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**Climate change-related movements and online  
behavior: building a narrative scenarios map**

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## Introduction

Sustainability has increasingly become one of the most pressing concerns in contemporary societies. Defined by the Brundtland Commission in 1987 as “development that meets the needs and aspirations of the present without compromising the ability of future generations to meet their own needs,” the concept of sustainable development anticipated the urgency of preserving the environment and natural resources, not only from a strictly environmental perspective but also from that of social equity.

Specifically, sustainability is a broad concept that encompasses multiple dimensions and actors: “populations, animal and plant species, ecosystems, natural resources – water, air, energy,” as well as “concerns such as the fight against poverty, gender equality, human rights, education for all, health, human security, and intercultural dialogue” (UNESCO, n.d.).

The interconnection among these aspects is well exemplified by the fact that sustainability is generally articulated through five fundamental pillars: social inclusion, environmental protection, and economic growth (United Nations, n.d.-a), often summarized by the expression “5Ps”: people, planet, prosperity, peace, and partnership.

These objectives were incorporated into the United Nations’ 2030 Agenda, adopted on September 25, 2015, by the 193 member states. The formulation of the 17 Sustainable Development Goals (SDGs) seeks to integrate these three dimensions of sustainability and to achieve them by 2030 (Territorial Cohesion Agency, n.d.).

Specifically, SDGs are rooted in three guiding principles:

1. Human Rights-Based Approach<sup>1</sup>;
2. Leaving No One Behind<sup>2</sup>;

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<sup>1</sup> “Under the HRBA, the plans, policies and processes of development are anchored in a system of rights and corresponding obligations established by international law, including all civil, cultural, economic, political and social rights, and the right to development. HRBA requires human rights principles (universality, indivisibility, equality and non-discrimination, participation, accountability) to guide United Nations development cooperation, and focus on developing the capacities of both ‘duty-bearers’ to meet their obligations, and ‘rights-holders’ to claim their rights.”, United Nations. (2025a). Principle One: Human Rights-Based. *United Nations Sustainable Development Group*. <https://unsdg.un.org/2030-agenda/universal-values/human-rights-based-approach> (accessed on November 8, 2025).

<sup>2</sup> “It represents the unequivocal commitment of all UN Member States to eradicate poverty in all its forms, end discrimination and exclusion, and reduce the inequalities and vulnerabilities that leave people behind and undermine the

### 3. Gender Equality and Women's Empowerment<sup>3</sup>.

Moreover, the SDGs are designed to promote six key transitions that cut across individual goals: food systems; energy access and affordability; digital connectivity; education; jobs and social protection; climate change, biodiversity loss and pollution (United Nations, 2023). Measures such as the United States' Green New Deal<sup>4</sup>, followed by the European Green Deal<sup>5</sup>, have marked crucial milestones in climate policymaking at a global scale.

Given the complex and multidimensional nature of the concept, it is not surprising that sustainability has become a particularly contested and controversial issue in both public opinion and political behavior. Because of the need to balance the various dimensions mentioned above, climate policymaking has entered political discourse in both a favorable and an unfavorable light.

Specifically, the topic of a fair green transition has become crucial in public debate and a key criterion for shaping environmental policymaking and its social acceptance (Belaïd and Unger, 2024).

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potential of individuals and of humanity as a whole.”, United Nations. (2025b). Principle Two: Leave No One Behind. *United Nations Sustainable Development Group*. <https://unsdg.un.org/2030-agenda/universal-values/leave-no-one-behind> (accessed on November 8, 2025).

<sup>3</sup> “Gender equality makes development stronger and more sustainable. It is not only a pressing moral and social issue but also a critical economic challenge. [...] Moreover, gender inequality in education prevents progress in the reduction of unintended pregnancies and high fertility and child mortality rates, thereby compromising a country's well-being. Societies that encourage women to hold political leadership positions demonstrate more equally balanced schools, and are overall more peaceful and equitable.”, United Nations. (2025c). Principle Three: Gender Equality and Women's Empowerment. *United Nations Sustainable Development Group*. <https://unsdg.un.org/2030-agenda/universal-values/gender-equality-and-womens-empowerment> (accessed on November 8, 2025).

<sup>4</sup> The Green New Deal is a resolution aimed at decarbonizing the American economy by 2030 while also addressing social inequalities., Sicotte, D.M., Joyce, K.A., and Hesse, A. (2022). Necessary, welcome or dreaded? Insights on low-carbon transitions from unionized energy workers in the United States. *Energy Research and Social Science*, 88: 102511. <https://doi.org/10.1016/j.erss.2022.102511>.

<sup>5</sup> “Launched by President von der Leyen in 2019, it responds to citizens' urgent call—especially from young people—for climate action. It sets out a plan to transform Europe's economy, energy, transport, and industries for a more sustainable future.

It aims to cut emissions by at least 50% by 2030, rising towards 55%, while legally binding the 2050 neutrality goal through the European Climate Law. It pushes forward a clean transition that protects people and planet, is economically sound and socially fair.”, European Commission. (n.d.). The European Green Deal. Striving to be the first climate-neutral continent. *European Commission*. [https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal\\_en](https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal_en) (accessed on November 4, 2025).

According to Hirvilammi et al. (2023), it is essential that environmental and social issues are jointly addressed within the context of climate policymaking. Policies should not only consider economic growth and the broader well-being of people and their relationship with nature but also be grounded in principles of global social justice from a redistributive perspective.

The centrality of the connection between climate policymaking and social justice in ensuring a just transition is also highlighted by Cairney, Timonina, and Stephan (2023). They argue that climate policymaking often prioritizes economic and technological aspects over social ones. Instead, more open, equitable, and inclusive decision-making processes that involve the most vulnerable groups, together with a fairer distribution of costs and benefits, are presented as fundamental for achieving a successful green transition.

These issues, namely the difficulty of balancing economic and technological dimensions with social justice, have contributed to the emergence of antagonistic narratives about climate science. Kroll and Zipperer (2020) suggest that, since populist movements opposing climate policies tend to arise mainly from economic concerns and low institutional trust, the positive and effective implementation of the SDGs could help mitigate such movements, in line with their foundational principle of “leaving no one behind.”

Specifically, Marschall and Klingebiel (2019) argue that populism poses a concrete threat to policies related to sustainable development, as such policymaking is often framed as a tool used by elites against ordinary citizens, intended to reward or punish specific behaviors, to favor migration flows, and to undermine national interests, which ultimately often leads to withdrawal from international partnerships and agreements. By politicizing climate change, populism may transform climate-related issues into a significant global cleavage (Marquardt and Lederer, 2022).

According to Zürn (2019: 978), politicization can be understood as the process through which an issue enters the public sphere and becomes subject to collective decision-making. This process involves placing the issue on the public agenda, engaging in deliberation over possible courses of action, and confronting a range of differing viewpoints. The greater the public relevance of the issue and the higher the number of actors involved, the more politicized the issue becomes.

The opposite process, that of depoliticization, can instead be understood in line with Swyngedouw’s (2010) definition of environmental governance as an increasingly technocratic and managerial process, an approach that will be explored in greater detail in Chapter 1 due to its crucial relevance to the objectives of this research. A similar perspective is offered by d’Albergo and Moini (2019), who interpret depoliticization as an analytical lens through which to examine how public issues are

framed, how solutions are defined, and how they are legitimized through changing relations among political, social, and economic actors.

These two concepts therefore constitute the main theoretical foundations on which this study is built. This choice makes the connection with the SDGs, and in particular with Goal 16, especially relevant. Goal 16, “Peace, Justice, and Strong Institutions,” aims to strengthen institutions in order to ensure safe and inclusive societies. Given that antagonistic narratives may be creating a major global cleavage, it is essential that institutions remain solid, accountable, and effective, capable of containing conflict while also guaranteeing freedom of expression and access to information (United Nations, n.d.-b).

Given that the United States represents a paradigmatic case of ideological polarization, where climate change has become a partisan identity issue and media play a central role in shaping individual attitudes towards the topic (Ophir et al., 2024), this study adopts a comparative design focusing on Italy, situated within the EU’s policy framework, and the U.S. The two countries also differ structurally in their media systems, with the U.S. following a liberal pluralist model and Italy a polarized pluralist one (Hallin and Mancini 2016). Comparing the two cases allows for a more detailed examination of the extent to which the politicization of climate communication is shaped by media framing, ideological polarization, and populist discourse within distinct political and cultural contexts.

Regarding how this work is situated within the scientific literature and the state of the art, Chapter 1 was specifically designed to contextualize it within the broader research landscape on the politicization of climate change. It includes a bibliometric analysis, complemented by further quantitative and qualitative analyses aimed at identifying the main topics addressed in the scientific debate, as well as potential future developments of current research trends and their implications. This approach therefore serves as a theoretical framework grounding the empirical analyses presented in the following chapters. In order to explore how discourse on climate change is constructed across both levels of public opinion, namely media representations and audience reception, and how these dimensions interact with, influence, and are influenced by political and scientific dynamics, three research questions were developed to guide the analysis.

RQ1. Is climate change politicized in the two national contexts, and what differences can be observed between them?

RQ2. How does political orientation influence the framing of climate change in both public and media discourse?

RQ3. Which are the main human and non-human actors emerging from these discourses, and how do they contribute to shaping the narratives around climate change?

It is important to note that the thesis includes two distinct empirical studies: Chapter 2 focuses on public discourse, while Chapter 3 examines media representations. Accordingly, each chapter formulates specific research questions that reflect its own analytical focus, thereby allowing a more nuanced investigation of the processes underlying these phenomena and enriching the overall discussion of the three central research questions outlined above.

These research questions were addressed through a mixed-methods approach aimed at combining quantitative and qualitative analyses, with the goal of providing a detailed and comprehensive comparative view of how climate discourses are constructed across Italy and the U.S., and how political and scientific dimensions interact.

In addition to the bibliometric analysis discussed in Chapter 1, which was conducted to scientifically contextualize this work within the broader scholarly literature, the other two chapters will employ quantitative text analyses. The second will also include a keyword-in-context (KWIC) analysis, while the third will further elaborate on the quantitative results through a KWIC-based qualitative content analysis (QCA).

To be more specific, the thesis is structured as follows. This Introduction is followed by Chapter 1, which provides the theoretical foundation on which the entire work is built. Chapter 2 focuses on the analysis of Italian and American user comments retrieved from Facebook and referring to media content shared by four Italian and four American popular media outlets, each with at least 40 comments, classified according to their editorial political stance (progressive or conservative). The analyses will be quantitative and textual, including keyness analysis, topic modeling, and KWIC analysis.

Chapter 3, in turn, focuses on the same media content from which the comments were retrieved. In this case, alongside quantitative textual analyses, the KWIC search will serve as a bridge to develop a QCA aimed at exploring media narratives in greater detail, given their richer textual content and clearer political orientation. Finally, the concluding section will summarize the main findings of the study, address the research questions outlined above, and connect the empirical results with the theoretical framework presented in Chapter 1, reflecting on their broader socio-political implications for society and research.

# **1. Science and Technology Studies and the State of the Art on Climate Change Politicization**

## **1.1. Climate Change, Science and Technology Studies, and Politicization**

This chapter presents a bibliometric, textual, and qualitative analysis aimed at analyzing the social science scientific literature on the polarization and politicization of climate-related issues. The purpose is to provide a comprehensive theoretical background for the comparative investigation of the Italian and American debates developed in the following chapters.

