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The Circular Economy and SDG 13: Strategies for Reducing the Carbon Footprint and Mitigating Climate Change-A Systematic Review

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***Abstract*–Climate change demands sustainable solutions, and the circular economy emerges as key to reducing waste and reusing resources. However, its integration faces gaps in key sectors, highlighting the need for more research to enhance its impact on SDG 13. This paper aims to analyze circular economic strategies implemented in different contexts to reduce carbon footprint and mitigate climate change, exploring their effective contribution to the achievement of SDG 13. A systematic literature review (SLR) was conducted using the PRISMA guidelines. An initial 354 studies were identified by searching databases such as Springer, Scopus and Science Direct, applying inclusion and exclusion criteria, 50 relevant studies were selected for analysis. The findings highlight that the most effective strategies include waste management, recycling and reuse. In addition, tools such as life cycle assessment and integration of emerging technologies proved to be fundamental for the implementation of sustainable policies. Finally, it can be concluded that the circular economy is an essential tool for reducing the carbon footprint and advancing global sustainability. This study emphasizes the need to strengthen infrastructure and public-private collaboration to overcome barriers and maximize its impact on climate action.**

Keywords-- Circular economy; Carbon footprint; Climate change; SDG 13; Sustainable.

I. INTRODUCTION

As environmental and social challenges evolve, the circular economy becomes a crucial strategy to address climate change and advance sustainability globally [1]. With increasing pressure on natural resources and ecosystems, adopting new circular economy practices has become a fundamental task to achieve the Sustainable Development Goals (SDGs), especially SDG 13, which focuses primarily on climate action and reducing carbon emissions [2]. The European Union, for example, adopted the 'Nexus' approach to integrate the circular economy into climate and biodiversity policies, addressing the interconnections between these sectors through the European Green Pact [3]. Meanwhile, cities around the world are seeking to implement climate neutrality measures, identifying waste management and the circular economy as key factors in achieving net zero emissions [4].

With current linear production models, many countries are facing difficulties in fully integrating the circular economy into their economies, especially in critical sectors such as water, energy and construction [5]. In China, the implementation of ambitious policies focused on the circular economy has proven to be instrumental in reducing carbon footprint and stabilizing material use, being a strategic tool in the transition to a low-carbon economy by 2050 [6]. However, the adoption of circular strategies presents significant barriers, such as the lack of infrastructure for proper waste management and the need for investment in recycling and reuse technologies [7]. These barriers have become evident in multiple sectors, with chemical technologies having to be explored to maximize reuse and reduce emissions [8].

The need to reduce waste and optimize resource use has driven the development of innovative strategies in the circular economy, such as advanced recycling and reuse of municipal waste. In the case of tree waste in the United States, for example, its conversion into biochar and compost significantly reduces global warming potential and eutrophication [9]. Similarly, in net zero emission neighborhoods in South Wales, circular economy practices have been implemented that promote the efficient use of building materials and foster social sustainability through community participation [10]. Furthermore, research on sustainable materials development underlines the importance of innovation in this field, with decarbonization and the adoption of closed-loop materials crucial to mitigating climate change [11]. While the circular economy has been widely discussed in recent literature, there are still significant gaps in its practical implementation as an effective way to achieve the SDG 13 targets. A considerable proportion of research focuses on developed settings with high technological and regulatory capacity, leaving aside resource-constrained environments. Likewise, there are few studies that systematically and comparatively articulate circular strategies applied to emissions reduction and their sectoral feasibility.

Faced with this gap, the present work employs a systematic review under the PRISMA guidelines, focusing on identifying and classifying circular strategies published between 2019 and 2024. This review considers mixed methodological approaches and criteria applicable to different sectors, allowing the detection of common patterns, frequent barriers and opportunities for improvement. In this way, it provides an analysis that not only contributes to conceptual strengthening but also offers a useful technical basis for decision making in sustainable policies and multi-sectoral planning.

II. LITERATURE REVIEW

It is evident that the circular economy has generated a great positive change in the drive towards sustainability and minimizing environmental impact. For example, the study [12] investigated the impact of renewable energy circularity on the environment, given the need for intervention to mitigate global warming. Two environmental models were applied using the biased corrected method in 28 low-income countries between 1990 and 2019. The results showed that renewable energy circularity has a positive effect on the environment. It was concluded that digitization also improves environmental quality, suggesting that policies based on circular practices were crucial for achieving sustainable development goals. Another study [13] examined the drivers of consumer participation in Indonesia in polyethylene terephthalate (PET) waste recycling, using the Theory of Planned Behavior (TPB) as a theoretical framework, analyzing consumers' recycling intentions and their impact on the circular economy. It turned out that consumer participation was essential for the success of recycling programmers. It was concluded that understanding recycling motivations was key to improving plastic waste management.

In the industrial field, the study [14] on the impact of the circular economy on Taiwanese multinational companies. A structural equation analysis was conducted on data from 4050 companies from 2013 to 2018, evaluating reduction, reuse and recycling policies with respect to climate change and company size. As a result, reduction and reuse increased competition, while recycling contributed to climate resilience. Businesses responded to climate pressure by strengthening circular economy policy networks. Additionally, work [15] on the environmental impact of the fashion industry and its ability to drive sustainable practices. It focused on an Italian luxury brand, monitoring its activities for one year according to ISO 14064-1:2019. A generation of 9804 tonnes of CO2 equivalent was identified and six mitigation scenarios were proposed to reduce emissions by 25%. It was concluded that environmental assessment tools are essential to improve sustainability in luxury fashion.

On the other hand, the research [16] redefined the principles of Sustainable Production towards a Circular Economy and Industry 4.0 models. As a methodology, a Delphi Panel with 11 experts was used to agree on ten principles that were evaluated in terms of significance and consistency. The results identified four key principles that strengthen the development of others, such as employee well-being and the use of sustainable technologies. In conclusion, this proposal boosts the understanding and application of sustainability to achieve SDG 12. The article [17] identified the challenges and opportunities in integrating new technologies in the circular economy. Through bibliometric methods, the impact of tools such as blockchain and artificial intelligence was analyzed. The results showed that these technologies optimized resource efficiency, sustainable business models and product lifecycle management. However, their implementation required overcoming challenges such as supply chain transparency and regulatory adaptation for equitable and sustainable growth.

In the context of sustainability policies, a study [18] analyzed environmental challenges after COP27 focusing on income, population ageing and industrial development in 17 developed countries. It used estimators to measure emission reductions through the circular economy, carbon policy and public-private partnerships. It showed that the circular economy and carbon policies contributed to emissions reductions. It can be said that, to achieve sustainability, it was crucial to implement green policies and strengthen public-private partnerships. Similarly, other research [19] examined the extent to which companies can meet Science-Based Targets (SBTi) following the Paris Agreement. Using a review of carbon reduction methodologies, the contribution of the circular economy (CE) to strategies such as reuse, recycling and remanufacturing was analyzed. The results highlight that, although the GHG Protocol covers some practices, several CE strategies still require methodological adjustments. Then better integrating CE will help manufacturing companies to realistically achieve carbon targets.

