



**A QUALITATIVE ANALYSIS OF COP 29's
SUSTAINABILITY COMMITMENTS AND THE GREEN
DIGITAL ACTION DECLARATION ON ECONOMIC
GROWTH, GREEN SECTOR INVESTMENT, AND
DIGITAL CLIMATE TOOLS**

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Abstract

This study examines how COP 29's sustainability commitments and the Green Digital Action Declaration influence the economic growth, green sector investment, and digital tools for mitigating climate change. Using a qualitative approach, it draws on stakeholder's perspective and policy analysis, framed by Stakeholder Theory, Sustainable Development Theory, and Innovation Adoption Theory. The findings highlight opportunities for green investment and innovation while addressing challenges like policy gaps and digital inequality, offering ideas for enhancing the impact of global climate change mitigation initiatives.

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I) Introduction

The 29th Conference of the Parties (COP-29) embarks on an important moment in the global efforts to combat extreme challenges like climate change, combining ambitious sustainability commitments with an unparalleled focus on the usage of digital tools to accomplish the climate goals. Central to the agenda that is set by this conference are two foundation initiatives: broader sustainability commitments aimed towards nurturing the green economic transformation and the "Green Digital Declaration", that highlights the role of digital innovation in tackling climate change. Together, these initiatives underscore a global recognition of the dual importance of environmental administration and technological advancement in enhancing sustainable economic growth.

The central aim of this study poses an important research question regarding: How do the commitments set up by the COP-29 nations influence economic growth, induce key investment(s) in green sectors, and accelerate the adoption of digital tools for climate action?

Understanding this relationship is crucial, as the outcomes of COP 29 will not only shape the trajectory of global climate policy but also emphasise the dynamics of investment, innovation, and governance into the green economy.

This research adopts a qualitative approach to unveil the perceptions, aspirations, and challenges faced by key stakeholders, including policymakers, industry leaders, investors, and sustainability advocates. By examining the narratives surrounding COP 29's commitments, the study aims to shed some light on the synergies and tensions between sustainability and digitalization, offering insights that are both timely and essential for policymakers and practitioners.

II) Literature Review

Global agreements related to climate change, such as the Paris Agreement and prior COP conferences, have consistently underscored the role of sustainability commitments in nurturing economic growth. Studies highlight that these commitments can serve as promoters for transitioning to a green economy by incentivizing low-carbon innovations and renewable energy adoption. For example, Stern (2007) argued that strong climate policies not only mitigate environmental risks but also create economic opportunities through green job creation and sustainable infrastructure development. However, a study from Nordhaus (2019) emphasizes that the economic benefits of such commitments are dependent on consistent implementation and robust cooperation from the international community. The anticipated economic impact of COP 29 builds on this foundation, with researchers projecting enhanced growth in industries aligned with decarbonization efforts.

Policy-induced green investment is a key instrument through which climate agreements influence economic outcomes. Research by Sovacool et al. (2020) illustrates that clear, enforceable commitments enhance investor confidence, particularly in renewable energy, clean technology, and sustainable agriculture. In contrast, ambiguous

policies create uncertainty, deterring long-term investment. Studies by the International Energy Agency (IEA) further indicate that financial incentives, such as subsidies for renewable energy or carbon pricing mechanisms by the government(s), significantly increase the flow of private capital and investments into the green sectors. Empirical studies examining the European Union's 'Green Deal', reveal a strong positive correlation between policy rigidity and investment in green technologies, setting a pattern for the potential impact of COP 29.

Digital tools like artificial intelligence (AI), blockchain, and Internet of Things (IoT), are increasingly recognized as crucial enablers of climate action. Studies by Foley et al. (2022) state that digitalization enhances resource effectiveness, optimizes energy use, and facilitates environmental monitoring. For instance, blockchain technology has been explored for transparent carbon trading, while IoT devices and AI have been engaged to monitor and reduce industrial emissions. The United Nations Framework Convention on Climate Change (UNFCCC) stresses the role of digital innovation in bridging data gaps, especially in developing countries. However, research by Acatech (2021) warns of potential challenges, like the carbon footprint of digital infrastructures and the unequal access to digital resources, particularly in low-income regions.

