2022f).

These documents show that the EU's institutions have constantly emphasised the synergies between the twin transitions, aiming to tightly tie them together. However, the potential conflicts and trade-offs between the often-competing objectives of these transitions have been largely disregarded. Digitalisation can be a double-edged sword in the effort to achieve sustainability. For instance, digital technologies account for around 8–10% of energy consumption in Europe (European Commission, 2022a). Still, the risks of pushing forward two agendas simultaneously are sidelined at the EU level. The only exception is the *2022 Strategic Foresight Report: Twinning the Green and Digital Transitions in the New Geopolitical Context*, which discusses tensions between the two transitions and calls for a response that addresses them.

With regard to conceptual coherence at the national level, member states have signed several inter-state declarations that place rhetorical emphasis on the green

and digital transitions as synergistic policy areas. At the ministerial meeting on 8 December 2020, member states signed the Berlin Declaration on Digital Society and Value-Based Digital Government, which states that 'the digital transformation in Europe' needs to be closely aligned with the goals of the European Green Deal (European Commission, 2020h). In 2021, on the occasion of Digital Days, 26 EU member states plus Norway and Iceland signed the Declaration on a Green and Digital Transformation of the EU (European Commission, 2021a), which aims to accelerate the use of green digital technologies that benefit the environment, society and the economy. On 30 June 2022, following the Digital Assembly held on 21–22 June 2022, 18 member states signed a demand for the green and digital transitions in the EU. In this document, member states emphasised a holistic approach to using the full potential of digital technologies to foster climate neutrality (Toulouse Call for a Green and Digital Transition in the EU, 2022).

Despite the considerable rhetorical emphasis on the synergies between the twin transitions in the aforementioned inter-state declarations, individual member states' attitudes towards these transitions vary. In most cases, states have tended to prioritise either the green transition or the digital transition rather than embracing both. For instance, the four Visegrád countries – Poland, Hungary, the Czech Republic and Slovakia – hesitate to follow the goal of sustainability (Brězovská & Karásková, 2021). The Portuguese Secretary of State for Energy, João Galamba, has declared that 'those who are against mines are against life'. Anti-green transition narratives are frequently used by for Central Europe populists 'who have been using the topic's inherent long-term nature to buttress their voters' support' (Marin, 2021). The limited sustainability commitments of the Visegrád countries can be explained by a number of factors, including their dependency on fossil fuels, the lack of a narrative stressing the importance and urgency of tackling climate change, and the lack of institutional settings that can govern climate issues at the national level (Marin, 2021). In contrast, member states that significantly depend on Russian oil and gas are facing additional pressures to replace these fossil fuels, especially after Russia's invasion of Ukraine (Benford et al., 2022). These countries therefore prioritise the green transition. In April 2022, a joint statement calling for a EU-led swift transition to renewable energy was signed by 11 EU member states, including Austria, Germany, Spain, Finland, Ireland, Luxembourg, Latvia, the Netherlands, Sweden and Slovenia (Taylor, 2022).

Concerning the digital transition, member states have generally acknowledged its necessity. However, they have prioritised different policy areas falling within the scope of digital transition due to their dissimilar digital infrastructures and the varying levels of investment required to achieve digitalisation. For those countries that need to catch up, such as Croatia, Poland, Romania and Bulgaria, the priority has been the adoption of existing technologies, while policies to create new digital technologies have largely been neglected. In contrast, western European

countries have concentrated on operational and information technologies to advance their global competitiveness (Hallward-Driemeier et al., 2022).

Concerning the rhetorical emphasis on synergies between the green and digital transitions among private actors from different industries, the overall picture is mixed. The ICT sector has been a key player in the promotion of the twin transitions. For instance, 26 chief executive officers of ICT companies formed the European Green Digital Coalition (EGDC) and signed a declaration to support the EU's green and digital transformations on 19 March 2021. The main aim of this coalition is to aid the continent's green digital transformation by promoting the participation of actors from the private sector, specifically those working in priority areas such as energy, transport, construction, agriculture and manufacturing (Declaration of the European Green Digital Coalition Members, 2021). In contrast, the mining industry has faced criticism for being slow to respond to the twin transitions, even though it is of importance to them (Bolger et al., 2021). Moreover, without the ability to qualify their progress in terms of sustainability and digital technology, mining companies risk being seen as performing greenwashing (Leonida, 2022). In general, firms operating in the financial and ICT sectors can benefit more from the new business opportunities derived from the twin transitions; they also have more resources. As a result, they are more open to the transformations in question. Enterprises operating in construction, transportation and mining are reluctant to commit to the twin transitions due to fewer business opportunities and skill shortages (Eurochambres, 2022, p. 5).