To better understand the phenomenon of the polarization of public opinion on the issue at hand, it is essential to point out that one of the main underlying reasons is the public's lack of understanding of climate change. For example, in 2012, only 45% of survey respondents in the U.S. were aware of the scientific consensus on anthropogenic climate change (Brulle, 2014: 681). More recent evidence points to a significant increase in public concern about climate change. According to the 2025 Eurobarometer survey, 85% of respondents consider climate change a serious problem, while 81% support the EU's goal of achieving climate neutrality by 2050. At the same time, although 84% of respondents recognize the anthropogenic nature of climate change, only 52% believe that traditional media provide clear information on the issue, and 49% report difficulty in distinguishing reliable content from misinformation on social media. This suggests that increasing awareness does not necessarily correspond to a stable and trustworthy informational environment, and that public understanding may still be shaped by selective exposure, mistrust, and media fragmentation.

As a result, the issue of global warming has remained highly debated. Giddens (2008) noted the role of skeptics in this debate, who either altogether reject global warming theories or accept them but believe certain aspects are exaggerated. In the U.S., McCright and Dunlap (2011: 178) demonstrated that Democrats are more likely than Republicans to align with the scientific community's views. They also found that providing more information and education on the climate issue does not necessarily change the minds of Republicans (McCright and Dunlap, 2011: 179). Dunlap and McCright explained this differing approach by highlighting how conservatives and industries that support them have manufactured uncertainty about global warming research, dismissing it as "junk science" (2015: 306-307).

This polarization is further highlighted by Feinberg and Willer (2013: 61), who found that liberals tend to view environmental issues through a moral lens, unlike conservatives. Tesler (2017: 323)

suggests that ideology can override scientific evidence when it contradicts the interests of ideological elites shaping public opinion, which may help explain the skepticism shown by American conservatives regarding global warming (Tesler, 2017: 307). This hypothesis is supported by skepticism towards anthropogenic climate change, which would decrease if more Republicans in Congress believed in it (Tesler, 2017: 313). The relationship between political ideology and trust in science has also been examined by Leiserowitz et al. (2012), who found that, following the Climategate controversy, the most significant decline in trust toward scientific expertise occurred among individuals with a conservative political orientation.

Rekker and Harteveld (2024) highlight that the politicization of climate change is closely linked to factual belief polarization, where citizens' perceptions of scientific facts vary according to their ideological beliefs. They specifically note that individuals' ideological predispositions significantly influence the polarization of factual beliefs about climate change. Kossowska, Szwed, and Czarnek (2023) demonstrate that right-wing individuals display a greater degree of factual belief polarization. However, an open-minded thinking style can mitigate this polarization, suggesting that individual cognitive traits significantly influence how political ideology affects the perception of scientific facts. Hoffarth and Hodson (2016: 48) also investigated how right-wing political communication contributes to the polarization of climate issues by portraying environmentalists as threatening figures, such as Nazis, terrorists, and Communists.

Regarding Europe, Campbell (2022) examines the level of support for a fossil fuel tax in several countries, including Italy. The study also highlights the connection between skepticism towards climate change policies and the risk associated with policy performance (Campbell, 2022: 42).

Swyngedouw (2010) describes contemporary environmental governance as increasingly shaped by post-political and technocratic processes, where climate change tends to be framed as a managerial and expert-driven issue rather than as a site of ideological conflict. Within this framework, political contestation is often replaced by a consensus on technical solutions, delegated to experts, international institutions, and policy mechanisms. Such a depoliticized approach, while promoting efficiency, may also limit democratic deliberation and reduce the space for alternative perspectives.

The media reflects these assumptions. Zehr (2000: 88) emphasizes how the perceived authority of science can be undermined when scientists acknowledge uncertainty, making it easier for other groups to challenge knowledge production. This uncertainty in the press has created a divide between science and the public, resulting in misinformation and a tendency towards inaction (Zehr, 2000: 98).

Boykoff and Boykoff (2004: 134) argue that scientific communication and the American press do not always align, particularly when it comes to the human contribution to global warming and decisions aimed at addressing it. Furthermore, the polarized media environment promotes “biased assimilation,” where individuals seek information confirming their pre-existing beliefs (Kahan, Jenkins-Smith and Braman, 2011: 168). This conclusion is further supported by Wang and Jaidka (2024), who found that online information-seeking behaviors related to climate change are subject to confirmation bias, demonstrating how partisan wording preferences reinforce ideological divides and predict public opinions.

Bassolas et al. (2024) found that online discussions about climate change are dominated by left-leaning perspectives, while right-leaning views tend to be smaller and more isolated from the broader conversation. This polarization, reinforced by the dynamics of social media, intensifies the conflict between these groups, making it harder to work toward common solutions. The spread of digital platforms has in fact significantly transformed how information circulates and how individuals engage with climate-related topics. The phenomenon of selective exposure, that is, the tendency to seek out content and interactions consistent with one’s own beliefs and attitudes (Buder and Said, 2024), together with the formation of echo chambers, online spaces where users are mainly exposed to opinions similar to their own (Poelzer, 2024: 278), tends to reinforce existing convictions and reduce contact with differing viewpoints, with important consequences for public engagement and deliberation (Williams et al., 2015). These environments also encourage homophily, namely the tendency to interact primarily with people who share similar views (Samantray and Pin, 2019), which in turn facilitates the circulation of misleading information and contributes to reinforcing climate skepticism (Treen, Williams and O’Neill, 2020).

These dynamics help explain how a predominantly progressive climate discourse may coexist with more conservative and skeptical interpretations, which continue to persist through selective exposure, ideologically oriented media content, and more segmented communicative environments.

Furthermore, Castillo Esparcia and López Gómez (2021) demonstrate the extent of media polarization surrounding the COP25 (25th Conference of the Parties to the UNFCCC) in the U.S. The study reveals that right-wing media tended to spread denialist viewpoints, while Democratic sources prioritized scientific communication on climate change.

Within the Science and Technology Studies (STS) framework, Isopp (2024: 617) has also shown that “misrepresentation of science and scientism can be a simultaneous problem” in Canadian newspapers.

The STS (MacKenzie and Wajcman, 1985; Latour, 1987), specifically focusing on the Actor-Network Theory (ANT), were used as a theoretical framework to analyze the polarization of public opinion on climate change issues by conservatives and progressives in the two countries examined and to explore how political ideologies and scientific knowledge co-construct public opinion about climate change. ANT does in fact illustrate that political ideologies can influence the framing and acceptance of scientific findings. This dynamic, in turn, impacts the public's understanding and response to climate change, highlighting the relationship between political discourse and scientific knowledge in shaping public opinion.

Misrepresentation of science was also found to affect online discourse as a communicative strategy in far-right environments. As demonstrated by Knüpfer and Hoffmann (2024), this mechanism allows for the construction of alternative ideological frameworks opposed to those of the democratic establishment and the current modalities of public communication. The development of a vocabulary is another crucial consequence: specifically, their study found the word “cult” to be one of the most commonly used terms to derogatorily refer to climate activists and environmental-friendly policies and to undermine scientific authority by portraying climate advocates as irrational and authoritarian. This process, namely framing cascades, consists of extreme narratives spreading from partisan media through digital networks, amplifying opposition to environmental policies. These cascades privilege an emotionally coded register and suggest concepts like “totalitarianism” and “fearmongering” to transform scientific expertise into political actors, contributing to an increased distrust in science. This highlights the need to apply the ANT perspective, in order to acquire a clear understanding of the actors involved in these dynamics.

This erosion of trust is also discussed by Huber, Fesenfeld, and Bernauer (2020), who show that populist narratives contribute to weakening confidence in both scientific and political institutions, thereby reducing support for climate policies, particularly among populist Republicans. However, they also observe that populist Democrats tend to express stronger support for environmental measures than their non-populist counterparts, suggesting that the relationship between populism and climate policy is not inherently antagonistic. Support appears to increase when policies are perceived as fair, inclusive, and responsive to citizens' needs. This dynamic reflects the populist narrative in which elites are portrayed as acting against the interests of ordinary people (Hawkins and Rovira Kaltwasser, 2017: 2), indicating that perceptions of fairness may mitigate institutional distrust.

According to Bennett and Livingston (2025), such dynamics are symptoms of a more general shift toward connective action and illiberal communication spheres, in which the basic principles of liberal democratic discourse, such as tolerance, civility, inclusion, and reasoned debate, are increasingly

replaced by emotionally coded and antagonistic narratives perceived as “transgressive.” Such narratives represent a specific threat to democratic institutions and discourse as they actively try to silence and delegitimize opposing opinions, including scientific expertise and activists. Therefore, it can be argued that these anti-scientific narratives are reinforcing populist discourse, particularly in online environments, and putting democratic principles at risk.

Finally, with her concept of “accounting for expertise,” Jasanoff (2003) points out that scientific knowledge acts as a tool for social governance and can pose as a source of conflict in public discourse. Specifically, under this perspective scientific facts, including those related to climate change, are selectively communicated and manipulated according to ideological lines. Such a dynamic is exemplified by Oliveira and Siqueira (2022) in relation to a form of Brazilian environmental counter-activism generated from rhetorics aimed at eroding public trust in science and strategically mobilized through digital platforms. Moreover, according to the co-productionist framework, science and social order are mutually constructed. Therefore, science should not be viewed merely as a product of political interests or as entirely neutral, as it is inherently linked to political ideologies (Jasanoff, 2004). This framework provides a theoretical lens to critically examine both the processes of politicization and depoliticization in public discourse on climate change.

## **1.2. Structure of this Study**

A mixed-methods approach was adopted in order to better delve into the complexity of the phenomenon under investigation and grasping a clearer overview of how the scientific discourse is framed and discussed within literature.

In order to clarify the main goals of this analysis, the following three research questions are proposed:

RQ1: What are the main research interests and thematic focuses in the scientific literature regarding the phenomenon under investigation?

RQ2: What are the most likely future developments in this literature?

RQ3: How are discourses about politics, science, and expertise framed and articulated in the literature?

To answer these questions, the study employs a bibliometric analysis of the available literature up to the end of 2024, retrieved from the scientific database Scopus. A textual analysis methodology was then applied to the abstracts in the corpus, which included occurrence analysis and topic modeling aimed at identifying the main themes and trends.

To enhance the findings from the quantitative analysis, a KWIC search was performed on two subsets of documents: one focused on skepticism toward science and the other on populist narratives. This step served as a bridge between the quantitative and qualitative phases, allowing for the identification of significant textual patterns and contextual uses of the selected terms. Using this material, two coding schemes were manually developed by analyzing titles and abstracts, which were then employed to conduct a QCA to explore how these themes are framed in the literature.

The chapter is structured as follows: after this Introduction, the Material and Methods section describes the data and the methodologies used. Following the Results section, a final Discussion paragraph connects the findings to the theoretical framework and research questions and summarizes the main insights and implications for future research.

### **1.3. Material and Methods**

Bibliometric analysis is a quantitative study of bibliographic material through quantitative and statistical methods, with the objective of investigating the knowledge structure and forecasting the potential future evolutions of a specific field (Maretti, Tontodimamma, and Biermann, 2019: 3). This methodology also enables the evaluation of international cooperation and the quantification of the performance of journals, countries, and institutions. Moreover, bibliometric analysis facilitates the identification of relevant topics, making it possible to investigate their evolution over time and to forecast potential developments in the specific research field under investigation (Maretti, Tontodimamma, and Biermann, 2019: 3).