On the other hand, the article [20] analyzed the effect of the circular economy on CO2 emissions growth, considering energy transition and supply chain pressure. QARDL and PMG were used on data from 1997 to 2020. The results showed that the circular economy and strict climate policies reduced carbon emissions, while energy transition and industrialization increased emissions. The findings suggest recommendations for balancing circular economy and sustainable development.

Finally, the study [21] highlighted the role of corporate governance in the Circular Economy (CE) in industrial companies. Key practices such as stakeholder engagement and environmental management were identified as directly driving the adoption of CE. The findings highlighted that governance helped companies to adopt more sustainable models and mitigate climate risks. It is concluded that these mechanisms were useful for managers and policy makers in the transition to more sustainable business models.

III. METHODOLGY

This work is carried out from a qualitative approach, structuring the elements that explore the purpose of the systematic review, the research questions, the type of study used, the search strategy in different databases and the application of the inclusion and exclusion criteria.

A. Purpose and Research Questions

Based on the literature review, we seek to analyze the role of the circular economy in reducing the carbon footprint and its contribution to sustainable development, especially within the framework of Sustainable Development Goal (SDG) 13, focusing on climate action. The main research questions guiding this review are:

- Which circular economy strategies are most effective in reducing the carbon footprint in the context of SDG 13?
- What are the benefits and outcomes of applying the circular economy for climate change mitigation?
- What techniques or tools are used to integrate policies that support carbon emission reductions?

B. Type of study

Systematic literature review (SLR) was selected as the methodology because it is a well-known method widely used to identify, evaluate and interpret relevant research for a topic, area or phenomena of interest [22].

To address this research gap and gain a deeper understanding, the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines were followed to review existing literature on the development of a network of barriers, an integrated framework and strategies for the implementation of the circular economy in a structured manner [23].

C. Search strategies

The search for data for this review was conducted through a comprehensive analysis of several databases, including Springer, Scopus, Science Direct. Initially, 354 studies were identified, and after exclusions, 50 studies were selected using PRISMA criteria. The search string was composed of keywords and related terms, varying the filters according to each database (economy AND circular AND carbon AND footprint AND climate AND change AND ODS 13 AND sustainable).

D. Inclusion and Exclusion Criteria

Identification and selection processes were carried out in each database, resulting in a final number of studies. Of the 354 studies that were initially found, after exclusion by title, 202 were left and after exclusion by abstract, only 143 were left, as there was no relevant information related to the topic. Finally, after a meticulous review, 93 studies were excluded for not answering the research questions correctly, thus including only 50 studies in the Systematic Literature Review. Table 1 shows the criteria. The PRISMA diagram, showing the application of the inclusion and exclusion criteria, is shown in fig. 1.

TABLE 1 EXCLUSION AND INCLUSION CRITERIA

Inclusion	**Exclusion**
I01: Manuscripts published between 2019 and 2024	E01: Manuscripts in a language other than English.
I02: Manuscripts written in English.	E02: Manuscripts that do not answer the research questions.
I03: Original manuscripts	E03: Manuscripts not related to the research topic.
I04: Publicly accessible manuscripts	
I05: Manuscripts including the full PDF format	

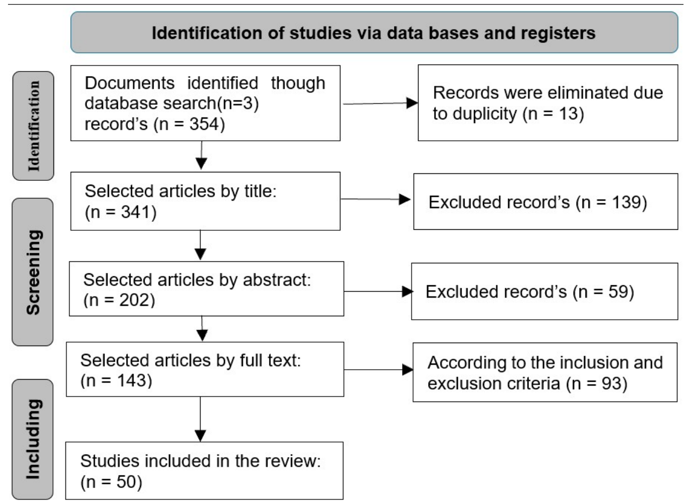

Fig. 1 PRISMA diagram

IV. RESULTS

In this section, the results obtained in different databases are presented, highlighting key aspects such as the types of study, the methodological approach and the amount of research found in each database.

Fig. 2 shows the bibliometric analysis of the most frequent keywords related to circular economy, SDGs, carbon footprint and climate change. It also illustrates the central themes around the circular economy, which is the central and most interesting topic of study among the different researches. The ramifications that stand out include topics that address essential aspects such as the implementation of the circular economy linked to ODS 13, with the purpose of obtaining strategies that contribute to reducing the carbon footprint and promote the mitigation of climate change. Also considering sustainability because of applying the circular economy.

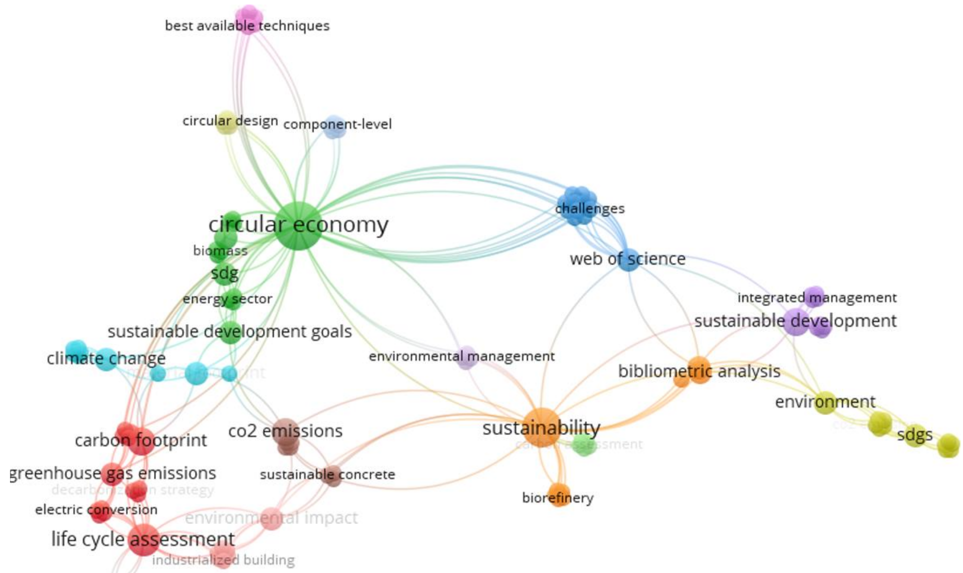

Fig. 2 bibliometric analysis of the most recurrent words

Fig. 3 shows the methods used in the papers analyzed. The qualitative approach is the most used in literature with 32 articles, while the quantitative approach has 18 papers. This finding shows that qualitative studies are more common in the literature reviewed, indicating a clear inclination towards research that focuses on the interpretation and detailed analysis of the cases studied.