The preceding discussion shows that despite the green and digital transitions have been framed as closely intertwined policy areas at the EU, national and private sector levels, there exists varying conceptual coherence horizontally across these governance levels. At the EU level, considerable rhetorical emphasis has been placed on the significant link between the green and digital transitions, largely overlooking potential conflicts and trade-offs between the often-competing objectives of these transitions. This indicates a high level of conceptual coherence. However, at the national level and within the private sector, while there is a general acknowledgement of the essential connection between the two transitions, individual member states and private actors have adopted relatively different attitudes towards the twin transitions. Within member states, different domestic situations have led to a tendency to prioritise either the green transition or the digital transition rather than embracing both. In terms of private actors, certain actors, particularly those within the financial and ICT sectors, are more receptive to the concept of twin transitions. Conversely, enterprises operating in construction, transportation and mining are reluctant to commit to the twin transitions due to perceived limited business opportunities and shortages in required skills.

3.2. Vertical conceptual coherence

Regarding the conceptual coherence between the EU, national and private sector levels, there has been a

significant rhetorical focus on the perceived need for EU-wide policy responses to achieve the twin transitions. The European Commission has noted that the transition towards a greener and more digital future requires a coordinated approach and sustained efforts involving all actors at the European, national and regional levels (European Commission, 2022b). Similarly, the Toulouse Call for a Green and Digital Transition in the EU (2022) affirms that member states will work closely with the European Commission to ensure the realisation of the twin transitions. In this sense, considerable emphasis has been placed on the public sector as an important element of said realisation.

Cooperation with the private sector is also considered essential because the major share of investment to finance the two transitions will come from private firms (European Commission, 2022f). The EU and national authorities should create a favourable business environment that attracts private investment (European Commission, 2022b). The important role of small and medium-sized enterprises (SMEs) in leading the twin transitions has also been stressed (European Commission, 2022f).

The preceding discussion shows that there has been a significant rhetorical focus on the perceived need for cooperation between the EU and member states, as well as between the EU and the private sector. This suggests a high level of conceptual coherence at the vertical level.

4. FROM CONCEPT TO OPERATION: OPERATIONAL COHERENCE IN PRACTICE

4.1. Horizontal operational coherence

Regarding operational coherence at the EU level, although the green and digital transitions have been placed side by side, no coordinated policy framework has been developed to explore the opportunities and conflicts inherent in their juxtaposition and deliver concrete policies. The EU has promulgated several regulations and directives to boost the twin transitions. For example, the 2020 Industrial Strategy introduced a list of actions to accelerate progress towards climate neutrality and digital leadership (European Commission, 2020c). The 2021 Industrial Strategy takes into account the circumstances following the COVID-19 pandemic and ensures that the EU can still lead the way in transitioning towards a green and digital economy (European Commission, 2021c). All the documents that make up the Commission's digital strategy, including the Communication on a European Strategy for Data (European Commission, 2020f), the Communication on Fostering a European Approach to Artificial Intelligence (European Commission, 2021e) and the Roadmap for Internet of Things Research, Innovation and Deployment in Europe 2021–2027 (European Commission, 2022e), stress that data, AI and the Internet of Things are vital tools for achieving the goals of the Green Deal.

Despite all of the above, attempts to boost the twin transitions have not always led to a high level of operational coherence. The reason is that the EU institutional

architecture governing the many policy areas relevant to these transitions is still fragmented. Realising the twin transitions requires coordinating multiple policy areas, including macroeconomic and growth policies, industrial and sectoral policies, environmental policies, energy policies and social-protection policies. These policy areas have traditionally been dealt with separately because they fall under the responsibility of different EU institutions, including the European Commission's DG for Communications Networks, Content and Technology; DG for Energy; DG for Environment; DG for Internal Market, Industry, Entrepreneurship and SMEs; DG for Mobility and Transport; DG for Competition and DG for Structural Reform Support. This institutional fragmentation has been exacerbated by the political balancing act performed by Ursula Von der Leyen, who put her VP Vestager in charge of the EU's digital policy, whereas Executive VP Timmermans is responsible for implementing the European Green Deal (Lehne & Dethier, 2020). By assigning carbon neutrality and digitalisation to separate policy teams, the EU has so far failed to develop a more coordinated institutional framework to govern the twin transitions.