To conduct the analysis, the R (R Core Team, 2021) package Bibliometrix, a tool specifically designed for science mapping analysis (Aria and Cuccurullo, 2017), was employed. Specifically, the analysis was carried out with Biblioshiny, the associated web app of Bibliometrix.

Data were retrieved from the scientific database Scopus on March 17, 2025, using the following search query: (“politicization” OR “polarization” OR “public opinion”) AND “climate change”.

The asterisks were employed to ensure the query accounted for both singular and plural forms of the specified terms. The Boolean operator “OR” was applied to retrieve all documents containing at least one of the three specified keywords. Subsequently, the Boolean operator “AND” was used to link the group of keywords with climate change, in order to ensure that the polarization phenomenon was specifically tied with the climate issue. The research was carried out according to Scopus’s criterium “Article Title, Abstract, Keywords,” and restricted to the disciplinary areas of Social Sciences, Environmental Science, and Decision Sciences. The results were further limited to English documents published from 1991 to 2024.

A total of 1,606 documents were exported in BibTeX format. After removing 311 unrelated items and 6 duplicates, the final dataset consisted of 1,289 documents and was then imported into Biblioshiny in BibTeX format.

Secondly, attention was focused on the abstracts of the documents included in the corpus. An occurrence analysis was then conducted to identify the most frequent words, followed by a topic modeling analysis. The goal was to delve in further detail into the major themes of interest in literature and to hypothesize the potential future developments, as topic modeling allows the researchers to discover the main themes underlying broad corpuses of documents (Blei, 2012).

This phase was carried out with R and, specifically, with the Quanteda package (Benoit et al., 2018), designed to analyze texts through natural language processing. Words occurring fewer than 5 times were removed, as well as those with fewer than 3 letters.

Finally, the analysis was limited to those documents related to populism and science skepticism in order to investigate the specific correlation between climate populism and public opinion and how it affects environmental policies worldwide. Two different subsets were obtained: one comprising 115 documents, and another smaller group including only the 26 documents explicitly mentioning populism. Consequently, a KWIC analysis was conducted to extract textual fragments and explore the most frequent associations of specific identified terms related to climate and politics. The selection of keywords was based on their relevance to both the political and scientific aspects of the climate skepticism and populism debate. According to McTavish and Pirro (1990: 253), KWIC lists display keywords alongside their immediate textual context. This allows researchers to refine conceptual categories and identify broader discursive patterns that may extend across various thematic fields.

Subsequently, a QCA was conducted to combine and enrich the results of the quantitative analyses through a comprehensive qualitative interpretation (Mayring, 2014: 10). Codes were inductively developed through the reading of titles and abstracts, allowing recurrent themes to emerge from the data.

Both analytical steps were performed using the software MAXQDA (VERBI Software, 2021), specifically designed for qualitative and mixed-methods data analysis. These procedures were applied independently to both subsets in order to ensure the most thorough and detailed exploration of the topic under investigation.

The decision to employ a mixed-methods approach was made in order to provide the most comprehensive and articulated answer to the research questions. Therefore, it is important to specify that the quantitative analysis - including bibliometric analysis, occurrence analysis, and topic modeling - was designed to address both RQ1 (“What are the main research interests and thematic focuses in the scientific literature regarding the phenomenon under investigation?”) and RQ2 (“What are the most likely future developments in this literature?”). In contrast, the KWIC and the QCA were specifically designed to answer RQ3 (“How are discourses about politics, science, and expertise framed and articulated in the literature?”).

## **1.4. Results**

### **1.4.1. Bibliometric Analysis**

All 1,289 documents in the database were successfully processed in Biblioshiny. The analysis indicates a total of 599 different sources and 2,817 authors. It is interesting to note that only 354 documents are single-authored. This disproportion is likely related to the complex nature of the phenomenon that favors co-authorship rather than individual contributions. This is further supported by an average of 2.71 co-authors per document, indicating a moderate but consistent tendency toward co-authorship in the field.

Most documents are articles (1,019), followed by book chapters (115), reviews (64), books (30), conference papers (28), notes (13), letters (10), editorials (6), short surveys (2), one data paper and one erratum. In addition, Biblioshiny indicates an annual growth rate of 17.38%. This is an extremely

significant data, as it points to the strong and increasing academic interest in the topic over the analyzed period. Moreover, the international co-authorship rate stands at 21.18%, suggesting a moderate but meaningful level of cross-national collaboration in the field. Both data combined seem to suggest that the intertwinement between public opinion and climate change will be an increasingly hot topic on the international scale.

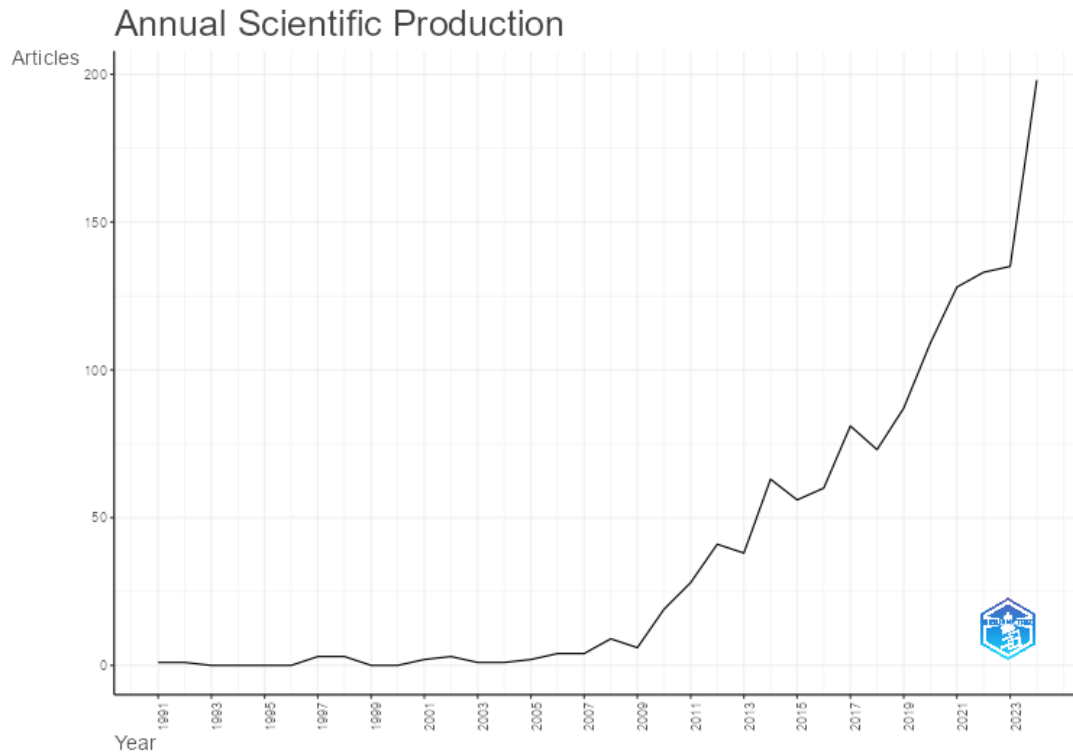


Fig. 1. Annual scientific production of the documents under investigation.

The chart above (Fig. 1) shows the annual scientific production of the documents included in the dataset. It is interesting to observe how, after a sharp decline in 2018 (73 documents compared to 81 in 2017), production recorded an uninterrupted increase, even when the growth slowed down between 2021 and 2023. The 73 documents in 2018 were followed by 87 in 2019, 109 in 2020, 128 in 2021, 133 in 2022, 135 in 2023, and 198 in 2024. This is further supported by the annual growth rate of 17.38% mentioned above.

Moreover, production did not seem to be halted by the COVID-19 emergency; instead, it was fueled by COP26<sup>6</sup> in 2021, COP27<sup>7</sup> in 2022, and the U.S. Inflation Reduction Act (2022) - the largest American investment against climate change to date, aiming to reduce the country's greenhouse gas emissions by about 40% from 2005 levels by 2030 (Merry and Payne, 2024: 380). This highlights the crucial significance of the topic, as even the wars in Ukraine and Gaza may have contributed to the debate surrounding climate policies (Coetzer, Rajmil and Morales, 2023) and the energy crisis resulting from Russia's weaponization of energy supplies (Consilium, 2025).

The Green New Deal proposed in the U.S. in 2019 may explain the renewed interest in the topic under investigation and this continued growth starting from this year. Given its strong consequences in terms of partisan polarization (Gustafson et al., 2019), the Green New Deal has most likely brought climate-related issues back to public attention. At the same time, the European Green Deal also entered the political scene. It is likely that its ambitious aim - climate neutrality by 2050, net negative greenhouse gases emissions, and multiple, diverse environmental goals (Dupont et al., 2024) - may have fueled the climate debate in the European Union as well. Another relevant aspect of 2019 was the beginning of Greta Thunberg's activism and the wave of Fridays for Future throughout the world. As shown by Salerno (2023), public interest in climate change on Google Trends has risen in 2019 as a consequence of Thunberg's actions and public speeches. Additionally, in the same year the UN Climate Action Summit<sup>8</sup> also took place, with the main goal of decidedly implementing the Paris Agreement<sup>9</sup> (United Nations, 2019).

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<sup>6</sup> Hosted from 31 October to 13 November 2021 in Glasgow, COP26 aimed to monitor global progress on the implementation of the Paris Agreement, raise emission reduction targets for 2030, strengthen adaptation policies, and increase climate finance commitments to support developing countries., Consilium (Council of the European Union and European Council). (2022). Climate change summit COP26. *Consilium*, October 21. <https://www.consilium.europa.eu/en/policies/paris-agreement-climate/cop26/> (accessed on April 5, 2025).

<sup>7</sup> Held in Sharm El-Sheikh on 6–18 November 2022, with the World Leaders Summit on 7 and 8 November, COP27 focused on implementing the commitments made at COP26, particularly regarding adaptation strategies and strengthening cooperation among all relevant stakeholders., Consilium (Council of the European Union and European Council). (2025). UN climate change conference (COP27), climate implementation summit, Sharm El-Sheikh, Egypt, 7-8 November 2022. *Consilium*, January 9. <https://www.consilium.europa.eu/en/meetings/international-summit/2022/11/07-08/> (accessed on April 5, 2025).

<sup>8</sup> The UN Climate Action Summit was hosted in New York on 23 September 2019, by initiative of the UN Secretary-General António Guterres. Countries had to present realistic plans that had to contribute to implement measures to effectively meet the deadline set by the Paris Agreement., United Nations. (2019). 2019 Climate Action Summit. *United Nations*. <https://www.un.org/en/climatechange/2019-climate-action-summit> (accessed on April 5, 2025).

<sup>9</sup> “The Paris Agreement is a legally binding international treaty on climate change. It was adopted by 195 Parties at the UN Climate Change Conference (COP21) in Paris, France, on 12 December 2015. It entered into force on 4 November 2016.

Previous interesting peaks are recorded in 2014 (63 documents) and in 2017 (81 documents): the latter may be explained with Donald Trump's public announcement of the intention to withdraw from the Paris Agreement (Kenny, 2024).