In this case, the predominance of the qualitative approach may be related to the nature of the problems addressed in the studies analyzed, which may require a more detailed and contextualized understanding of the cases or the particularities of the contexts in which they take place.

On the other hand, the quantitative approach yielded 18 articles. This shows us the importance of experimental studies, which allow us to address real problems, establishing correlations, measuring variables, testing hypotheses objectively. This finding indicates the importance of integrating both approaches into future work to obtain a more comprehensive vision.

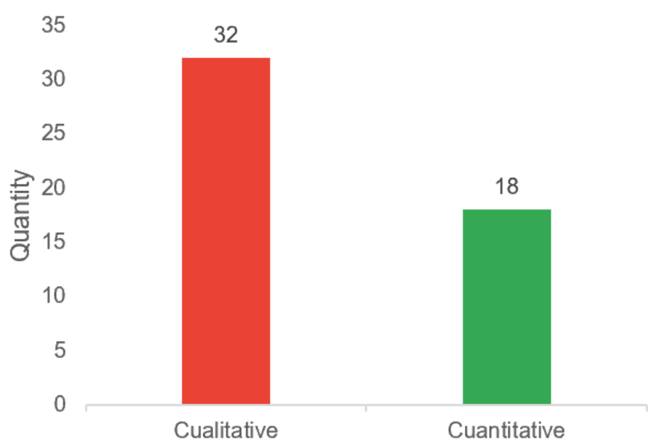

Fig. 3 Articles reviewed by methodological approach

Fig. 4 illustrates the number of studies collected in each database that were included in the final version of this review, presenting the documents obtained from various sources, allowing us to appreciate their relevance in the review. Science Direct stood out as the most consulted source with a total of 26 articles, being of greatest importance in the central subject. Scopus contributed a total of 17 documents and, lastly, Spinger made a smaller contribution, but no less important, with a total of 7 reports, bearing in mind that the sources must be diversified for a comprehensive understanding of the topic under investigation.

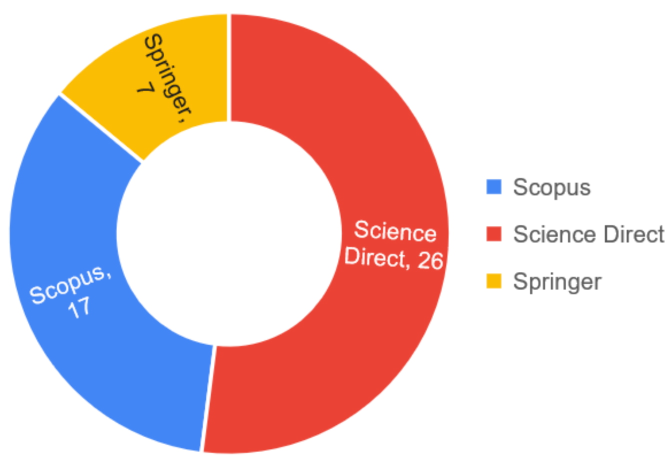

Fig. 4 Number of articles per database

Fig. 5 shows the frequency of publication of these studies between 2020 and 2024. Between 2020 and 2021 the use of topics such as circular economy was not a topic that was widely addressed. It was in 2022 that the application of this topic became more and more important as it brought with it positive consequences for the environment, which prompted the emergence of significant studies on this topic. It is evident that in 2024 it has become a common issue among researchers.

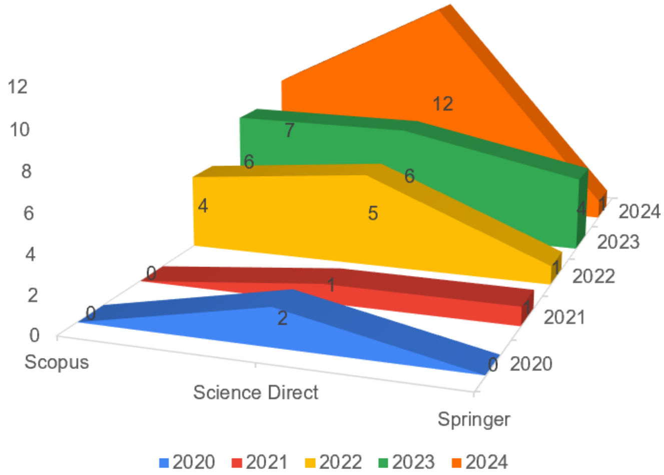

Fig. 5 Number of articles per year and database

Fig. 6 shows the geographical distribution of scientific publications related to the review topic. This map allows us to identify countries with the largest contribution to the topic, reflecting interest and academic output. India, for example, appears as one of the countries with the highest academic contribution, indicating a strong focus on research related to circular economy. This could be related to the need to address sustainability issues. China is the second country with the second highest academic contribution in circular economy, probably due to its rapid industrialization, urbanization and efforts to integrate circular economy initiatives into its sustainable development policies. Also, Spain and Italy stand out for their commitment to sustainability and circular economy models. Finally, we have Sweden, a country characterized as the world's leading driver of sustainability, which has implemented several circular economy strategies, as reflected in its scientific output.