As a result, there is a lack of operational coherence between the EU's climate policies and its digital strategy. For instance, the Sustainable and Smart Mobility Strategy sets out a plan for a 90% reduction in greenhouse gas emissions in the transport sector by 2050, and it notes that the digital transformation of transport is crucial to achieving this goal (European Commission, 2020a). However, no details are given on how the adoption of digital technologies, such as AI and 5G, will accelerate the sustainable transformation of the transportation sector. In a similar vein, the Clean Energy for All Europeans package calls for a green transition in the energy sector and states that 'enhanced digitalisation' is one of the keys to realising this change (European Commission, 2019d). However, this plan does not discuss how digital technologies should be applied to pave the way for the EU's energy transition.

At the national level, there is limited evidence that coordinated policies are being adopted to achieve the twin transitions, indicating operational problems similar to those at the EU level. However, it is noteworthy that some member states prefer forms of subregional cooperation. For instance, the joint statement released by France and the Netherlands in August 2021 notes that the twin transitions are critical to the EU's economy and values (Government of Netherlands, 2021). Following this statement, the French Alternative Energies and Atomic Energy Commission and the Dutch Organisation for Applied Scientific Research signed a memorandum of understanding to strengthen their collaboration in the field of research and innovation. This Franco-Dutch agreement has been based on their cooperation in the domains of sustainable solar cells and the hydrogen economy (EuropaWire, 2023). Another example of subregional cooperation is that taking place between France, Italy and Germany, which collaborate on the extraction, processing and recycling of the critical raw materials needed for

the twin transitions. Italy's enterprise minister, Adolfo Urso, stated that the three countries' push for securing these materials marked 'the opening of a new phase and the shaping of a European industrial policy for tackling all the challenges of the twin green and digital transitions' (Wettengel, 2023).

Similar operational problems between the green and digital transitions can be observed within the private sector. The financial and human resources allocated by private firms to embark on the twin transitions vary. As discussed above, ICT companies have been active in the pursuit of sustainability and digital leadership. For instance, in 2021, the EGDC was formed to support the twin transitions in Europe and beyond. Currently, the coalition has 36 members, and 45 SMEs have made commitments to sustainable digitalisation. The EGDC secretariat works closely with the expert organisations Carbon Trust, Deloitte and Sustainable ICT Consulting (EGDC, 2023). However, in other sectors, the implementation of the twin transitions has encountered a variety of challenges. For example, due to their lower digitalisation intensity, small-scale farms have found it difficult to cooperate with actors from other industries; these farms fear that they will not be able to afford the investment in digital solutions (European Commission, 2022b, p. 29). A lack of digital skills is another challenge to their pursuit of the two transitions (Bacco et al., 2019).

The abovementioned discussion highlights operational coherence problems between the green and digital transitions at the horizontal level. At the EU level, although a high level of conceptual coherence has been achieved, there is a lack of coordinated policy framework to formulate concrete policies. This gap is mostly due to the fragmented nature of the EU's institutional architecture governing policy areas relevant to the goal of twin transitions. At the national level, there is limited evidence of coordinated policies aimed at achieving the twin transitions. Notably, some member states prefer forms of subregional cooperation. Within the private sector, similar operational problems between the green and digital transitions can be observed, with varying allocation of financial and human resources by private firms to embark on these transitions.

4.2. Vertical operational coherence

In terms of operational coherence between the EU and national levels, the Recovery and Resilience Facility (RRF) is the key instrument to help member states achieve climate neutrality goals and set them on the path to digital leadership (European Commission, 2021f). The RRF lies at the heart of NextGenerationEU and has three pillars that are directly related to the twin transitions: (1) the green transition; (2) the digital transition; and (3) smart, sustainable and inclusive growth, including economic cohesion, jobs, productivity, competitiveness, research and development and innovation, and a smoothly functioning internal market with strong SMEs. With its available funds (€723.8 billion in current prices, of which €385.8 billion for loans and €338 billion for grants), the RRF allows the Commission to help member states

implement reforms that address country-specific challenges in line with the EU's transition goals (European Commission, 2021g). To benefit from the support of the RRF, member states must submit their recovery and resilience plans to the European Commission. One of the main criteria against which these plans are assessed is whether they contain measures that advance the green and digital transitions (European Commission, 2021g). Member states have thus been encouraged to combine their post-COVID-19 recovery with the twin transitions (Brězovská & Karásková, 2021).