On the other hand, 2014's peak could be linked to the proposal of the Climate Change Plan by Barack Obama, the former president of the U.S., in 2013, meant to pursue and favor environmentalist initiatives both on a domestic and international scale (Dotto and Oakes, 2019: 487) and to the later Clean Power Plan, promoted again by Obama and planned to reduce carbon dioxide emission of 32% compared to 2005 by 2030 (Dotto and Oakes, 2019: 488). Notably, 2015 (56 documents) also represents the starting point for another, yet modest, increase. This might be explained with the fact that the Paris Agreement was signed that same year during COP21, allowing climate issues to gain new attention from public opinion and academic discourse.

It is worth noting that the key turning point in the scholar interest towards climate change occurs in 2009, when the United Nations Climate Change Conference 2009 (COP15)<sup>10</sup> took place in Copenhagen, Denmark. It produced a relevant consequence above all: it contributed to reinforcing the polarization around climate discourse, also among online blogosphere (van Eck and Feindt, 2022).

However, 2008 was the first year when the number of publications (9) recorded an increase compared to previous years, during which scientific output remained modest, never exceeding 4 documents per year. This year marked the rising popularity of climate-related issues in public opinion, largely due to Obama's presidential campaign, during which he promised to take action to limit carbon dioxide emissions (Brewer, 2012).

This newfound attention may have been influenced by the fact that the 2007 Nobel Peace Prize was jointly awarded to the IPCC (Intergovernmental Panel on Climate Change) and Al Gore, Bill Clinton's vice president, for their environmental advocacy<sup>11</sup> (United Nations, n.d.-c).

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Its overarching goal is to hold "the increase in the global average temperature to well below 2°C above pre-industrial levels" and pursue efforts "to limit the temperature increase to 1.5°C above pre-industrial levels.", United Nations Framework Convention on Climate Change. (n.d.). The Paris Agreement. *United Nations Framework Convention on Climate Change*. <https://unfccc.int/process-and-meetings/the-paris-agreement> (accessed on April 5, 2025).

<sup>10</sup> The 15th Conference of the Parties (COP15) to the United Nations Framework Convention on Climate Change (UNFCCC) was held in Copenhagen, Denmark, from December 7 to 18, 2009. Its main outcome was the Copenhagen Accord, a political agreement acknowledging the necessity of limiting global temperature increases to below 2°C reached between the US, China, India, Brazil and South Africa. Moreover, it established a goal of providing \$100 billion annually by 2020 to assist poor countries in addressing the impacts of climate change., BBC. (2019). Copenhagen deal: Key points. *BBC*, December 19. <http://news.bbc.co.uk/2/hi/science/nature/8422307.stm> (accessed on April 5, 2025).

<sup>11</sup> "The Intergovernmental Panel on Climate Change (IPCC) and Albert Arnold (Al) Gore Jr. have been awarded the Nobel Peace Prize "for their efforts to build up and disseminate greater knowledge about man-made climate change, and to lay

| Sources                            | Documents |
|------------------------------------|-----------|
| Climatic Change                    | 62        |
| Public Understanding of Science    | 47        |
| Environmental Politics             | 46        |
| Environmental Communication        | 40        |
| Global Environmental Change        | 31        |
| Energy Policy                      | 28        |
| Energy Research and Social Science | 26        |
| Environmental Science and Policy   | 23        |
| Environmental Research Letters     | 19        |
| Nature Climate Change              | 18        |

Tab. 1. The 10 most relevant sources of the documents in the corpus.

According to Table 1, the most relevant sources of the documents under investigation are scientific journals, compatibly with the fact that most of the documents are articles (1,019 of 1,289). This data allows for a deeper understanding of the relevance of the relationship between public opinion and climate change in the academic field, given the consistency with which it is mostly addressed in specialized publications.

The strong focus on public communication is another interesting detail to note. The journals “Public Understanding of Science” and “Environmental Communication” are in fact related, respectively, to 47 and 40 documents. As showed by the 26 articles in “Energy Research and Social Science,” the interconnection between social and environmental sciences also emerges.

A stronger interconnection is that between environmental science and the political field: “Environmental Politics” is in fact the third source by relevance with 46 documents, while “Energy Policy” and “Environmental Science and Policy” respectively contain 28 and 23 documents. This is likely a developing trend, as environmental action requires implementation policies that cannot be discussed without taking politics into account.

| Country | Articles | SCP | MCP |
|---------|----------|-----|-----|
| USA     | 342      | 309 | 33  |

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the foundations for the measures that are needed to counteract such change.” [...] The winners of the Nobel Peace Prize see a link between the risk of accelerating climate change and the risk of violent conflict and wars.”, United Nations. (n.d.-c). 2007 - Intergovernmental Panel on Climate Change (IPCC) and Albert Arnold (Al) Gore Jr. *United Nations*. <https://www.un.org/en/about-us/nobel-peace-prize/ipcc-al-gore-2007> (accessed on April 5, 2025).

|                |     |    |    |
|----------------|-----|----|----|
| United Kingdom | 103 | 79 | 24 |
| Germany        | 63  | 47 | 16 |
| Australia      | 55  | 39 | 16 |
| Canada         | 37  | 24 | 13 |
| Sweden         | 33  | 25 | 8  |
| Netherlands    | 27  | 16 | 11 |
| China          | 26  | 21 | 5  |
| Spain          | 26  | 17 | 9  |
| Switzerland    | 22  | 12 | 10 |
| Norway         | 20  | 15 | 5  |
| Italy          | 19  | 12 | 7  |
| Belgium        | 15  | 10 | 5  |
| Korea          | 10  | 6  | 4  |
| Austria        | 9   | 7  | 2  |
| Denmark        | 9   | 5  | 4  |
| Greece         | 8   | 8  | 0  |
| India          | 8   | 8  | 0  |
| Poland         | 8   | 7  | 1  |

Tab. 2. Corresponding author's countries.

Table 2 displays the top 15 countries of corresponding authors by frequency. It is important to note that this data reflects authors' institutional affiliations rather than their citizenship. Single-country publications (SCP), where all authors are affiliated with institutions from the same country, are significantly more common than multiple-country publications (MCP). This disparity may be attributed to the prioritization of domestic environmental concerns, likely due to the greater availability and accessibility of national data.

Furthermore, this pattern aligns with the broader international co-authorship rate observed in the dataset, which stands at 21.18%. This moderate figure suggests a general tendency toward national rather than international collaboration in the field.

Switzerland presents an almost even distribution between SCPs (12) and MCPs (10), which suggests a stronger inclination toward international collaboration. The U.S. has the highest number of publications overall; however, the overwhelming majority are SCPs (309 compared to only 33 MCPs). This is particularly noteworthy given that the U.S. faces severe consequences of climate change in terms of natural disasters (Hammond, 2023: 1070) and a significant degree of political polarization around climate discourse (Merry, 2024). Another possible explanation could be the

succession of ambitious, yet ideologically divergent, domestic and international climate agendas, from Obama’s Clean Power Plan to the fluctuating stance on the Paris Agreement under Trump and Biden.

The reason for the United Kingdom’s ranking second in terms of the number of corresponding authors is likely due to the ambitious climate goals the country has set<sup>12</sup>, as well as the alarming forecasts regarding future increases in heatwaves and floods (Lohmann and Kontoleon, 2023). In contrast, Germany is facing a high degree of politicization in its climate discourse, particularly concerning the application of carbon capture and storage technologies in industry (Große-Kreul et al., 2024).

Australia’s relevance can also be attributed to the significant polarization in its climate discourse. Initiatives such as the creation of an emissions trading scheme and the public debate surrounding renewable energies (Kousser and Tranter, 2018) may have facilitated research on public opinion regarding climate change. Similarly, Canada’s fifth-place ranking may be explained by its substantial oil industry, the severe impacts of climate change in certain regions, and the politicization of the domestic climate debate (Isopp, 2024).

| Affiliation                    | Documents |
|--------------------------------|-----------|
| George Mason University        | 37        |
| Michigan State University      | 31        |
| University of California       | 31        |
| Yale University                | 30        |
| Cornell University             | 29        |
| Georgia State University       | 25        |
| University of Michigan         | 25        |
| Stanford University            | 22        |
| University of British Columbia | 20        |
| Harvard University             | 17        |

Tab. 3. The 10 most relevant affiliations.

The prevalence of the U.S. in this research field is further supported by Table 3, which shows that among the ten institutions that produced the most documents in the corpus, nine are American. The

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<sup>12</sup> “The ‘Net Zero Strategy’, published in October 2021, was the first document of its kind for a major economy. It set out the government’s vision for a market-led, technology- driven transition to decarbonise the UK economy and reach net zero by 2050.”, Department for Energy Security and Net Zero. (2023). Powering up Britain: Net zero growth plan. *UK Government*. <https://www.gov.uk/government/publications/powering-up-britain/powering-up-britain-net-zero-growth-plan> (accessed on April 7, 2025).

only exception is the University of British Columbia in Canada, which has 20 documents, aligning with Canada's high ranking in Table 2.

## Country Scientific Production

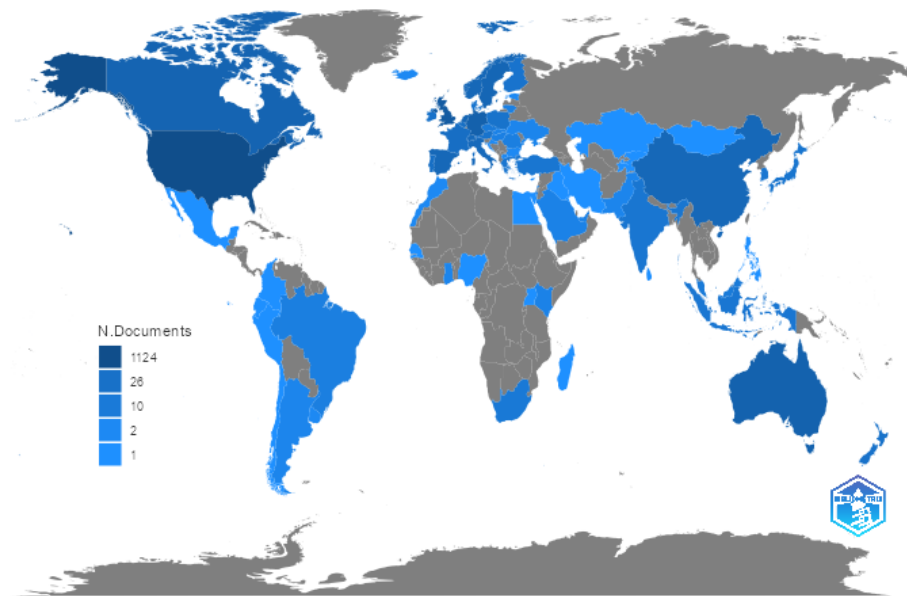


Fig. 2. Country scientific production of documents.

| Region         | Freq |
|----------------|------|
| USA            | 1124 |
| United Kingdom | 261  |
| Germany        | 144  |
| Australia      | 126  |
| Canada         | 98   |
| Sweden         | 82   |
| Netherlands    | 79   |
| Norway         | 67   |
| Spain          | 67   |
| China          | 66   |
| Switzerland    | 58   |
| Italy          | 56   |
| France         | 33   |

|          |    |
|----------|----|
| Belgium  | 32 |
| Portugal | 31 |

Tab. 4. The 15 most productive countries.

Figure 2 illustrates the most productive countries based on the number of documents produced; darker colors indicate a higher volume of production. Table 4 provides additional data, detailing the exact quantities of works generated by the fifteen countries identified as the most productive in the dataset.