This paper provides the foundation for investigating how COP 29's commitments and the Green Digital Action Declaration mutually shape the economic growth, green investments, and digital innovation for combating climate change. By addressing these gaps, this study aims to contribute new perspectives to the existing literature.

III) Theoretical Framework

To explore the impact of COP 29's sustainability commitments and the Green Digital Action Declaration on economic growth, green sector investment, and adoption of digital tools for mitigating climate change, this study draws on three interrelated theories: Stakeholder Theory, Sustainable Development Theory, and Innovation Adoption Theory.

Firstly, the 'Stakeholder theory' was introduced by Freeman (1984), where the study emphasized the importance of identifying and addressing the interests of all groups that are affected by organizational or policy outcomes. In the perspective of COP 29, the key stakeholders include the likes of the governments, businesses, investors, NGO's, and local authorities. This theory is crucial for understanding how the commitments made at COP 29 align with the priorities and concerns of these different parties. For instance, policymakers prioritize regulatory compliance and economic growth, while businesses and investors focus on the expected returns on green investments so as to maximize their profits. This framework helps to analyze the cooperation and conflicts between these perspectives, shedding light on how stakeholder collaboration can drive or obstruct the implementation of sustainability and digital initiatives. Secondly, the 'Sustainable development theory', introduced by the Brundtland Report (1987), serves as a foundational structure addressing economic growth with environmental and social objectives. It suggests that long-term economic development must balance the needs of present and future generations by protecting natural resources and reducing inequality. COP 29's sustainability commitments associate closely with this theory by promoting a

green transition through policy frameworks and international cooperation. This study applies sustainable development theory to examine how these commitments are expected to influence economic growth, particularly through investments in renewable energy, sustainable infrastructure, and cost-effective technologies. The theory also provides a basis for evaluating the broader societal benefits and trade-offs of these initiatives. Finally, the 'Innovation Adoption Theory', proposed in Rogers' (1962) seeks to explain how new ideas, technologies, or practices are accepted and adopted within an ecosystem of economies. The Green Digital Action Declaration reflects this process by encouraging the adoption of digital tools such as artificial intelligence (AI), blockchain, and IoT for climate change mitigation. This theory helps analyze the drivers and barriers to the widespread use of these technologies, including factors like perceived utility, technological readiness, and stakeholder attitudes. Furthermore, the framework is critical for understanding how digital tools can accelerate climate resilience and green innovation, especially in industries like renewable energy and smart infrastructure.

Combining these theories allows for an inclusive analysis of COP 29's dual objective on sustainability and digital innovation. Stakeholder theory provides insights into the human decision making behaviour and organizational dimensions, sustainable development theory addresses the economic and environmental effects, and innovation adoption theory highlights the technological aspects as mentioned. Together, these frameworks enable a subtle understanding of how COP 29's initiatives might collectively reshape economic systems, investment dynamics, and technological innovation.

IV) Research Design and Methodology

This research employs a qualitative approach, analyzing key policy documents, economic reports, and stakeholder perspectives to explore how COP 29's Green Digital Action Declaration aligns with the EU Green Deal. Special emphasis is placed on renewable energy investments, barriers to green funding, and the role of digital transformation in driving economic growth and enhancing climate resilience, providing a comprehensive understanding of these integrated efforts.

Document Analysis

Key policy documents and statements from COP 29 illustrate a strategic approach where advancing technology is central to meeting ambitious climate targets. The COP 29 Declaration on Green Digital Action highlights the role of digital technologies in emission reduction within the ICT sector and promotes collaboration among governments, tech companies, and civil society for climate resilience. This initiative supports global sustainability efforts through increased technology deployment and collective climate action. Additionally, the finalized COP 29 Declarations and Pledges (October 21, 2024) detail strategic measures to drive investment, economic growth, and sustainable practices. Key pledges include commitments to enhance energy storage and develop the hydrogen sector, reinforcing the alignment of climate strategies with economic planning.

Lastly, economic reports further place the Green Digital Action Declaration within the continuum of COP commitments, marking its significance in setting new emission reduction standards. These reports underscore the need for financial investment and infrastructure improvements to achieve net-zero goals, highlighting persistent themes

such as funding, policy cohesion, and regulatory challenges essential for stakeholder engagement and policy effectiveness.