However, in practice, Brussels often finds it difficult to evaluate the degree to which the actions proposed by member states are in line with the overall objectives of the twin transitions. For instance, Poland has agreed to phase out mining by 2049, which puts it on track to achieve the necessary changes. However, the Polish government has promised to keep subsidising coal production, the main source of greenhouse gas emissions in the country (Euractiv, 2020). This could potentially hinder Poland's efforts to catch up with other member states in pursuing the goal of twin transitions. Also, a Poland's projects, the construction of a new airport (the Central Communication Port), is believed to potentially cause environmental damage and is thus not in line with the EU's green and digital objectives (Pilati, 2021, p. 14). Another example comes from Italy, the biggest recipient of the EU's Recovery Fund. The nation's spending plans have been criticised for not being very green. For instance, environmentalists have noted that the Italian government plans to allocate significant funds to the development of public transport lines and high-speed trains without providing any assessments of their greenhouse gas emissions (Jewkes & Jones, 2021).

Similar operational problems emerge regarding the vertical cooperation between public authorities and private actors. There are two main reasons for this. First, the cooperation between public and private actors to boost the twin transitions is constrained by diverging interests – in general, the private sector prioritises business profits, while the public sector focuses on public goods. For example, reliable data are considered essential to the two transitions. Analysing big data can boost stakeholders' capabilities to collect and process environmental information, increase the potential of environmental monitoring systems, and make evidence-based decision-making possible (European Commission, 2022b, p. 26). Therefore, the European Commission (2022c) has stressed the need for data in support of 'the development of testing methods, management systems or interoperability solutions necessary for the twin transitions' (p. 10). However, in practice, data are often neither available nor interoperable. These barriers are mostly caused by firms' reluctance to share commercially sensitive information (Simon, 2021). Companies are also concerned with data misuse and data leaks (European Commission, 2022b, p. 27). Representatives from the digital industry have said that a regulatory framework for data use is required to build trusting relationships between public authorities and private actors (Orgalim, 2022).

Table 2. Coherence in the field of twin transitions.

	Horizontal coherence	Vertical coherence
Conceptual	<ul style="list-style-type: none"> Increasing number of official documents bond the green and digital transitions together and discursively construct them as synergetic A few inter-state declarations bond the green and digital transitions together and discursively construct them as synergetic. However, individual member states' attitudes to the twin transitions vary. In most cases, member states tend to prioritise either the green transition or the digital transition rather than embracing the twin transitions Private actors operating in financial and information and communication technology (ICT) are more open to the idea of twin transitions while private actors operating in the construction, transportation and mining sectors are reluctant to commitments to the twin transitions 	<ul style="list-style-type: none"> There has been a significant rhetorical focus on the perceived need for EU-wide policy responses to achieve the twin transitions Cooperation with the private sector is considered essential because the major share of investment to finance the twin transition will come from the private sector. In particular, the important role of small and medium-sized enterprises (SMEs) in leading the twin transitions is stressed
Operational	<ul style="list-style-type: none"> EU institutions have not adopted coordinated policies to achieve the twin transitions goal because the institutional architecture governing the wide scope of policy areas relevant to the twin transitions is still fragmented at the EU level No evidence is founded that coordinated policies are adopted to achieve the twin transitions at the national level because member states tend to prioritise either the green transition or the digital transition rather than embracing the twin transitions. But some member states prefer forms of subregional cooperation Private actors' financial and human resources allocated to embark on the twin transitions vary 	<ul style="list-style-type: none"> When it comes operational coherence between the EU and national levels, the Recovery and Resilience Facility (RRF) is the key instrument to help member states achieve the twin transitions goal However, Brussels has difficulty when evaluating the degree to which actions of member state are in line with the overall EU objectives of the twin transitions In terms of vertical cooperation between public authorities and private actors, similar operation problems emerge because cooperation between private and public actors to boost the twin transitions is constrained by divergent interests. Also, there is a lack of a concrete policy framework guiding private actors' actions to achieve the twin transitions

Second, another long-identified obstacle to public-private cooperation is the lack of a concrete policy framework that can guide firms' actions towards the twin transitions. As SMEunited president Petri Salminen has pointed out, public authorities need to provide the right framework for the green and digital transitions; they must also ensure that all enterprises are on board and guarantee access to investment and technical assistance (Richardson, 2022). Similarly, the EU steel industry has argued that it is crucial to create a clearly defined set of indicators that can allow for the assessment of the industry's progress towards a more sustainable and digitalised economy (EUROFER, 2022).