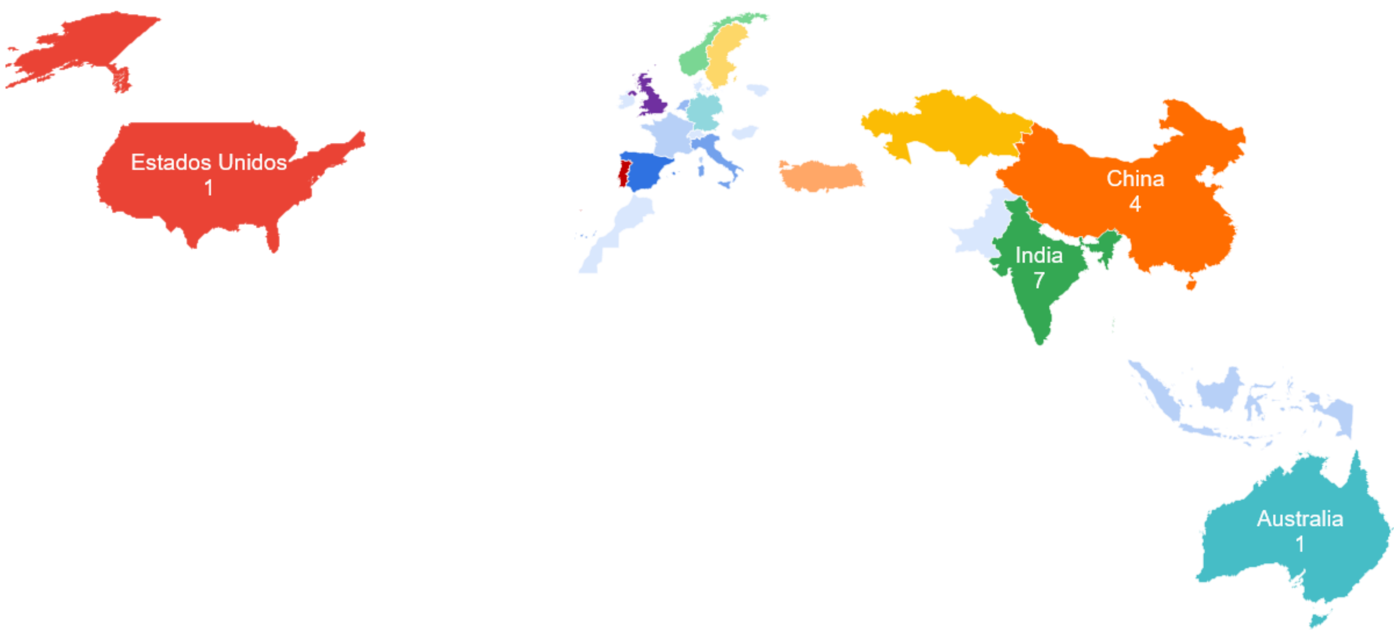

Fig. 6 Scientific contribution by country

V. DISCUSSIONS

In this section we address and deepen the findings with the advances of previous works, addressing issues such as the strategies and benefits brought about by the application of the circular economy. After examining the articles, these questions are answered and substantiated based on the findings obtained.

A. What circular economy strategies are most effective in reducing the carbon footprint in the context of SDG 13?

There are numerous strategies that can be used to reduce the carbon footprint. The results of the review show that waste management, reuse and recycling are the most commonly used strategies, followed by less frequently used strategies such as, waste management. These results relate to the work [14] because they used reduction and reuse policies in Taiwanese multinational companies that proved to be key to improving competitiveness and climate resilience, showing their effectiveness in reducing carbon footprint. Also, the paper [15] highlighted the importance of recycling and environmental monitoring in the fashion industry where six mitigation scenarios based on emission reduction practices were proposed. Also, in the work [19] it was evidenced that remanufacturing, recycling and reuse are essential for companies to meet their climate goals. Finally, these results can be seen in table 2 where other circular economic strategies are shown.

TABLE 2 CIRCULAR ECONOMY STRATEGIES

Circular economic strategies	***Quantity***	***References***
Resource management	3	[24], [25], [26]
Circular economic principles	1	[27]
Reduction, reuse of fuels	3	[28], [29], [30]
Reuse and recycling	11	[31], [32], [33], [34], [35], [36], [37], [38], [39], [40], [41]

Conversion of crop residues	1	[42]
Water saving and treatment	1	[43]
LCA Methodology	1	[44]
Waste management	1	[45]
E-waste reduction	1	[46]
Sustainable innovation	1	[47]
Carbon reduction	2	[48], [49]
New technologies and blockchain	2	[17], [50]
WEIS system	1	[51]
Investment in biodegradable plastics	1	[52]
Energy efficiency, low carbon technologies	1	[53]
Responsible consumption practices	1	[54]

B. What are the benefits and outcomes of applying the circular economy for climate change mitigation?

The application of the circular economy brings multiple benefits to mitigate climate change by efficiently addressing each environmental challenge through sustainable approaches. Among the main benefits extracted are emission reductions, economic and social welfare and improved quality of life and human consumption resources. These findings are associated with work [12] that indicated that renewable energy circularity improved environmental quality and contributed to global warming mitigation, highlighting its benefit in combating climate change. Similarly, [15] environmental assessment tools enabled the fashion industry to propose scenarios to reduce emissions and improve sustainability. However, [18] highlighted how green policies and public-private partnerships strengthen actions to reduce emissions and foster economic and social sustainability. On the other hand, [19] mentioned that circular strategies improved the ability of companies to meet their climate goals, benefiting long-term sustainability. After reviewing the studies, table 3 presents the most important benefits of the circular economy.

TABLE 3 BENEFITS OF THE CIRCULAR ECONOMY

Benefits of the circular economy	**Quantity**	**References**
Emission reductions	18	[17], [25], [26], [27], [34], [37], [38], [39], [49], [50], [52], [54], [55], [56], [57], [58], [59], [60]
Economic and environmental wellbeing	9	[28], [34], [41], [44], [50], [61], [62], [63], [64]
Reduced food and water wastage	1	[65]
Carbon footprint	1	[66]
Renewable electricity	1	[43]
Health for future generations	1	[67]
Increased lifespan	2	[68], [69]
Sustainable trajectories	3	[34], [45], [50]
Climate change mitigation	1	[70]
Improved water and air quality	2	[36], [71]
Increased sustainability potential	1	[72]

C. What techniques or tools are used to integrate policies that support the reduction of carbon emissions?

To efficiently implement policies that reduce carbon emissions, different methods, techniques and tools should be used that result in the easy integration of sustainable measures. Among the main tools are life cycle and environmental impact assessment, the use of closed reuse systems, Agenda 2030. Techniques that together support the integration of mitigation policies and in turn reinforce environmental accountability and transparency. For example, in the work [12] the Closed Reuse System helps to reduce the need for additional production, which reduces carbon emissions. Furthermore, in [14] the GSCM promotes sustainability in the supply chain through practices such as recycling and reuse, which also reduces emissions. On the other hand, in work [19] PLM with sustainability dimensions allows managing the life cycle of products more efficiently, controlling emissions during their production and final disposal. Finally, in [18] the 2030 Agenda promotes global policies that favor the use of renewable energies and sustainability, which contributes to the reduction of carbon emissions. Table 4 details the specialized tools for implementing these policies.