Data Analysis Method

In this study, a dual approach of thematic and content analysis was utilized to capture stakeholder perspectives and analyze policy language, with a particular focus on the EU Green Deal. This approach provided depth in examining how key themes such as *economic growth expectations, barriers to green investment, and adoption of digital technologies for climate resilience* align with the EU's sustainable development strategies.

The analysis reveals that the integration of economic and environmental priorities is central to the EU Green Deal. Investments in renewable energy and green technologies are portrayed as essential pathways to stimulating job creation and boosting competitiveness, underscoring the EU's vision of embedding sustainability within economic growth for long-term benefits (European Commission, 2022). According to EU Energy Commission's statistical report, the EU's share of renewable energy in the total energy supply increased from 19% in 2021 to 25% in 2022, as shown for 2022 statistical data in the figure 1 below, indicating substantial progress in integrating green technologies into the energy mix.

2022 Renewable energy shares							
	RE transport 2022	RE electricity 2022	RE Heating and cooling 2022	Overall RE Share 2022	Indicative 2017-2018	2020 RE target	2030 RE Target
% EU27_2020	9.6%	41.2%	24.9%	23.0%	n.a.	20%	43%

Figure 1. 2022 Renewable energy shares

SOURCE: Eurostat-RES SHARES March 2024

Notes: * in % of the Gross Final Energy Consumption

In 2023, International Energy Agency also reported that the EU invested nearly USD 110 billion in renewable energy generation, marking an increase of over 6% from the previous year, which can be observed from figure 2. This investment underscores the region's commitment to enhancing competitiveness through green technologies.

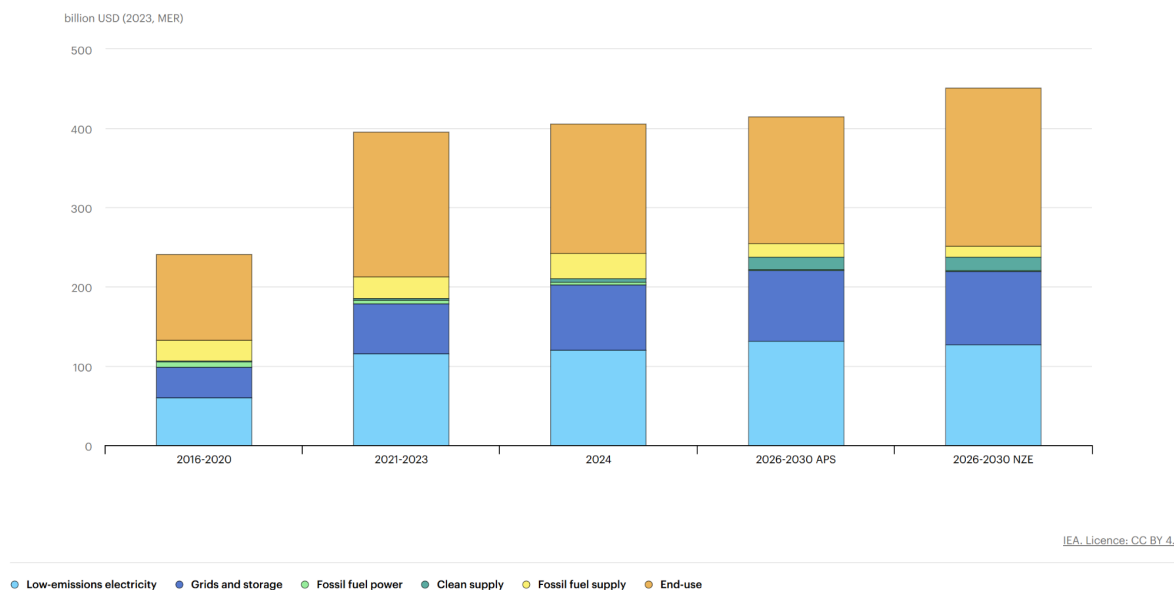


Figure 2. Past and future energy investment in the European Union in the Announced Pledges Scenario and the Net Zero Emissions by 2050 Scenario, 2016-2030

SOURCE: International Energy Agency IEA 2024

However, significant barriers and obstacles do exist, such as fragmented regulations and challenges in mobilizing private sector funding, and more mentioned in Figure 3 below, which energy costs are reported most frequently. Addressing these through regulatory alignment and enhanced financial incentives is critical for progress (European Parliament, 2023).