The discussion illustrates Brussels' frequent challenges in assessing the extent to which member states' actions align with the overarching EU objectives of the twin

transitions. This obstacle significantly impedes operational coherence between the EU and its member states. In terms of vertical cooperation between public authorities and private actors, similar operational problems emerge because cooperation is hindered by divergent interests. Also, there is a notable absence of a concrete policy framework guiding private actors' actions in achieving the twin transitions (Table 2).

5. CONCLUSIONS

This article uses the concept of coherence to assess whether the EU acts as a coherent actor in pursuing its goal of achieving the twin transitions. It challenges the existing literature that focuses only on coherence during policy implementation and suggests a broader approach

that starts by framing different policy domains as mutually beneficial and aligned towards common goals. The article introduces a dual understanding of coherence as conceptual and operational that applies both horizontally and vertically. By studying how green transition and digital transition policies are interconnected across governance levels and agendas, the article highlights varying degrees of conceptual coherence both horizontally and vertically. It also argues that while there is recognition of the link between the twin transitions, acting on this recognition is still problematic, which poses challenges for their effective implementation.

This article opens new avenues of research on coherence and the green and digital transitions. First, it broadens the scope of the coherence notion by considering how coherence can be framed. Future studies could delve more into this discursive framing and identify the key policy entrepreneurs who conduct it. Second, the article clarifies the EU's efforts, obstacles and potential solutions with regard to the twin transitions. Future scholars could focus on the policies and strategies necessary to enhance coherence. Third, it sheds light on the regional disparities impacting coherence among member states. Investigating how the twin transitions affect regional cohesion is an interesting avenue of future research for both the academic and policy communities.

DISCLOSURE STATEMENT

No potential conflict of interest was reported by the author.