TABLE 4 TECHNIQUES AND TOOLS

Techniques and tools	***Quantity***	***References***
Closed system reuse	1	[66]
GSCM	1	[73]
PLM sustainability dimensions	1	[32]
Technologies for circular principles	1	[29]
Electrical modernisations	1	[62]
Annual green finance	1	[57]
Agenda 2030	1	[58]
Sustainable designs	1	[47]
Digital sustainability indicators	1	[48]
Waste information system	1	[69]
CBA consumption-based tool	1	[34]
Technology models	1	[71]
DEMATEL and BWM tools	1	[72]
Transparent data exchange	1	[41]
Life cycle-based indicators	1	[52]
Environmental impact assessments	1	[38]
Transition to circular economy	1	[39]
Input-output analysis	1	[54]

VI. CONCLUSIONS

This research shows that the implementation of the circular economy (CE) is fundamental to address climate change and reduce the carbon footprint, in line with the goals set by SDG 13. The integration of practices such as reuse, recycling and remanufacturing offers companies the opportunity to transform their business models towards a more sustainable one, which translates into both environmental and economic benefits. Key benefits include a considerable decrease in greenhouse gas emissions, better use of natural resources and job creation, which also fosters economic development.

However, there are several challenges that hinder the widespread adoption of the circular economy. In many regions, recycling and waste management infrastructures are inadequate, limiting the full exploitation of the potential of the circular economy. Also, small and medium-sized enterprises (SMEs) face significant barriers, such as high upfront costs and a lack of tangible incentives to modify their business models and adopt circular practices. The perception that the long-term benefits do not justify the immediate costs is another significant barrier that persists in several industries.

Additionally, cultural resistance in several industrial sectors remains a limiting factor, as linear practices predominate due to a lack of information on the benefits that the circular economy could bring. Overcoming these obstacles requires the development of more robust public policies and effective incentive systems to drive the transition to the circular economy. Awareness raising and education, both at the business and social levels, are key to breaking down cultural barriers and promoting more sustainable models.

Despite progress, further research on how to improve the implementation of the circular economy in diverse industrial sectors is crucial. Improving recycling infrastructure and business education should be high on government and international policy agendas. In addition, emerging technologies, such as artificial intelligence, have the potential to optimize circular processes and reduce the technological barriers that still hinder the implementation of the circular economy in many business models.

Collaboration between governments, businesses and consumers will be essential to overcome the above-mentioned challenges and achieve a successful transition to a more sustainable economic model. A coordinated approach will be necessary to achieve global environmental goals and significantly reduce the carbon footprint, aligning with international climate change commitments.

In addition to the aspects, this research has identified other limitations that affect the global applicability of the circular economy. In particular, there is a geographical bias, as most studies come from developed economies, where access to advanced technology, sound environmental infrastructure and clear regulatory frameworks facilitate the adoption of circular models. In contrast, in developing countries, structural and financial challenges make the adoption of more complex circular practices more difficult. It is therefore necessary to apply approaches adapted to the realities of these countries. It is also evident that many studies have focused mainly on the immediate environmental benefits of the circular economy, without assessing in depth the social and economic effects that the transition can generate, especially in vulnerable communities and informal sectors. This approach could limit the effectiveness of future interventions if inclusive strategies that consider these factors are not incorporated. It is imperative to also address social inequalities and ensure that the benefits of the circular economy reach all sectors of society.

Another significant challenge is the applicability of the circular economy in resource-constrained contexts. In these environments, the success of the circular economy depends not only on technological or regulatory advances, but also on aspects such as organizational culture, informality at work and access to finance. Circular strategies must adapt to these conditions to be effective, fostering an inclusive and equitable approach. Integrating initiatives such as the participation of urban recyclers' cooperatives in waste recovery, support for circular micro-enterprises in rural areas and the creation of educational programs on the responsible use of resources can be fundamental to promoting the circular economy in these contexts.

Finally, it is suggested that differentiated tax incentives be established for small and medium-sized enterprises that adopt closed-loop practices. These actions will help reduce economic barriers and encourage wider adoption of circular models. Similarly, the implementation of policies that promote climate justice and sustainability will be crucial to achieve a successful transition to the circular economy.

REFERENCES

[1] C. Samberger, “The role of water circularity in the food-water-energy nexus and climate change mitigation,” *Energy Nexus*, vol. 6, p. 100061, Jun. 2022, doi: 10.1016/J.NEXUS.2022.100061.

[2] S. Paleari, “The EU policy on climate change, biodiversity and circular economy: Moving towards a Nexus approach,” *Environ Sci Policy*, vol. 151, p. 103603, Jan. 2024, doi: 10.1016/J.ENVSCI.2023.103603.

[3] I. D’Adamo, C. Daraio, S. Di Leo, M. Gastaldi, and E. N. Rossi, “Driving EU sustainability: Promoting the circular economy through municipal waste efficiency,” *Sustain Prod Consum*, vol. 50, pp. 462–474, Oct. 2024, doi: 10.1016/J.SPC.2024.08.022.

[4] M. Möslinger, G. Ulpiani, and N. Vetters, “Circular economy and waste management to empower a climate-neutral urban future,” *J Clean Prod*, vol. 421, p. 138454, Oct. 2023, doi: 10.1016/J.JCLEPRO.2023.138454.

[5] F. J. Castillo-Díaz, L. J. Belmonte-Ureña, F. Diánez-Martínez, and F. Camacho-Ferre, “Challenges and perspectives of the circular economy in the European Union: A comparative analysis of the member states,” *Ecological Economics*, vol. 224, p. 108294, Oct. 2024, doi: 10.1016/J.ECOLECON.2024.108294.

[6] Y. Lu, H. Schandl, H. Wang, and J. Zhu, “China’s pathway towards a net zero and circular economy: A model-based scenario analysis,” *Resour Conserv Recycl*, vol. 204, p. 107514, May 2024, doi: 10.1016/J.RESCONREC.2024.107514.

[7] W. Ahmed, V. Siva, J. Bäckstrand, N. Sarius, and H. Å. Sundberg, “Circular economy: Extending end-of-life strategies,” *Sustain Prod Consum*, vol. 51, pp. 67–78, Nov. 2024, doi: 10.1016/J.SPC.2024.09.003.

[8] B. I. Oladapo, M. A. Olawumi, T. O. Olugbade, and T. T. Tin, “Advancing sustainable materials in a circular economy for decarbonisation,” *J Environ Manage*, vol. 360, p. 121116, Jun. 2024, doi: 10.1016/J.JENVMAN.2024.121116.

[9] K. Lan, B. Zhang, and Y. Yao, “Circular utilization of urban tree waste contributes to the mitigation of climate change and eutrophication,” *One Earth*, vol. 5, no. 8, pp. 944–957, Aug. 2022, doi: 10.1016/J.ONEEAR.2022.07.001.

[10] J. Edwards *et al.*, “Achieving net zero neighborhoods: A case study review of circular economy initiatives for South Wales,” *J Clean Prod*, vol. 469, p. 143117, Sep. 2024, doi: 10.1016/J.JCLEPRO.2024.143117.