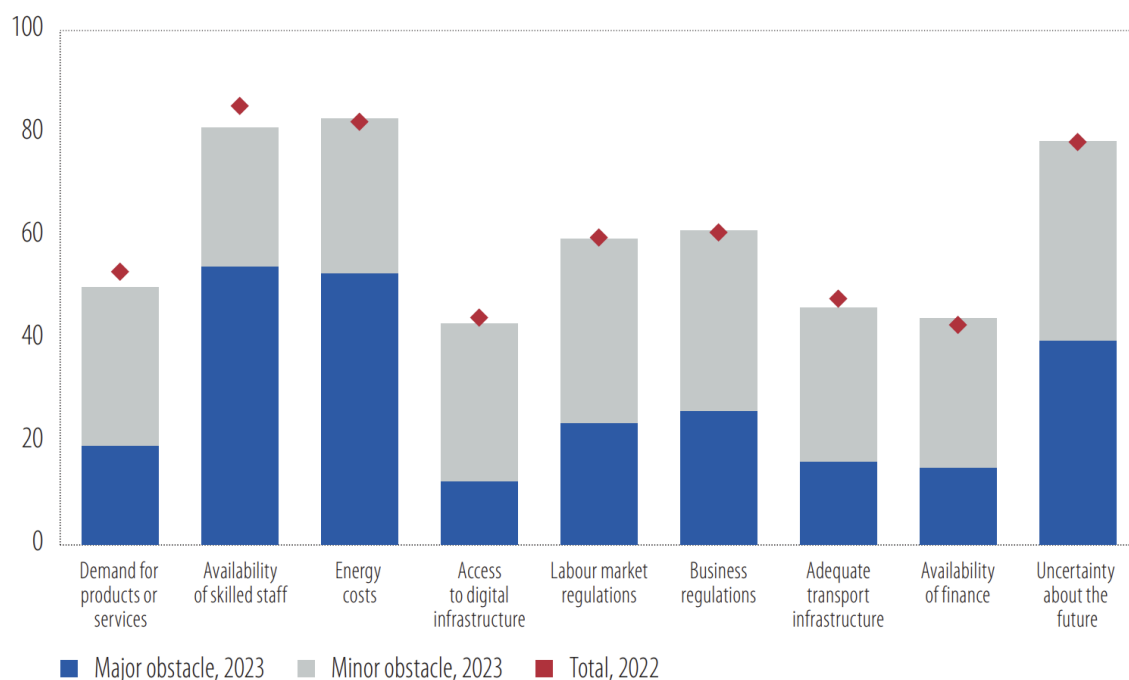


Figure 3: Long-term barriers to investment (% of firms)

SOURCE: EIBIS 2022-2023

The adoption of digital technologies is emphasized as vital for enhancing climate resilience and supporting sustainable economic growth. Policy documents, including the Green Digital Action Declaration, frequently reference “digital transformation,” “emission monitoring,” and “energy efficiency” as key objectives, portraying digital tools as enablers of climate action. However, challenges such as uneven infrastructure and regional disparities remain significant, necessitating investments in digital literacy and infrastructure for a comprehensive, EU-wide transition (ECNO, 2024). In 2023, it was reported by Eurostat that 41% of all EU businesses still did not reach a basic level of digital intensity, with very low or low percentages in many European countries, as depicted in Figure 4 below.