ORCID

Xinchuchu Gao  <http://orcid.org/0000-0001-5664-9122>

REFERENCES

- Bacco, M., Barsocchi, P., Ferro, E., Gotta, A., & Ruggeri, M. (2019). The digitisation of agriculture: A survey of research activities on smart farming. *Array*, 3(4), 1–11.
- Benford, J., Crist, N., Gnath, K., & Schwab, T. (2022, April 6). Green, smart and fair: Rethinking European Cohesion in an era of structural change. *New Perspectives on Global & European Dynamics*. <https://globaleurope.eu/europes-future/green-smart-and-fair-rethinking-european-cohesion-in-an-era-of-structural-change/>
- Bocquillon, P. (2018). (De-)constructing coherence? Strategic entrepreneurs, policy frames and the integration of climate and energy policies in the European Union. *Environmental Policy and Governance*, 28(5), 339–349. <https://doi.org/10.1002/eet.1820>
- Bolger, M., Marin, D. F., Tofighi-Niaki, A., & Seelmann, L. (2021, October 5). 'Green mining' is a myth: The case for cutting EU resource consumption. EEB and Friends of the Earth Europe. <https://eeb.org/library/green-mining-is-a-myth/>
- Bossuyt, F., Orbie, J., & Drieghe, L. (2020). EU in the trade–foreign policy nexus: Foreign policy through trade or strictly business? *Journal of International Relations and Development*, 23(1), 45–66. <https://doi.org/10.1057/s41268-018-0136-2>
- Brězovská, R., & Karásková, V. (2021). *The future of Europe: What role for Visegrad cooperation? Potential of the V4 countries to contribute to the Conference on the Future of Europe in relation to the climate agenda and the involvement of the Western Balkan countries*. AMO.CZ https://visegradinsight.eu/app/uploads/2021/05/AMO_The_Future_of_Europe_What_role_for_the_V4.pdf
- Carbone, M., & Orbie, J. (Eds.). (2014). *The trade–development nexus in the European Union: Differentiation, coherence and norms*. Routledge.
- Carrapico, H., & Barrinha, A. (2017). The EU as a coherent (cyber)security actor? *Journal of Common Market Studies*, 55(6), 1254–1272. <https://doi.org/10.1111/jcms.12575>
- Cremona, M. (2008). Coherence through law. *Hamburg Review of Social Sciences*, 3, 11–36.
- da Conceição-Heldt, E. (2011). Variation in EU member states' preferences and the commission's discretion in the Doha round. *Journal of European Public Policy*, 18(3), 403–419. <https://doi.org/10.1080/13501763.2011.551078>
- Den Hertog, L., & Stroß, S. (2013). Coherence in EU external relations: Concepts and legal Rooting of an ambiguous term. *European Foreign Affairs Review*, 18(3), 377.
- Dupont, C. (2015). *Climate policy integration into EU energy policy: Progress and prospects*. Routledge.
- Dupont, C., & Oberthür, S. (2012). Insufficient climate policy integration in EU energy policy: The importance of the long-term perspective. *Journal of Contemporary European Research*, 8(2), 228–247. <https://doi.org/10.30950/jcer.v8i2.474>
- Euractiv. (2020, September 26). *Poland agrees to shut coal mines by 2049*. EURACTIV. <https://www.euractiv.com/section/electricity/news/poland-agrees-to-shut-coal-mines-by-2049/>
- Eurochambres. (2022). *Eurochambres Twin Transition Survey*. <https://www.eurochambres.eu/wp-content/uploads/2022/09/Eurochambres-Twin-Transition-Survey.pdf>
- EUROFER. (2022). *Revisions of the Circular Economy Monitoring Framework*. <https://www.eurofer.eu/publications/position-papers/revision-of-the-circular-economy-monitoring-framework/>
- EuropaWire. (2023, April 13). *France and Netherlands sign MoU to strengthen technological capacity and autonomy in EU*. <https://news.europawire.eu/france-and-netherlands-sign-mou-to-strengthen-technological-capacity-and-autonomy-in-eu/eu-press-release/2023/04/13/11/52/11/114956/>
- European Commission. (2018). *USA–China–EU plans for AI – Where do we stand? European Commission*. <https://ati.ec.europa.eu/reports/technology-watch/usa-china-eu-plans-ai-where-do-we-stand-0>
- European Commission. (2019a). *Communication from the Commission to the European Parliament, the Council, the European Central Bank, the European Economic and Social Committee, the Committee of the Regions and the European Investment Bank: Annual Sustainable Growth Strategy 2020*. Office of Official Publications of the European Communities.
- European Commission. (2019b). *What is the European Green Deal?* Office of Official Publications of the European Communities.
- European Commission. (2019c). *Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions: The European Green Deal*. Office of Official Publications of the European Communities.
- European Commission. (2019d). *Clean energy for all Europeans*. Office of Official Publications of the European Communities.
- European Commission. (2020a). *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the regions: Sustainable and smart mobility strategy – Putting European transport on track for the future*. Office of Official Publications of the European Communities.
- European Commission. (2020b). *A roadmap for recovery: Towards a more resilient, sustainable and fair Europe*. Office of Official Publications of the European Communities.