[11] Beltozar-Clemente, S., Iparraguirre-Villanueva, O., Pucuhuayla-Revatta, F., Sierra-Liñan, F., Zapata-Paulini, J., & Cabanillas-Carbonell, M. (2023). Contributions of the 5G Network with Respect to Decent Work and Economic Growth (Sustainable Development Goal 8): A Systematic Review of the Literature. *Sustainability*, *15*(22), 15776. https://doi.org/10.3390/su152215776.

[12] M. Usman, B. Hussain, S. Anwar, and S. A. A. Naqvi, “Contribution of energy based circularity for better environmental quality: an evidence from Bias-corrected linear dynamic approach,” *Discover Sustainability*, vol. 5, no. 1, p. 83, Dec. 2024, doi: 10.1007/s43621-024-00264-9.

[13] Y. Farida, N. Siswanto, and I. Vanany, “Reverse logistics toward a circular economy: Consumer behavioral intention toward polyethylene terephthalate (PET) recycling in Indonesia,” *Case Studies in Chemical and Environmental Engineering*, vol. 10, p. 100807, Dec. 2024, doi: 10.1016/j.cscee.2024.100807.

[14] C. C. Lin and Y. C. Chang, “Impact of circular economy network building: resilience strategy to climate action,” *Int J Clim Chang Strateg Manag*, vol. 16, no. 3, pp. 337–361, Sep. 2024, doi: 10.1108/IJCCSM-12-2022-0150.

[15] F. F. de Albuquerque Landi, C. Fabiani, B. Pioppi, and A. L. Pisello, “Sustainable management in the slow fashion industry: carbon footprint of an Italian brand,” *International Journal of Life Cycle Assessment*, vol. 28, no. 10, pp. 1229–1247, Oct. 2023, doi: 10.1007/s11367-023-02205-6.

[16] E. Viles, F. Kalemkerian, J. A. Garza-Reyes, J. Antony, and J. Santos, “Theorizing the Principles of Sustainable Production in the context of Circular Economy and Industry 4.0,” *Sustain Prod Consum*, vol. 33, pp. 1043–1058, Sep. 2022, doi: 10.1016/j.spc.2022.08.024.

[17] E. Sánchez-García, J. Martínez-Falcó, B. Marco-Lajara, and E. Manresa-Marhuenda, “Revolutionizing the circular economy through new technologies: A new era of sustainable progress,” *Environ Technol Innov*, vol. 33, p. 103509, Feb. 2024, doi: 10.1016/j.eti.2023.103509.

[18] D. Balsalobre-Lorente, S. A. R. Shah, and R. Huseynova, “Do circular economy, public-private Partnership and carbon policy manage the environmental stress? Developed countries’ situation under the Prism of COP27,” *Heliyon*, vol. 10, no. 13, p. e33532, Jul. 2024, doi: 10.1016/J.HELIYON.2024.E33532.

[19] M. Marini, D. C. A. Pigosso, M. Pieroni, and T. C. McAloone, “To what extent are circular economy strategies accounted in science-based targets for carbon emission reduction?,” *Comput Ind Eng*, p. 110594, Sep. 2024, doi: 10.1016/J.CIE.2024.110594.

[20] S. Tiwari, K. Si Mohammed, G. Mentel, S. Majewski, and I. Shahzadi, “Role of circular economy, energy transition, environmental policy stringency, and supply chain pressure on CO2 emissions in emerging economies,” *Geoscience Frontiers*, vol. 15, no. 3, p. 101682, May 2024, doi: 10.1016/J.GSF.2023.101682.

[21] V. Palea, A. Migliavacca, and S. Gordano, “Scaling up the transition: The role of corporate governance mechanisms in promoting circular economy strategies,” *J Environ Manage*, vol. 349, p. 119544, Jan. 2024, doi: 10.1016/J.JENVMAN.2023.119544.

[22] C. Cagnetti, T. Gallo, C. Silvestri, and A. Ruggieri, “Lean production and Industry 4.0: Strategy/management or technique/implementation? A systematic literature review,” *Procedia Comput Sci*, vol. 180, pp. 404–413, Jan. 2021, doi: 10.1016/J.PROCS.2021.01.256.

[23] B. I. Oluleye, D. W. M. Chan, and T. O. Olawumi, “Barriers to circular economy adoption and concomitant implementation strategies in building construction and demolition waste management: A PRISMA and interpretive structural modeling approach,” *Habitat Int*, vol. 126, p. 102615, Aug. 2022, doi: 10.1016/J.HABITATINT.2022.102615.

[24] Z. Xu, “Water-climate change extended nexus contribution to social welfare and environment-related sustainable development goals in China,” *Environmental Science and Pollution Research*, vol. 30, no. 14, pp. 40654–40669, Mar. 2023, doi: 10.1007/S11356-023-25145-Y.

[25] E. Sofuoğlu and D. Kirikkaleli, “Towards achieving net zero emission targets and sustainable development goals, can long-term material footprint strategies be a useful tool?,” *Environmental Science and Pollution Research*, vol. 30, no. 10, pp. 26636–26649, Feb. 2023, doi: 10.1007/S11356-022-24078-2.

[26] Y. Liu, L. Rosado, A. Wu, N. Melolinna, J. Holmqvist, and B. Fath, “Consequence CO2 footprint analysis of circular economy scenarios in cities,” *Cleaner Production Letters*, vol. 5, p. 100045, Dec. 2023, doi: 10.1016/j.clpl.2023.100045.

[27] A. Karmaoui, G. Yoganandan, D. Sereno, K. Shaukat, S. El Jaafari, and L. Hajji, “Global network analysis of links between business, climate change, and sustainability and setting up the interconnections framework,” *Environ Dev Sustain*, 2023, doi: 10.1007/S10668-023-03883-W.

[28] H. Akram, J. Li, and W. A. Watto, “The impact of urbanization, energy consumption, industrialization on carbon emissions in SAARC countries: a policy recommendations to achieve sustainable development goals,” *Environ Dev Sustain*, 2024, doi: 10.1007/S10668-024-05365-Z.

[29] T. Ronzon and A. I. Sanjuán, “Friends or foes? A compatibility assessment of bioeconomy-related Sustainable Development Goals for European policy coherence,” *J Clean Prod*, vol. 254, May 2020, doi: 10.1016/J.JCLEPRO.2019.119832.

[30] M. K. Mediboyina, S. O’Neill, N. M. Holden, and F. Murphy, “Prospective life cycle assessment of an integrated biorefinery for production of lactic acid from dairy side streams,” *Sustain Prod Consum*, vol. 50, pp. 376–390, Oct. 2024, doi: 10.1016/J.SPC.2024.08.007.