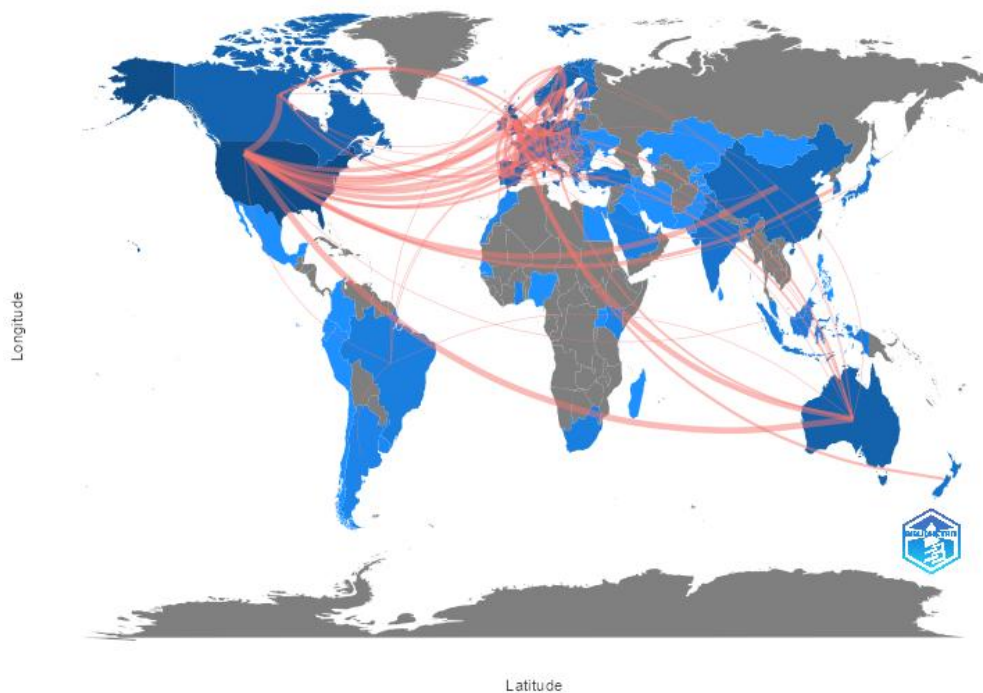


Fig. 3. International collaboration map.

Figure 3 illustrates the extent of international collaboration among institutions from different countries. The thickness and number of lines indicate the frequency and intensity of these collaborations. Darker blue countries represent higher levels of scientific output, while lighter shades indicate lower participation.

The U.S. stand out as the central hub of international collaboration, maintaining strong connections with nearly all other high-output regions, particularly Western Europe. This observation aligns with the U.S.'s leading role in scientific production, as demonstrated in Tables 2, 3, and 4.

Europe is portrayed as a densely interconnected region, particularly among the United Kingdom, Germany, the Netherlands, and Switzerland - all of which rank highly in previous tables and confirm

their significant role in international climate scholarship. Similarly, Canada and Australia also show strong integration into global collaboration networks.

In contrast, countries like Russia, many in Africa, and parts of Asia appear to be only lightly connected, or entirely absent, from the collaborative landscape. This underrepresentation may stem from various factors, including limited academic engagement with the specific intersection of climate change and public opinion, a lower degree of politicization in climate discourse, and disparities in research funding and infrastructure.

| Topic                        | Frequency | Year_Q1 | Year_med | Year_Q3 |
|------------------------------|-----------|---------|----------|---------|
| Global climate change        | 7         | 2012    | 2014     | 2018    |
| Cultural theory              | 6         | 2014    | 2014     | 2016    |
| Mass media                   | 7         | 2012    | 2015     | 2017    |
| Newspapers                   | 7         | 2014    | 2015     | 2020    |
| Environmental concern        | 9         | 2015    | 2016     | 2023    |
| Science                      | 9         | 2013    | 2016     | 2023    |
| Post-politics                | 8         | 2014    | 2016     | 2019    |
| Science communication        | 31        | 2014    | 2017     | 2022    |
| Climate change mitigation    | 14        | 2016    | 2017     | 2022    |
| Trust                        | 11        | 2016    | 2017     | 2020    |
| Environment                  | 26        | 2014    | 2018     | 2023    |
| Risk perception              | 26        | 2015    | 2018     | 2020    |
| Communication                | 17        | 2016    | 2018     | 2023    |
| Framing                      | 46        | 2016    | 2019     | 2022    |
| Adaptation                   | 24        | 2017    | 2019     | 2022    |
| Renewable energy             | 22        | 2016    | 2019     | 2021    |
| Motivated reasoning          | 20        | 2017    | 2020     | 2022    |
| United States                | 20        | 2016    | 2020     | 2022    |
| Partisanship                 | 18        | 2018    | 2020     | 2022    |
| Energy policy                | 19        | 2020    | 2021     | 2023    |
| Environmental policy         | 19        | 2016    | 2021     | 2022    |
| Survey experiment            | 17        | 2019    | 2021     | 2023    |
| Climate policy               | 53        | 2019    | 2022     | 2023    |
| Climate change communication | 19        | 2018    | 2022     | 2023    |
| Twitter                      | 15        | 2019    | 2022     | 2023    |
| Social media                 | 30        | 2020    | 2023     | 2024    |
| Sentiment analysis           | 17        | 2023    | 2023     | 2024    |
| Misinformation               | 10        | 2020    | 2023     | 2024    |
| Depoliticization             | 6         | 2022    | 2024     | 2024    |
| Climate action               | 5         | 2024    | 2024     | 2024    |
| Selective exposure           | 5         | 2023    | 2024     | 2024    |

Tab. 5. Trend topics (from the least to the most recent ones according to median year of occurrence).

Further insights are evident from the trend topics section of the bibliometric analysis, which highlights the major topics of interest over the years. Biblioshiny identified 31 trend topics that have emerged since 2012. In Table 5, the “Frequency” column indicates the number of occurrences for each topic in the corpus. “Year\_Q1” represents the first quartile year of occurrence, indicating when the topic first emerged. “Year\_med” represents the median year of occurrence, or the midpoint in the topic’s frequency distribution. Conversely, “Year\_Q3,” the third quartile year of occurrence, indicates the most recent period during which the topic remained consistently active in the literature.

Table 5 presents the trend topics identified by Biblioshiny, ranked from the least to the most recent in terms of median year of occurrence. Notably, topics such as misinformation, the depoliticization of environmental issues, the role of social media, and selective exposure, as well as the use of sentiment analysis strategies, are among the most recent in the literature and remained active in scientific production in 2024. Their emergence aligns with the post-COVID-19 pandemic period, likely due to the increased use of social media and online tools. The earliest topics, “misinformation” and “social media,” both emerged in 2020; thus, COVID-19 likely heightened awareness of the widespread dissemination of misinformation on social networks. Additionally, the topic “newspapers,” which emerged in 2014, was last recorded in 2020, likely coinciding with a growing academic interest in online media.

Another hypothesis is that the topic “partisanship,” which emerged in 2018 and was last active in 2022, may have evolved into the more media-specific topic “selective exposure,” which emerged in 2023 and is still active in 2024. As previously mentioned, selective exposure refers to the individual preference for engaging with information that aligns with one’s attitudes and beliefs or interacting with like-minded individuals, a phenomenon greatly facilitated by social media (Buder and Said, 2024).

This facilitation is made possible by the nature of these platforms, which allow the creation of echo chambers - online spaces where individuals are exposed to information that aligns with their attitudes and beliefs (Poelzer, 2024: 278), hindering contact with differing views and opinions. Echo chambers increase homophily, described as the individual preference for communicating with people who share similar beliefs (Samantray and Pin, 2019). Selective exposure has been linked to partisanship, as it enhances discourse polarization and the rise of populist narratives (Poelzer, 2024: 278). Therefore, this shift in interest may be explained by the desire to investigate the consequences of partisanship on news consumption, particularly online. This assumption is supported by the topic “social media,” which recorded 30 occurrences in the brief period from 2020 to 2024.

Attention to media has consistently highlighted the close interconnection between climate issues and the media field. Notably, the topic of "mass media" emerged in 2012 alongside "global climate change." While the first topic has evolved into different ones over the years, academic interest has gradually shifted toward multiple other aspects. "Science communication" emerged a few years later, in 2014, linked to "newspapers," signaling a growing focus on how climate science is communicated and perceived by the general public. "Framing" appeared in 2016, followed by the more specific "climate change communication" in 2018, indicating a progressive development of communication-focused topics. Additionally, "framing" and "science communication" (both recorded as last active in 2022) display the highest occurrences in the corpus, with 46 and 31 instances, respectively.

However, the topic with the highest overall occurrences is "climate policy," which has 53 instances recorded from its introduction in 2019 to its last active period in 2023. This prominence within such a limited timeframe can be attributed to 2019 being an extraordinarily active year for climate discourse. As aforementioned, significant events occurred that year, including the proposal of the Green New Deal in the U.S., the European Green Deal, the UN Climate Action Summit, and the global Fridays for Future movement. The importance of climate policies was further stated in 2021 and 2022 by COP26, COP27, and the Inflation Reduction Act. Consequently, the centrality of this topic may have become secondary compared to the attention focused on social media and its effects on opinion polarization.

Such an assumption seems to be supported by the emergence of "depoliticization" as a trend topic since 2022, which likely reflects a strategic and discursive response to years of highly polarized climate debates, especially in the U.S. It aims to reframe climate change as a critical technical and global issue rather than an ideological matter. This trend may align with post-pandemic expectations for science-driven governance and the international call for pragmatic cooperation following COP26 and COP27, aligning with Jasanoff's (2004) co-productionist framework on the mutual construction of scientific authority and political order.

Additionally, the focus on climate policies may have evolved into a broader discussion with the topic "climate action" that emerged in 2024. This evolution likely reflects the same call for pragmatic cooperation, indicating a shift in how the climate issue is framed. Consequently, this transition from policy to action may symbolize a larger narrative shift in the climate change discourse, moving from planning to implementation.

To further explore the thematic structure of the abstracts, the following sections will provide a content-based textual analysis. This analysis begins with occurrence analysis and is followed by topic modeling.

### 1.4.2. Occurrence Analysis

Shifting to the occurrence analysis, the 15 words with the highest frequency are listed in Table 6 and in the wordcloud (Fig. 4) below.

| Word          | Frequency |
|---------------|-----------|
| Policy        | 1361      |
| Political     | 1027      |
| Support       | 809       |
| Media         | 585       |
| Energy        | 574       |
| Science       | 514       |
| Policies      | 507       |
| Survey        | 411       |
| Attitudes     | 390       |
| Data          | 371       |
| Scientific    | 343       |
| Communication | 326       |
| Action        | 322       |
| Concern       | 308       |
| Risk          | 298       |

Tab. 6. The 15 words with the highest frequencies among the abstracts.



the close interrelation between these two spheres.