- European Commission. (2020c). *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: A new industrial strategy for Europe*. Office of Official Publications of the European Communities.
- European Commission. (2020d). *Circular Economy Action Plan: The European Green Deal*. Office of Official Publications of the European Communities.
- European Commission. (2020e). *Committing to climate-neutrality by 2050: Commission proposes European climate law and consults on the European climate pact*. Office of Official Publications of the European Communities.
- European Commission. (2020f). *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: A European strategy for data*. Office of Official Publications of the European Communities.
- European Commission. (2020g). *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: Sustainable Europe investment plan, European Green Deal Investment Plan*. Office of Official Publications of the European Communities.
- European Commission. (2020h, December 8). *Berlin declaration on digital society and value-based digital government*. <https://digital-strategy.ec.europa.eu/en/news/berlin-declaration-digital-society-and-value-based-digital-government>
- European Commission. (2021a). *EU countries commit to leading the green digital transformation*. <https://digital-strategy.ec.europa.eu/en/news/eu-countries-commit-leading-green-digital-transformation>
- European Commission. (2021b). *Horizon Europe*. https://research-and-innovation.ec.europa.eu/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe_en
- European Commission. (2021c). *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on a new approach for a sustainable blue economy in the EU: Transforming the EU's blue economy for a sustainable future*. Office of Official Publications of the European Communities.
- European Commission. (2021d). *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: Updating the 2020 new industrial strategy: Building a stronger single market*. Office of Official Publications of the European Communities.
- European Commission. (2021e). *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: Fostering a European approach to artificial intelligence*. Office of Official Publications of the European Communities.
- European Commission. (2021f). *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions Empty: Forging a climate-resilient Europe – The new EU strategy on adaptation to climate change*. Office of Official Publications of the European Communities.
- European Commission. (2021g). *Regulation (EU) 2021/241 of the European Parliament and of the Council of 12 February 2021 establishing the Recovery and Resilience Facility*. Office of Official Publications of the European Communities.
- European Commission. (2022b). *Towards a green & digital Europe: Key requirements for successful twin transitions in the European Union*. Joint Research Centre (JRC).
- European Commission. (2022c). *Communication from the Commission to the European Parliament and the Council: 2022 Strategic foresight report – Twinning the green and digital transitions in the new geopolitical context*. Office of Official Publications of the European Communities.
- European Commission. (2022d). *Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions: REPowerEU plan*. Office of Official Publications of the European Communities.
- European Commission. (2022e). *Shaping Europe's digital future: A roadmap for the Next4Generation IoT in Europe*. <https://digital-strategy.ec.europa.eu/en/news/roadmap-next-generation-iot-europe>
- European Commission. (2022f). *Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: Towards a green, digital, and resilient economy: our European growth model*. Office of Official Publications of the European Communities.
- European Communities. (1987). *Single Europe Act*. Office of Official Publications of the European Communities.
- European Green Digital Coalition (EGDC). (2021, March 19). *Declaration of the European Green Digital Coalition members: In support of the green and digital transformation of the EU*. https://ec.europa.eu/information_society/newsroom/image/document/2021-12/european_green_digital_coalition_declaration_-_final_-_digital_day_2021_E592503B-D1CC-A599-5EF97E6891B038DF_74943.pdf
- European Green Digital Coalition (EGDC). (2023). *European Green Digital Coalition*. <https://www.greendigitalcoalition.eu/>
- European Parliament. (2020). *Digital sovereignty for Europe*. [https://www.europarl.europa.eu/RegData/etudes/BRIE/2020/651992/EPRS_BRI\(2020\)651992_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/BRIE/2020/651992/EPRS_BRI(2020)651992_EN.pdf)
- European Parliament. (2021). *The role of artificial intelligence in the European Green Deal*. [https://www.europarl.europa.eu/RegData/etudes/STUD/2021/662906/IPOL_STU\(2021\)662906_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/STUD/2021/662906/IPOL_STU(2021)662906_EN.pdf)
- European Union. (2012). *Consolidated version of the treaty on European Union*. Official Journal of the European Union.
- Gänzle, S., Grimm, S., & Makhan, D. (Eds.). (2012). *The European Union and global development: An 'Enlightened Superpower' in the making*. Palgrave Macmillan.
- Gebhard, C. (2017). The problem of coherence in the European Union's international relations. In C. Hill, M. Smith, & S. Vanhoonacker (Eds.), *International relations and the European Union* (3rd ed., pp. 123–142). Oxford University Press.
- Government of Netherlands. (2021, August 31). *Joint statement of France and the Netherlands*. <https://www.government.nl/documents/diplomatic-statements/2021/08/31/joint-statement-of-france-and-the-netherlands>
- Hallward-Driemeier, M., Kapil, N., Turskaya, A., Marc, L. M., Milchevski, T., & Querejazu, D. (2022, March 4). *How to close Europe's digital divide*. Brookings. <https://www.brookings.edu/articles/how-to-close-europes-digital-divide/>
- Hill, C. (1993). The capability–expectations gap, or conceptualizing Europe's international role. *Journal of Common Market Studies*, 31 (3), 305–328. <https://doi.org/10.1111/j.1468-5965.1993.tb00466.x>
- Jewkes, S., & Jones, G. (2021, April 30). *Analysis: Europe's green revolution? Italy's spending plans raise doubts*. Reuters.
- Jordan, G., & Halpin, D. (2006). The political costs of policy coherence: Constructing a rural policy for Scotland. *Journal of Public Policy*, 26(1), 21–41. <https://doi.org/10.1017/S0143814X06000456>
- Kalff, D., & Renda, A. (2019). *Hidden treasures: Mapping Europe's source of competitive advantage in doing business*. Centre for European Policy Studies (CEPS).
- Koenig, N. (2011). The EU and the Libyan crisis – In quest of coherence? *The International Spectator*, 46(4), 11–30. <https://doi.org/10.1080/03932729.2011.628089>
- Lehne, J., & Dethier, S. (2020, June 18). *Recasting the 'twin' green and digital transitions as one integrated challenge* [blog]. E3G.