[31] A. Das and A. Ghosh, “Vision Net Zero: A review of decarbonisation strategies to minimise climate risks of developing countries,” *Environ Dev Sustain*, 2023, doi: 10.1007/S10668-023-03318-6.

[32] M. Z. Hauschild, S. Kara, and I. Røpke, “Absolute sustainability: Challenges to life cycle engineering,” *CIRP Annals*, vol. 69, no. 2, pp. 533–553, Jan. 2020, doi: 10.1016/J.CIRP.2020.05.004.

[33] W. Ahmed, V. Siva, J. Bäckstrand, N. Sarius, and H. Å. Sundberg, “Circular economy: Extending end-of-life strategies,” *Sustain Prod Consum*, vol. 51, pp. 67–78, Nov. 2024, doi: 10.1016/J.SPC.2024.09.003.

[34] R. Raman, H. H. Lathabai, and P. Nedungadi, “Sustainable development goal 12 and its synergies with other SDGs: identification of key research contributions and policy insights,” *Discover Sustainability*, vol. 5, no. 1, 2024, doi: 10.1007/s43621-024-00289-0.

[35] W. Ijassi, D. Evrard, and P. Zwolinski, “Development of a circularity design methodology for urban factories based on systemic thinking and stakeholders engagement,” *Sustain Prod Consum*, vol. 46, pp. 600–616, May 2024, doi: 10.1016/j.spc.2024.02.031.

[36] F. Karaca *et al.*, “Cultivating Sustainable Construction: Stakeholder Insights Driving Circular Economy Innovation for Inclusive Resource Equity,” *Buildings*, vol. 14, no. 4, p. 935, Apr. 2024, doi: 10.3390/buildings14040935.

[37] F. Häfner, O. R. Monzon Diaz, S. Tietjen, C. Schröder, and A. Krause, “Recycling fertilizers from human excreta exhibit high nitrogen fertilizer value and result in low uptake of pharmaceutical compounds,” *Front Environ Sci*, vol. 10, p. 1038175, Jan. 2023, doi: 10.3389/fenvs.2022.1038175.

[38] M. Boccarossa, D. Cespi, I. Vassura, and F. Passarini, “Still edible wasted food from households: A regional Italian case study,” *Waste Management and Research*, vol. 41, no. 1, pp. 222–234, 2023, doi: 10.1177/0734242X221105447.

[39] S. Sasmoko *et al.*, “How Do Industrial Ecology, Energy Efficiency, and Waste Recycling Technology (Circular Economy) Fit into China’s Plan to Protect the Environment? Up to Speed,” *Recycling*, vol. 7, no. 6, p. 83, Dec. 2022, doi: 10.3390/recycling7060083.

[40] Sasmoko *et al.*, “Environmental Effects of Bio-Waste Recycling on Industrial Circular Economy and Eco-Sustainability,” *Recycling*, vol. 7, no. 4, p. 60, Aug. 2022, doi: 10.3390/recycling7040060.

[41] S. Horn, K. M. Mölsä, J. Sorvari, H. Tuovila, and P. Heikkilä, “Environmental sustainability assessment of a polyester T-shirt – Comparison of circularity strategies,” *Science of the Total Environment*, vol. 884, p. 163821, Aug. 2023, doi: 10.1016/j.scitotenv.2023.163821.

[42] V. Venkatramanan, S. Shah, S. Prasad, A. Singh, and R. Prasad, “Assessment of Bioenergy Generation Potential of Agricultural Crop Residues in India,” *Circular Economy and Sustainability*, vol. 1, no. 4, pp. 1335–1348, Dec. 2021, doi: 10.1007/S43615-021-00072-7.

[43] I. Radelyuk, K. Tussupova, J. J. Klemeš, and K. M. Persson, “Oil refinery and water pollution in the context of sustainable development: Developing and developed countries,” *J Clean Prod*, vol. 302, Jun. 2021, doi: 10.1016/J.JCLEPRO.2021.126987.

[44] A. Arias, G. Feijoo, and M. T. Moreira, “Biorefineries as a driver for sustainability: Key aspects, actual development and future prospects,” *J Clean Prod*, vol. 418, Sep. 2023, doi: 10.1016/J.JCLEPRO.2023.137925.

[45] A. Ansari, D. Dutt, and V. Kumar, “Catalyzing paradigm shifts in global waste Management: A case study of Saharanpur Smart city,” *Waste Management Bulletin*, vol. 2, no. 1, pp. 29–38, Apr. 2024, doi: 10.1016/J.WMB.2023.12.003.

[46] A. V. Nair, S. S. Jayasree, D. S. Baji, S. Nair, and D. Santhanagopalan, “Environment-friendly acids for leaching transition metals from spent-NMC532 cathode and sustainable conversion to potential anodes,” *RSC Sustainability*, vol. 2, no. 8, pp. 2377–2388, Jun. 2024, doi: 10.1039/D4SU00209A.

[47] J. Faludi, L. Acaroglu, P. Gardien, A. Rapela, D. Sumter, and C. Cooper, “Sustainability in the Future of Design Education,” *She Ji*, vol. 9, no. 2, pp. 157–178, Jun. 2023, doi: 10.1016/J.SHEJI.2023.04.004.

[48] X. Chen, M. Huang, Y. Bai, and Q. B. Zhang, “Sustainability of underground infrastructure – Part 1: Digitalisation-based carbon

assessment and baseline for TBM tunnelling," *Tunnelling and Underground Space Technology*, vol. 148, Jun. 2024, doi: 10.1016/J.TUST.2024.105776.

[49] M. Norouzi, A. N. Haddad, L. Jiménez, S. Hoseinzadeh, and D. Boer, "Carbon footprint of low-energy buildings in the United Kingdom: Effects of mitigating technological pathways and decarbonization strategies," *Science of the Total Environment*, vol. 882, Jul. 2023, doi: 10.1016/J.SCITOTENV.2023.163490.

[50] E. Sánchez-García, J. Martínez-Falcó, B. Marco-Lajara, and E. Manresa-Marhuenda, "Revolutionizing the circular economy through new technologies: A new era of sustainable progress," *Environ Technol Innov*, vol. 33, p. 103509, Feb. 2024, doi: 10.1016/j.eti.2023.103509.

[51] M. C. Oliveira and H. A. Matos, "Sustainability and Strategic Assessment of Water and Energy Integration Systems: Case Studies of the Process Industry in Portugal," *Energies (Basel)*, vol. 17, no. 1, p. 195, Jan. 2024, doi: 10.3390/en17010195.