### 1.4.3. Topic Modeling

The software R was configured to display eight topics, each consisting of twenty words, in order to effectively capture the potential emerging dimensions. The Latent Dirichlet Allocation (LDA) approach was adopted, according to which each document in the analyzed corpus includes a mixture of different topics (Grimmer and Stewart, 2013: 284). It is a probabilistic algorithm that treats “both words and documents as exchangeable”, assuming that “all documents are generated in the same time steps” (Del Gobbo et al., 2021: 672).

| Topic 1      | Topic 2     | Topic 3      | Topic 4       |
|--------------|-------------|--------------|---------------|
| Energy       | Risk        | Adaptation   | Political     |
| Carbon       | Concern     | Water        | Politics      |
| Renewable    | Survey      | Development  | Governance    |
| Power        | Health      | Management   | Policy        |
| Nuclear      | Perceptions | Environment  | International |
| Emissions    | Support     | Sustainable  | Actors        |
| Fossil       | Risks       | Local        | Institutions  |
| CCS          | Factors     | Conservation | Rights        |
| Gas          | Perceived   | Strategies   | Discourse     |
| Technologies | Data        | Actions      | Future        |
| Industry     | Local       | Challenges   | Framework     |
| Support      | Perception  | Future       | Society       |
| Fuel         | Awareness   | Need         | Debate        |
| Transition   | Weather     | Nature       | Debates       |
| Respondents  | Attitudes   | Knowledge    | Economic      |
| Development  | Individual  | Forest       | Security      |
| Air          | Respondents | Barriers     | Agenda        |
| Technology   | Threat      | Education    | Discourses    |
| Acceptance   | Responses   | Urban        | Crisis        |
| Oil          | Coastal     | Resources    | Action        |

Tab. 7. Topics 1 - 4.

Table 7 displays the first four topics.

Topic 1 primarily focuses on the comparison between renewable and non-renewable energy sources, and the related debate. Terms such as “energy,” “carbon,” “oil,” “gas,” and “nuclear” are mentioned, reflecting this dichotomy. Sustainable technologies are also taken into account, as suggested by the word “CCS” (acronym for Carbon Capture and Storage). Moreover, the presence of the term “transition” highlights the consistent investigation of energy and technological transition processes within this research area.

The presence of the words “acceptance” and “support” is another interesting detail, as the ecological transition appears to be closely intertwined with public opinion’s willingness to accept the ongoing transformations. Overall, this topic appears to be highly policy-oriented and strongly interconnected with technological innovation and industrial development.

Topic 2 revolves around the individual awareness and behaviors towards environmental issues, as evidenced by terms such as “awareness,” “attitudes,” and “individual”. Risk perception is another main component of this topic, together with the degree of support expressed towards climate policies. Therefore, this topic is closely connected to psychological dimensions and the study of individual responses to climate change.

The consideration of the local dimension is also particularly relevant, as this topic appears to focus on the acceptance of policies addressing environmental threats posed by weather conditions and their implications for health and coastal preservation. This is illustrated by words such as “health,” “local,” “weather,” “threat,” and “coastal.” This specific field of research also appears to be strongly associated with the survey research method, as suggested by the presence of the terms “survey,” “data,” and “respondents.” This may be explained by the fact that surveys represent the most suitable methodology for collecting data on individuals’ attitudes, perceptions, and beliefs.

Topic 3 focuses on the sustainable management of natural resources, as well as on adaptation and conservation strategies. This is exemplified by terms such as “adaptation,” “management,” “conservation,” “strategies,” and “resources.” Moreover, the focus appears to be predominantly local, with terms such as “water,” “forest,” and “urban” suggesting practical, territory-oriented actions.

The relevance of education and the need for environmental literacy also emerge as key aspects within this topic, together with the urgency to overcome the barriers that may hinder their development. This is illustrated by the occurrence of terms such as “knowledge,” “barriers,” and “education.”

Topic 4 focuses on the issue of climate governance, adopting a multi-actor and normative approach. This is evident in terms such as “governance,” “actors,” and “institutions.” Additionally, the topic emphasizes the political and economic dimensions of climate issues, highlighted by words like

“political,” “politics,” “policy,” “economic,” and “agenda.” Climate is also viewed as a security problem, as indicated by terms such as “security” and “crisis.”

Discursive aspects are taken into account, emphasizing the importance of “framework,” “debates,” and “discourses.” This characteristic underscores how climate is perceived as an urgent public issue, with outcomes closely linked to public narratives and the framing of the topic. The international dimension is also significant, with references to “rights.” Thus, it is clear that the urgent need for coordinated normative, legal, and political actions is the central focus of this topic.

| <b>Topic 5</b> | <b>Topic 6</b> | <b>Topic 7</b> | <b>Topic 8</b> |
|----------------|----------------|----------------|----------------|
| Science        | Political      | Policy         | Media          |
| Scientific     | Attitudes      | Policies       | Online         |
| Media          | Partisan       | Support        | Discourse      |
| News           | Beliefs        | Countries      | Communication  |
| Communication  | Party          | Mitigation     | Data           |
| Knowledge      | Survey         | States         | Twitter        |
| Information    | Republicans    | International  | Debate         |
| Scientists     | Support        | Government     | Narrative      |
| Consensus      | Data           | National       | Sentiment      |
| Coverage       | Conservative   | Preferences    | Tweets         |
| Framing        | Democrats      | Action         | Misinformation |
| Frames         | States         | European       | Model          |
| Evidence       | American       | Carbon         | Network        |
| Trust          | Concern        | Emissions      | Narratives     |
| Messages       | Parties        | Political      | Discussion     |
| Perceptions    | Belief         | Economic       | Opinions       |
| Interest       | Ideological    | Costs          | Information    |
| Engagement     | Views          | China          | Crisis         |
| Beliefs        | Differences    | Citizens       | Perspective    |
| Newspapers     | Nature         | Governments    | Comments       |

Tab. 8. Topics 5 - 8.

Table 8 presents topics five to eight.

Topic 5 focuses on the intersection of science and media communication. Terms such as “science,” “scientific,” and “scientists” are often found alongside “media,” “news,” and “communication.” The

primary emphasis is on building trust and credibility in climate science, as indicated by words like “consensus,” “evidence,” and “trust.”

Additionally, the beliefs and perceptions of various interests are also influential aspects of this topic, illustrated by terms such as “interest,” “perceptions,” and “beliefs.” Individual beliefs and attitudes are therefore crucial elements considered in this specific research field. The relevance of media framing is closely linked to these discussions, with terms like “coverage,” “framing,” and “frames” appearing frequently. Notably, the presence of the term “newspapers” suggests a particular focus on traditional media. Consequently, this research field analyzes in detail the relationship between science, public trust, and the impact of media narratives on public opinion.

Topic 6 focuses on the American context regarding climate change. It reveals a heavily politicized environment where climate is framed more as an ideological issue than a scientific one. Terms like “attitudes,” “beliefs,” and “ideological” highlight how the debate is largely driven by individual perspectives rather than empirical data. Furthermore, climate discourse appears to be closely tied to partisanship, which in turn influences voting behavior. Terms such as “partisan,” “Republicans,” “conservative,” and “Democrats” reflect the significant impact of politics on this debate. Consequently, the most noteworthy finding in this topic is the extreme politicization of environmental issues in the U.S.

On the other hand, Topic 7 centers on the European Union. Notably, unlike in the U.S., the literature regarding the EU emphasizes the environmental and economic implications of climate change rather than ideological aspects. While some political elements are mentioned, such as “governments” and “political,” they are significantly less impactful than in the American context. Instead, the focus is on policies and mitigation strategies, with the mention of “costs” highlighting attention to the economic implications of environmental measures.

There also appears to be a focus on international situations and relationships, as indicated by references to “China,” likely in a comparative context. The issues of “emissions” and “carbon” are discussed, reflecting their prominence in European public debate and scientific literature. Carbon policies, in particular, emerge as a relevant topic. Public opinion is also significant, as evidenced by terms such as “support,” “preferences,” and “citizens.”

Topic 8 focuses entirely on the discourses occurring in digital media, with social media being the major area of interest. This is evident from terms like “media,” “online,” “Twitter,” “tweets,” and “comments.” Notably, Twitter is the only major social platform mentioned, suggesting it is the most analyzed within this research field. A specific emphasis appears to be on network and sentiment

analyses as crucial methodologies, as highlighted by the terms “network,” “sentiment,” and “opinions.”

Another significant focus is the construction and communication of narratives surrounding climate-related issues and the resulting online debates. Additionally, “misinformation” emerges as a key aspect of this field, as it is closely intertwined with the nature of online discourse and fuels discussions on social media. The most important insight from this topic is that digital media and social networks have gained such prominence in disseminating information about climate change and shaping public opinion that an entire topic is devoted to this aspect.

Overall, it is evident that literature addresses various aspects of climate change, with a significant emphasis on political issues, particularly in the U.S. Notably, both the U.S. and the EU each have distinct focuses: this is likely related to the substantial number of publications exploring the link between climate change and public opinion, consistent with the bibliometric analysis using Biblioshiny. There is a marked difference, however; in the U.S., climate discourse is more intertwined with partisanship and political ideology, whereas research in the EU tends to emphasize policy-making processes and mitigation strategies.

Media constitute another crucial component of the corpus, appearing in two distinct topics. Specifically, Topic 5 examines the relationship between science and media, highlighting the importance of trust-building processes and the framing of scientific content in media communication. Topic 8 focuses entirely on digital media, particularly social media, and its impact on public debate and opinion formation.

Topic 1 addresses technological and industrial innovations related to sustainability, suggesting a growing interest in public acceptance of these developments. Lastly, Topic 2 focuses on individual attitudes and perceptions, especially concerning local environmental risks and associated mitigation strategies.

In conclusion, while the interests in literature are diverse, the primary focus remains on politics, policies, and media communication.

#### **1.4.4. KWIC and QCA**

The initial database was filtered in order to focus on topics related to the populism and climate skepticism areas. Only the documents whose title or abstract included at least one of the following keywords were selected: “populism\*,” “populist\*,” “skeptic\*,” and “sceptic\*” so as to include the British spelling as well. The asterisks in “skeptic\*/sceptic\*” were meant to include the broader range of vocabulary consisting of “skepticism/scepticism,” “skeptical/sceptical,” and “skeptics/sceptics.” “Populism\*” and “populist\*” were instead meant to include both the singular and plural forms of the words. The result was a group of 115 documents, 26 of which are strictly related to the specific topic of populism.

Two separate KWIC analyses were conducted: the first on the whole dataset consisting of 115 documents, the second only on the 26 documents focused on populism in order to delve deeper into this specific field. The analysis was performed with MAXQDA (VERBI Software, 2021).

For the 115-document corpus, keywords related to both science and politics were selected in order to examine their usage, contextual meanings, and interrelations in greater depth. The following keywords were considered: “credibility,” “denial,” “denialist\*,” “distrust,” “elite\*,” “evidence,” “expert\*,” “expertise,” “fake,” “political,” “politician\*,” “politics,” “science,” “scientific,” “scientist\*,” “scientific,” “trust,” “truth.”

The “Keyword in Context” option available on MAXQDA was employed to perform the KWIC analysis. A 7-word window before and after each keyword was selected to provide a more comprehensive overview than the standard 5-word setting. After downloading the table in .xlsx format and removing empty records, the result was 529 associations. After a further clean up, with the removal of 207 duplicates and 125 irrelevant contents, the final dataset consisted of 196 associations.

A manual coding process was carried out in MAXQDA, based on the results of the previous KWIC analysis. Codes were developed inductively through a close reading of titles and abstracts, revealing recurring themes and discursive patterns related to science skepticism, political identity, and media framing. Instead of coding individual sentences, the entire title/abstract was coded as a coherent discursive unit, which is concise enough for meaningful and context-informed code assignment.