- <https://www.e3g.org/news/recasting-the-twin-green-and-digital-transitions-as-one-integrated-challenge/>
- Leonida, C. (2022). Building better mining companies through ESG. *Engineering and Mining Journal*, 223(6), 34–39.
- Lurweg, M. (2011). Coherent actor or institution wrangler? The EU as a development and security actor in Eastern DR Congo. *African Security*, 4(2), 100–126. <https://doi.org/10.1080/19392206.2011.579025>
- Marin, D. F. (2021, June 3). *Unearthing the buried truth about green mining*. EEB. <https://meta.eeb.org/2021/06/03/unearthing-the-buried-truth-about-green-mining/>
- May, P. J., Sapotichne, J., & Workman, S. (2006). Policy coherence and policy domains. *Policy Studies Journal*, 34(3), 381–403. <https://doi.org/10.1111/j.1541-0072.2006.00178.x>
- Meunier, S., & Nicolaidis, K. (2006). The European Union as a conflicted trade power. *Journal of European Public Policy*, 13(6), 905–926. <https://doi.org/10.1080/13501760600838623>
- Missiroli, A. (2001). The challenge of coherence. *European Foreign Affairs Review*, 6(2), 177–196. <https://doi.org/10.1023/A:1011471421125>
- Nilsson, M., Zamparutti, T., Petersen, J. E., Nykvist, B., Rudberg, P., & McGuinn, J. (2012). Understanding policy coherence: Analytical framework and examples of sector-environment policy interactions in the EU. *Environmental Policy and Governance*, 22(6), 395–423. <https://doi.org/10.1002/eet.1589>
- Nuttall, S. J. (1992). *European political cooperation*. Clarendon.
- Orgalim. (2022, February 14). *EU industry days – Europe's technology industries at the heart of the twin transition*. <https://orgalim.eu/news/eu-industry-days-europes-technology-industries-heart-twin-transition>
- Pilati, M. (2021, April 4). *National recovery and resilience plans: Empowering the green and digital transitions?* European Policy Centre (EPC). <https://www.epc.eu/en/Publications/National-Recovery-and-Resilience-Plans-Empowering-the-green-and-digital-transitions>
- Pilegaard, J. (2009). ... and Never the twain shall meet? An institutional perspective of EU trade and development policies in the context of the EPA negotiations. In G. Faber, & J. Orbie (Eds.), *Beyond market access for economic development: EU–Africa relations in transition* (pp. 263–276). Routledge.
- Portela, C., & Raube, K. (2009). (In-)coherence in EU foreign policy: Exploring sources and remedies. Paper presented at The European Studies Association Annual Meeting, Los Angeles, CA, USA.
- Richardson, N. (2022). *EU should facilitate for SMEs to move into twin transition?* SMEunited. <https://www.smeunited.eu/news/eu-should-facilitate-for-smes-to-move-into-twin-transition-2>
- Simon, F. (2021). 'No Green Deal without digital,' EU official says. EURACTIV <https://www.euractiv.com/section/energy-environment/news/no-green-deal-without-digital-eu-official-says/>
- Smith, M. (2001). The European Union's commercial policy: Between coherence and fragmentation. *Journal of European Public Policy*, 8(5), 787–802. <https://doi.org/10.1080/13501760110083518>
- Taylor, K. (2022). *Speed up green transition to break from Russia fossil fuels, say 11 EU countries*. EURACTIV. <https://www.euractiv.com/section/energy/news/speed-up-green-transition-to-break-from-russian-fossil-fuels-say-11-eu-countries/>
- The Council. (2020). *Draft Council conclusions on digitalisation for the benefits of the environment*, 13957/20.
- Toulouse Call for a Green and Digital Transition in the EU. (June 2022). https://www.economie.gouv.fr/files/files/2022/Call_for_Green_Digital_Transition_EU.PDF.
- Wettengel, J. (2023, June 27). *France, Italy, Germany launch joint push for securing critical raw materials*. Clean Energy Wire. <https://www.cleanenergywire.org/news/france-italy-germany-launch-joint-push-securing-critical-raw-materials>