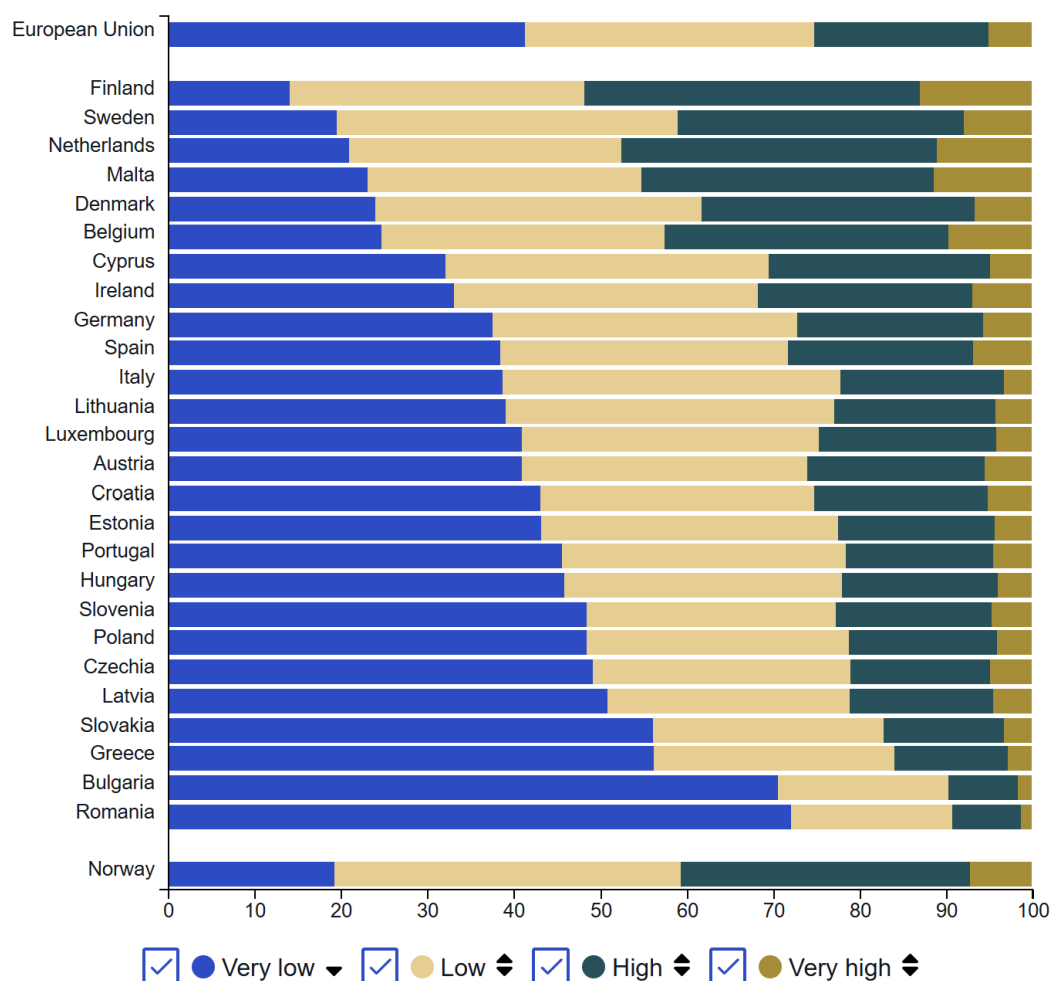


Figure 4. Digital intensity level in businesses, 2023 (as % of total businesses)

SOURCE: Eurostat

V) Results

Analysis of key policy documents reveals consistent themes regarding economic growth linked to climate commitments. Stakeholders frequently emphasize that the integration of technology and green investments is vital for stimulating economic development. First of all, the COP29 and Green Digital Action emphasizes the critical role

that digital technologies play in emission reduction and collaboration for climate resilience. Specifically, digital tools such as emission monitoring and energy efficiency solutions are presented as enablers of climate action, facilitating enhanced environmental sustainability across sectors. This matter is stated in the United Nations Digital Economy Report (UNCTAD, 2024), which highlights how emerging digital solutions are paving the way for more efficient resource management and creating new avenues for sustainability. The International Energy Agency (IEA 2024) also indicates that digital platforms for energy management could reduce energy waste by up to 20%, further reinforcing the potential of digital innovation to address climate challenges.

However, the results reveal significant disparities in the adoption of digital technologies across the EU, as shown in statistical figures provided by Eurostat (2023) of 41% of EU businesses have not yet reached even a basic level of digital intensity, which suggests that uneven infrastructure and digital literacy gaps remain key challenges. These disparities could hinder the comprehensive integration of digital tools for climate resilience, necessitating targeted investments to bridge these gaps. A recent study by ElMassah and Mohieldin (2023) also found that regional digital inequality is a prominent barrier to achieving sustainability targets, particularly in regions where infrastructure remains underdeveloped.