This methodological choice made it possible to avoid an overly fragmented interpretation of the discourse, ensuring greater semantic consistency in the application of codes. Codes were assigned after a careful reading and evaluation of titles and abstracts, taking into account not only the presence of specific keywords but also the broader meaning and argumentative context in which they appeared.

The cleaned KWIC analysis file (.xlsx format) was subsequently imported into MAXQDA for the coding phase. The following codes were then developed: “Political and Voting Behavior,” “Trust and Distrust in Science,” “Media Framing,” “Public Opinion,” and “Disinformation.” These codes were developed to ensure comprehensive coverage of all topics discussed in the material under investigation, allowing for simultaneous use of multiple codes within the same association.

Following the coding process, a marked prevalence of the “Political and Voting Behavior” code was observed (130), followed by “Trust and Distrust in Science” code (108). “Media Framing” code was used 83 times, highlighting a strong interest toward the mediatic processes and communication. “Public Opinion” code was applied for a total of 69 documents, while the “Disinformation” code only appears in 12 documents. Therefore, it is evident that prominent attention is dedicated to the political aspect of the phenomenon under investigation, as well as its relationship with the topic of trust - or distrust - in science.

The media aspect also emerges as a popular area of research, offering insight into how scientific communication is framed and how skeptic discourse and narratives are constructed and gain popularity, particularly on social networks. The category of Public Opinion offers deep insight into the process of construction of scientific consensus, on the conditions with which citizenship accepts or rejects it, and how skeptic positions originate and gain credibility. Interestingly, not many documents involve the aspect of disinformation despite dealing with the theme of skepticism. This limited occurrence suggests that the intentional dissemination of disinformation online has not been a major focus in scientific literature concerning climate skepticism and populism. Instead, disinformation tends to be addressed implicitly within broader discussions about trust or media framing, rather than as a distinct focus.

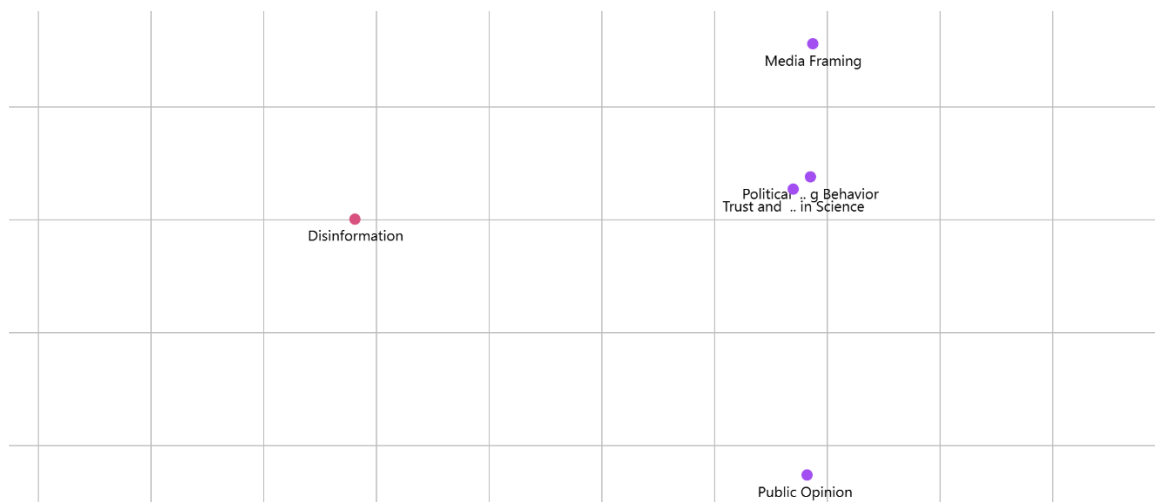


Fig. 5. Map of the codes used for the analysis on the 115 documents.

A code map (Fig. 5) was then generated using MAXQDA to visualize code co-occurrences and identify potential discursive clusters. This map, based on the co-presence of codes within the same documents, provides a spatial representation of thematic affinities emerging from the examined literature.

Notably, the codes “Political and Voting Behavior” and “Trust and Distrust in Science” are in closest proximity, with a calculated distance of 100, the lowest among all code pairs. This finding is significant as it highlights a strong correlation between political orientation and attitudes toward science. The high co-occurrence frequency of 69 further supports this connection, demonstrating that these themes frequently appear together in the analyzed corpus. This evidence supports the hypothesis that political identity and trust in scientific authority are central to the discourse within the selected literature.

The code “Media Framing” also shows considerable proximity to both “Political and Voting Behavior” and “Trust and Distrust in Science,” with distances of 126 and 123, respectively. These distances suggest that discussions of media representation often intertwine with political behavior and attitudes toward science. Although the proximity is slightly stronger regarding the “Trust and Distrust in Science” code, the association with “Political and Voting Behavior” code remains relevant. Co-occurrence frequencies reinforce this interpretation, with 46 co-occurrences reported between “Media Framing” and “Trust and Distrust in Science,” and 43 between “Media Framing” and “Political and Voting Behavior.”

A similar pattern can be observed for the code “Public Opinion,” which is closest to “Trust and Distrust in Science” (distance = 127), followed by “Political and Voting Behavior” (distance = 131). Co-occurrence frequencies reflect this trend, totaling 42 and 38, respectively. This reinforces the assumption that both political engagement and scientific trust are central reference points in public opinion discourse within the literature.

In contrast, the code “Disinformation” appears significantly more distant from all other codes, suggesting its relative isolation. Its closest association is with “Trust and Distrust in Science” (distance = 157), followed by “Political and Voting Behavior” (162), “Media Framing” (168), and “Public Opinion” (169). Despite its position, the smallest distances remain connected to the two most central codes identified above, suggesting their broader relevance across thematic clusters.

Co-occurrence frequencies further support this observation: 12 with “Trust and Distrust in Science,” 7 with “Political and Voting Behavior,” 1 with “Media Framing,” and none with “Public Opinion,” confirming the marginal role of “Disinformation” within the dataset.

The same analyses, namely KWIC and qualitative coding, were subsequently applied to a subset of 26 documents whose titles and/or abstracts included at least one occurrence of the keywords “populism” or “populist\*.”

For this second KWIC analysis, keywords were selected to effectively capture a broader range of populist rhetoric and themes, including: “anti-scienc\*,” “corrupt\*,” “democrac\*,” “democratic,” “elite\*,” “establishment,” “technocrac\*,” “technocratic,” and “truth.” The asterisks at the end of some words are intended to include all possible forms of the keyword, such as singular and plural forms, as well as nouns, verbs, and adjectives. MAXQDA extracted 37 associations. After downloading the table in .xlsx format, 12 irrelevant entries were manually removed, resulting in a final total of 25 associations.

Four codes were developed to encompass the thematic complexity of the subset. The code “Political and Voting Behavior” was reused, reflecting the centrality of the political dimension. The code “Elite vs People” was introduced to specifically address this recurring rhetorical structure within the documents. In place of the more general “Trust and Distrust in Science,” the code “Science and Expertise Skepticism” was adopted to more precisely describe the attitudes identified in the dataset. Lastly, the code “Media and Narratives” was employed to focus on the content and processes underlying populist rhetoric. Importantly, these codes could coexist within the same document.

Once again, a marked predominance of the code “Political and Voting Behavior” was observed (22), followed by the code “Elite vs People” (11). This is particularly interesting because it highlights the deep connection between anti-elite rhetoric and the political sphere. The code “Science and Expertise Skepticism” also appeared significantly (10), demonstrating the centrality of this topic in studies of populism. Lastly, the code “Media and Narratives” (9) was the least utilized; however, the difference compared to “Elite vs People” and “Science and Expertise Skepticism” is not significant. Therefore, it can be assumed that studies of populist narratives and the framing of climate change are at least as important as those focused on the aforementioned subjects.



Fig. 6. Map of the codes used for the analysis on the 26 populism-related documents.

Another code map (Fig. 6) was generated with MAXQDA to explore this smaller subset of codes as well. The code “Political and Voting Behavior” displays the closest proximity to all other codes in the system. The shortest distance, 17, is recorded with the code “Elite vs People,” suggesting a strong connection between political aspects and the opposition between elites and ordinary citizens. This relationship is further supported by the co-occurrence frequency of 11, the highest among all code pairs, indicating that these themes frequently co-occur in the analyzed corpus.

The second closest proximity is to “Science and Expertise Skepticism” (18), which has a related co-occurrence frequency of 10. This finding aligns with previous analysis on the 115 documents, where the political field appeared to be closely connected to attitudes toward science. However, in this case, the political aspect is specifically linked to skepticism, rather than just an ambivalent trust or distrust toward science and expertise. This finding is particularly interesting, as it highlights that populist approaches tend to adopt skeptical views, rather than expressing a more general distrust. The code “Media and Narratives” follows with a proximity of 21 and a co-occurrence frequency of 7, demonstrating a slighter, yet significant, connection between the discourse about politics and the process of construction of media narratives.

The code “Elite vs People” not only shows the highest proximity to “Political and Voting Behavior,” but also exhibits similar proximity to “Science and Expertise Skepticism” and “Media and Narratives,” with distances of 23 and 26, and co-occurrence frequencies of 5 and 2, respectively. These distances indicate a connection among these themes, although not as strong as the one with

political behaviors. It is noteworthy that the lowest proximity is observed with the media aspect, suggesting that political attitudes play a more significant role in the rhetoric of elites versus citizens than media communication itself.

Similarly, the code “Science and Expertise Skepticism” shows the highest proximity and co-occurrence with “Political and Voting Behavior” (distance = 18; co-occurrence frequency = 10). This finding aligns with the previous analysis, which revealed that political behavior and attitudes toward science are deeply intertwined in public opinion discourse within the literature. The code “Elite vs People” is slightly further away, with a distance of 23 and a co-occurrence frequency of 5. Therefore, it appears that, despite the lower number of documents, some do discuss the correlation between skepticism and populist rhetoric. Surprisingly, the code “Media and Narratives” is the most distant, with a distance of 28 and a co-occurrence frequency of 0; this indicates that no document in this subset examines the direct relationship between skepticism toward science and related media frames.

Predictably, the code “Media and Narratives” is the furthest from the other codes in the coding system. Its closest association is with “Political and Voting Behavior” (distance = 21), followed by “Elite vs People” (distance = 26) and “Science and Expertise Skepticism” (distance = 28). The corresponding co-occurrence frequencies reflect this finding: 7, 2, and 0, respectively. Thus, it may be concluded that the political aspect remains the most crucial focal point of the discussion, even when the focus is strictly on populism.

## **1.5. Discussion**

In conclusion, an attempt will now be made to provide answers to the research questions. The bibliometric and textual analysis conducted on 1,289 documents highlights an evolving, dynamic, and complex research landscape regarding the politicization of climate change.

Regarding the first two research questions (RQ1, “What are the main research interests and thematic focuses in the scientific literature regarding the phenomenon under investigation?” and RQ2, “What are the most likely future developments in this literature?”), the bibliometric and textual analyses provided comprehensive answers.

For RQ1, scientific production appears to relate primarily to issues from countries with the highest number of publications, such as the U.S., the UK, Germany, Australia, and Canada. Therefore, it may be observed that the major topics of interest reflect those prevalent in major Western democracies. This geographical distribution could indicate a potential limitation in the global representativeness of the literature, which future research may address by incorporating more diverse perspectives from the Global South and other less-represented socio-political contexts.