[52] G. Yilan, M. Cordella, and P. Morone, "Evaluating and managing the sustainability performance of investments in green and sustainable chemistry: Development and application of an approach to assess bio-based and biodegradable plastics," *Current Research in Green and Sustainable Chemistry*, vol. 6, 2023, doi: 10.1016/j.crgsc.2022.100353.

[53] C. T. Chong, Y. Van Fan, C. T. Lee, and J. J. Klemeš, "Post COVID-19 ENERGY sustainability and carbon emissions neutrality," *Energy*, vol. 241, p. 122801, Feb. 2022, doi: 10.1016/j.energy.2021.122801.

[54] G. Liobikienė and J. Brizga, "Sustainable Consumption in the Baltic States: The Carbon Footprint in the Household Sector," *Sustainability (Switzerland)*, vol. 14, no. 3, p. 1567, Feb. 2022, doi: 10.3390/su14031567.

[55] I. Lande and R. Terje Thorstensen, "Comprehensive sustainability strategy for the emerging ultra-high-performance concrete (UHPC) industry," *Cleaner Materials*, vol. 8, Jun. 2023, doi: 10.1016/J.CLEMA.2023.100183.

[56] S. Mehmood, K. Zaman, S. Khan, Z. Ali, and H. ur R. Khan, "The role of green industrial transformation in mitigating carbon emissions: Exploring the channels of technological innovation and environmental regulation," *Energy and Built Environment*, vol. 5, no. 3, pp. 464–479, Jun. 2024, doi: 10.1016/J.ENBENV.2023.03.001.

[57] S. Somosi, G. D. Kiss, and S. Md Tanvir Alam, "Examination of carbon dioxide emissions and renewables in Southeast Asian countries based on a panel vector autoregressive model," *J Clean Prod*, vol. 436, Jan. 2024, doi: 10.1016/J.JCLEPRO.2023.140174.

[58] M. Mura, M. Longo, F. Boccali, F. Visani, and S. Zanni, "From outcomes to practices: Measuring the commitment to sustainability of organisations," *Environ Sci Policy*, vol. 160, Oct. 2024, doi: 10.1016/J.ENVSCI.2024.103868.

[59] A. Parodi, G. Villamonte-Cuneo, A. M. Loboguerrero, D. Martínez-Barón, and I. Vázquez-Rowe, "Embedding circularity into the transition towards sustainable agroforestry systems in Peru," *Science of the Total Environment*, vol. 838, Sep. 2022, doi: 10.1016/J.SCITOTENV.2022.156376.

[60] Á. Galán-Martín, M. del M. Contreras, and E. Castro, "Carbon-negative products to engage society in climate action: The life cycle of olive oil," *Sustain Prod Consum*, vol. 47, pp. 516–527, Jun. 2024, doi: 10.1016/J.SPC.2024.04.025.

[61] J. Villarroel-Schneider *et al.*, "Energy self-sufficiency and greenhouse gas emission reductions in Latin American dairy farms through massive implementation of biogas-based solutions," *Energy Convers Manag*, vol. 261, Jun. 2022, doi: 10.1016/j.enconman.2022.115670.

[62] E. Innocenti, L. Berzi, F. Del Pero, and M. Delogu, "Life cycle greenhouse gas emissions of retrofit electrification: Assessment for a real case study," *Results in Engineering*, vol. 23, Sep. 2024, doi: 10.1016/J.RINENG.2024.102454.

[63] I. Meireles, M. Martín-Gamboa, V. Sousa, A. Kalthoum, and J. Dufour, "Comparative environmental life cycle assessment of partition walls: Innovative prefabricated systems vs conventional construction," *Cleaner Environmental Systems*, vol. 12, Mar. 2024, doi: 10.1016/J.CESYS.2024.100179.

[64] A. Arias, S. Estévez-Rivadulla, R. Rebolledo-Leiva, G. Feijoo, S. González-García, and M. T. Moreira, "Boosting the transition to biorefineries in compliance with sustainability and circularity criteria," *J Environ Chem Eng*, vol. 12, no. 5, p. 113361, Oct. 2024, doi: 10.1016/j.jece.2024.113361.

[65] A. Ben Youssef and A. Zeqiri, "Hospitality Industry 4.0 and Climate Change," *Circular Economy and Sustainability*, vol. 2, no. 3, pp. 1043–1063, Sep. 2022, doi: 10.1007/S43615-021-00141-X.

[66] H. Bherwani, M. Nair, A. Niwalkar, D. Balachandran, and R. Kumar, "Application of circular economy framework for reducing the impacts of climate change: A case study from India on the evaluation of carbon and materials footprint nexus," *Energy Nexus*, vol. 5, Mar. 2022, doi: 10.1016/J.NEXUS.2022.100047.

[67] T. Svitnič, K. Beer, K. Sundmacher, and M. Böcher, "Optimal design of a sector-coupled renewable methanol production amid political goals and expected conflicts: Costs vs. land use," *Sustain Prod Consum*, vol. 44, pp. 123–150, Jan. 2024, doi: 10.1016/j.spc.2023.12.003.

[68] M. R. Gorman, D. A. Dzombak, and C. Frischmann, "Potential global GHG emissions reduction from increased adoption of metals recycling," *Resour Conserv Recycl*, vol. 184, Sep. 2022, doi: 10.1016/J.RESCONREC.2022.106424.

[69] I. Bote Alonso, M. V. Sánchez-Rivero, and B. Montalbán Pozas, "Mapping sustainability and circular economy in cities: Methodological framework from europe to the Spanish case," *J Clean Prod*, vol. 357, Jul. 2022, doi: 10.1016/J.JCLEPRO.2022.131870.

[70] P. McKenna, F. Zakaria, J. Guest, B. Evans, and S. Banwart, "Will the circle be unbroken? The climate mitigation and sustainable development given by a circular economy of carbon, nitrogen, phosphorus and water," *RSC Sustainability*, vol. 1, no. 4, pp. 960–974, Apr. 2023, doi: 10.1039/D2SU00121G.

[71] F. Mustafa, C. Mordi, and A. A. Elamer, "Green gold or carbon beast? Assessing the environmental implications of cryptocurrency trading on clean water management and carbon emission SDGs," *J Environ Manage*, vol. 367, p. 122059, Sep. 2024, doi: 10.1016/j.jenvman.2024.122059.

[72] K. Govindan, "How digitalization transforms the traditional circular economy to a smart circular economy for achieving SDGs and net zero," *Transp Res E Logist Transp Rev*, vol. 177, p. 103147, Sep. 2023, doi: 10.1016/j.tre.2023.103147.

[73] N. Saini, K. Malik, and S. Sharma, "Transformation of Supply Chain Management to Green Supply Chain Management: Certain investigations for research and applications," *Cleaner Materials*, vol. 7, Mar. 2023, doi: 10.1016/j.clema.2023.100172.