The analysis also indicates considerable progress in renewable energy investment within the EU, aligning economic growth objectives with sustainability priorities. The results based on EU Energy Commission's 2022 statistics and IEA highlight the EU's commitment to expanding renewable energy as a vehicle for enhancing competitiveness and achieving the broader climate goals set by the EU Green Deal and COP 29's goal. Economic integration of renewable energy into the EU's policy framework demonstrates that sustainability can be a driver of growth. Investments in renewable energy are linked to job creation and enhanced competitiveness, with a focus on fostering long-term economic benefits. This aligns with findings by Kadir et al. (2023), who concluded that investing in renewable energy infrastructure could contribute to GDP growth while ensuring environmental sustainability.

Despite the progress, significant barriers to green investment still remain. The European Investment Bank Investment Survey (EIBIS, 2023) identifies persistent obstacles such as energy costs and inconsistent regulations, which are the frequent hurdles for consistent investment flows. According to Kern and Rogge (2018), uniform policy frameworks are essential for driving green technology adoption and reducing investor uncertainty, supporting the need for cohesive regulatory practices mentioned in this study. Similarly, a recent report by Dechezleprêtre et al. (2022) indicates that countries adopting policies that align economic and climate goals tend to show more resilient economic performance and greater success in meeting their climate targets. Moreover, financial barriers are evident in the private sector's hesitation to invest in long-term green initiatives. Addressing these barriers will require enhanced financial incentives and streamlined regulatory measures, which aligns with the conclusions of the European Parliament's 2023 report.

Overall, the findings illustrate a clear alignment between the EU Green Deal, COP 29 commitments, and the Green Digital Action, highlighting a cohesive strategy where economic growth, sustainability, and digital innovation are intertwined to drive emission reductions and bolster climate resilience.

VI) Discussion

Stakeholder perspectives converge on the necessity of integrating green technology for sustainable economic growth, yet differ in their priorities for implementation. Policymakers focus on regulatory frameworks and public investments, while investors express concerns about barriers such as fragmented regulations and high energy costs. Technology providers emphasize the transformative potential of digital tools, though they acknowledge that disparities in infrastructure and digital literacy pose significant challenges. Common themes include the need for cohesive regulations, financial incentives, and digital innovation to achieve climate and economic targets. The alignment of the EU Green Deal with COP 29 and the Green Digital Action highlights the critical importance of unified policy frameworks that promote sustainability and economic resilience. Policymakers must work on regulatory harmonization to reduce investor uncertainty and incentivize private sector investments in green and digital technologies. Addressing regional disparities in digital literacy and infrastructure is also crucial to ensure equitable access to green technologies. Fostering public-private partnerships can enhance financial flows into sustainable projects, driving both climate resilience and economic growth.

Despite significant progress, stakeholders face persistent challenges such as fragmented regulations, funding gaps, and technological limitations. Regulatory fragmentation deters investment, as investors require clear and consistent frameworks. Funding gaps, particularly in the private sector, underscore the need for enhanced financial incentives to drive green investments. Technological infrastructure disparities across EU regions create unequal opportunities for digital transformation, potentially undermining the effectiveness of collective climate action. Overcoming these challenges will require cohesive regulatory alignment, stronger financial incentives, and targeted investments in digital infrastructure and literacy to ensure a comprehensive transition to a sustainable economy.

VII) Conclusion

The study reveals that the integration of economic growth, sustainability, and digital innovation is central to achieving COP 29 commitments and Green Digital Action within the context of the EU Green Deal. Stakeholders agree on the necessity of a cohesive policy environment to drive green investments and the adoption of digital technologies to bolster climate resilience. Policymakers should prioritize regulatory harmonization and enhanced financial incentives to mobilize private sector investments. Industry leaders must focus on reducing disparities in digital literacy and infrastructure across regions to foster equitable climate action. Future research should examine the effectiveness of public-private partnerships in bridging funding gaps and conduct regional case studies to identify best practices for overcoming infrastructure and regulatory challenges.

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