Scientific production also seems to have recorded varying topics of interest over time. However, the occurrence analysis suggests that the most frequent topics concern policy, politics, and media. Individual attitudes toward climate-related issues constitute another significant portion of the scientific literature, along with support for climate initiatives and risk perception. Additionally, there appears to be notable attention toward energy discourse and interest in science and scientific communication.

This prominence is further emphasized by topic modeling. Topic 1 is centered on the energy debate, specifically addressing public discussion comparing renewable and non-renewable energy sources.

Sustainable technologies also appear to be part of this discourse. Conversely, Topic 2 focuses entirely on themes such as individual acceptance, attitudes, and risk perception, particularly regarding local environmental policies. Interest in individual attitudes is also present in Topic 1, likely linked to sustainable technologies and transitions.

Similarly, Topic 3 addresses the sustainable management of natural resources, along with adaptation and conservation strategies. Alongside Topic 2, the policy aspect is also present in Topic 3, with a specific focus on the local dimension.

Topic 4 emphasizes political and policy aspects with an international orientation and explores the relationship between climate science, public trust, and media communication. Topic 5 investigates how scientific discourses are framed and perceived by the general public, including public trust in the scientific community, as well as individual attitudes and beliefs.

Topics 6 and 7 focus on the situations in the U.S. and the EU, respectively. In the U.S., the theme of politics appears to be crucial, as partisanship seems closely linked to attitudes toward climate-related issues. In the EU, the main focus is on policy and citizens' support for environmental initiatives. Finally, Topic 8 addresses the role of digital media and how online discourse may shape and polarize climate debates.

These findings seem to align with and support the results of the occurrence analysis, highlighting the major thematic fields of interest and exploring their complex nuances. They also reflect the inequalities noted in the bibliometric analysis, as two of the eight topics focus exclusively on the U.S. and the EU, which may highlight a geographical imbalance in the main topics of interest.

Regarding RQ2, the trend topics section from the bibliometric analysis offers valuable insights. The most recently emerged and still active themes include, among others, media influence, misinformation, selective exposure, and the resulting urge for the depoliticization of climate-related issues, alongside the need for pragmatic and concerted climate action. Taking into account the results of occurrence analysis and topic modeling as well, it may be assumed that the future development in literature will likely show increased attention to political phenomena, discourses, and narratives, aiming to better understand how ideological divisions affect the implementation of environmental policies and technologies.

Transitioning to RQ3 (“How are discourses about politics, science, and expertise framed and articulated in the literature?”), the section of the analysis comprising KWIC and QCA appears to offer a satisfactory answer. This phase, conducted on a subset of 115 documents focused on skepticism toward science and populism, and then on a smaller one (26 documents) exclusively centered on the latter, allowed for a deeper understanding of how political and scientific themes are framed within the literature under investigation.

The KWIC phase served as a bridge between textual exploration and thematic categorization by providing contextualized fragments on which the subsequent qualitative analysis was based. This approach facilitated a deeper interpretation of how discourses on science, politics, and expertise are constructed within the selected literature. These fragments served as an empirical basis for the coding process, guiding the development of thematic categories in the QCA.

For the larger subset, the following codes were created: “Political and Voting Behavior,” “Trust and Distrust in Science,” “Media Framing,” “Public Opinion,” and “Disinformation.”

After manually coding the titles and abstracts, it seems evident that the political dimension constitutes the most significant portion of the scientific literature under review, appearing 130 times. This dimension is also the most interconnected with trust and distrust in science, as they are closely aligned in the coding map with a co-occurrence frequency of 69. This may suggest that political identity is strongly linked to individual attitudes toward science and expertise. Additionally, the topics of media framing and public opinion appear to be closely related to political behavior and trust in science. In

contrast, the theme of disinformation seems marginal and is primarily addressed indirectly within discussions about politics, trust in science, and media.

In the smaller subset, only the code “Political and Voting Behavior” was reused; the other three codes were developed anew to effectively capture the specificity of the populist themes. The new codes are: “Elite vs People,” “Science and Expertise Skepticism,” and “Media and Narratives.”

Once again, the political aspect remains prominent in this subset, with an occurrence of 22. It also appears as the most central node in the coding map, showing the highest proximity to “Elite vs People,” followed by “Science and Expertise Skepticism” and “Media and Narratives.” Notably, the latter is the most isolated code: its co-occurrence with “Science and Expertise Skepticism” is zero, which may suggest that the relationship between scientific skepticism and media framing remains largely unexplored in the analyzed literature. However, it shows the highest proximity to “Political and Voting Behavior,” which could highlight the focus on how political themes are constructed and framed by the media.

## **1.6. Conclusions**

In conclusion, these findings offer a comprehensive overview of how the politicization and polarization of climate change are discussed in the current scientific literature.

The strong emphasis on themes related to political identity, emerging from both topic modeling and QCA, seems to indicate that the issue is mostly addressed from a political perspective. The consistent presence of research on populist narratives may constitute a significant finding, in line with Bennett and Livingston’s (2025) concern regarding the potential erosion of fundamental democratic principles due to illiberal discourse. Trust in science and media dynamics also appear to represent a relevant part of scientific discourse, along with attention to individual support for environmental policies, sustainable energy sources, and technological innovations.

However, the analysis also presents some limitations. Firstly, as suggested by the bibliometric analysis, the literature seems to be focused on issues affecting Western democracies, especially the U.S. and the EU, while the Global South remains underrepresented. Secondly, while political and

ideological framing is widely discussed, there appears to be a lack of research addressing the explicit role of disinformation and its broader societal consequences, as reflected in the relative isolation of the code “Disinformation” within the coding map that emerged from the QCA.

This chapter aimed to provide a better understanding of the theoretical foundation on which the following empirical sections are based. The next chapter will present a comparative analysis of public opinion between Italy and the U.S., focusing on how online discourse is articulated within these two socio-political contexts.

## **2. Polarization and Politicization of Public Opinion Online: A Comparison Between Italy and the U.S.**

### **2.1. Introduction**

Climate change has increasingly become a highly relevant topic in global public discourse, not only as a scientific issue but also as one intertwined with social, political, and economic implications. As discussed in the previous chapter, the politicization of climate issues has contributed to the polarization of public opinion, particularly in national contexts where political ideologies dominate public debate.

Several studies included in the previous chapter offer particularly valuable insights into the polarization of public opinion around climate change. McCright and Dunlap (2011) and Tesler (2017), for example, have demonstrated the significant influence of political orientation on the perception of climate change, particularly in the U.S. context, where conservative media often amplify skepticism

toward climate science. Similarly, Hoffarth and Hodson (2016) explored how perceived threats from environmentalism contribute to the political polarization of climate change. Boykoff and Boykoff's (2004) research also highlighted how media coverage, particularly in the U.S., can introduce biases and reinforce existing divisions, thereby influencing public understanding of climate science.

Drawing from STS concepts such as accounting for expertise and co-production, this chapter aims to explore how political and scientific narratives are constructed and contested in the online public discourse of Italy and the U.S., particularly when debate is stimulated by media with different political orientations. The objective is to identify both differences and similarities between the two national contexts in terms of content, tone, and thematic focus.

Specifically, the research has three objectives: first, to identify the main topics covered by the media sources in both countries; second, to understand how political ideologies shape public opinions in Italy and the U.S. regarding climate change; and third, to analyze the role of the media in reflecting and amplifying these divisions.

This study adopts a mixed-methods approach to analyze the politicization of climate change in Italy and the U.S. In order to transition from the analysis of the scientific literature (Chapter 1) to that of online discourse, new empirical research questions were formulated:

RQ1. Is climate change a politicized topic in both countries?

RQ2. If so, how does the political orientation of sources influence the online public debate and shape the main differences between the two countries?

RQ3. What are the main issues covered by the media sources in both countries?

RQ4. Who are the main human and non-human actors involved in this topic?

To answer the research questions, the study employs a textual analysis methodology applied to comments on climate change media content items selected from the Facebook pages of Italian and American media outlets, categorized by political orientation (conservative, progressive). The analysis includes a keyness analysis along with topic modeling to identify the main themes and trends. Finally, a KWIC analysis was performed on a smaller selection of words from the field of science and politics.

A mixed-methods approach was adopted once again to provide comprehensive answers to the research questions. The keyness analysis addresses RQ1 and RQ2, offering a quantitative basis for detecting politicization and identifying how political orientations shape public discourse. Topic

modeling was selected to answer RQ3 and RQ4, focusing on the main topics and actors involved in the dynamics of both countries, as well as to address RQ2 with regard to the key differences between the Italian and American cases. Additionally, KWIC analysis was performed to examine the specific discourse patterns of American comments related to RQ2.

The chapter is structured as follows: after this Introduction, the Material and Methods section illustrates the data collection and analysis process. Finally, the results are presented, followed by a discussion that attempts to answer the research questions and reflect on the future implications of the findings for understanding the politicization of climate change.

## **2.2. Material and Methods**

To answer the research questions, a content analysis of user comments collected online was conducted in order to investigate the determinants of polarization in public opinion on climate change and to identify the actors involved and their strategies. Facebook was selected as the platform of analysis based on methodological and strategic considerations. According to We Are Social, Facebook remains the most widely used social networking platform worldwide in 2025 (Kemp, 2025). Prior research in political communication and computational social science indicates that its algorithmic structure, through mechanisms such as filter bubbles (Russo et al., 2025) and echo chambers, is particularly conducive to ideological homogeneity and the intensification of polarization.

A total of 33,394 comments were collected the Facebook pages of Italian and American media sources with the web scraping (Khder, 2021) online tool Export Comments. The corresponding media content, ranging from news articles to posts, images, and short videos, spans the period from October 2023 to June 2024. A total of nine items were selected for each media source, resulting in 72 content items overall. To find them, the following keywords were used: “climate change;” “ecoactivism;” “ecoactivists;” “ecologism;” “ecoterrorism;” “ecoterrorists;” “environmentalism;” “Green Deal;” “sustainability;” “sustainable development.”

The selection was based on the number of comments, with a minimum requirement of 40 comments per item. There were two main reasons for this approach: first, choosing popular media content, and second, a substantial number of comments provided ample material for the study. In this first phase of the research, the attention was focused on the comments rather than the media content itself in order to explore how it stimulated public discussion.

To focus specifically on the politicization of the topic, the sources were classified based on their political orientation. For each country, two conservative and two progressive sources were identified. This classification is based on the fact that Italy operates under a multiparty system (Veronese, 2008: 124), in contrast to the U.S.' traditional two-party system, which poses obstacles to the creation of new parties (Breux and Bherer, 2013). Therefore, this analysis reflects the more pronounced diversity of the Italian system, adopting a general juxtaposition between conservatives and progressives. Specifically, *Il Sole 24 Ore* was classified as a conservative source because it is owned by Confindustria, the Italian employers' federation (Cerasa, 2024), which is historically opposed to labor unions, aligns with entrepreneurs (Brondi et al., 2014: 41), and is perceived as such by the general public (Massara, 2019).

The specific outlets for each country are listed in the following tables (Tabs. 1-2).

| <b>Italian sources</b> |                    |
|------------------------|--------------------|
| <b>Conservative</b>    | <b>Progressive</b> |
| Il Sole 24 Ore         | Il Post            |
| Libero Quotidiano      | La Repubblica      |

Tab. 1. The Italian sources selected for the study.

| <b>American sources</b> |                    |
|-------------------------|--------------------|
| <b>Conservative</b>     | <b>Progressive</b> |
| Breitbart               | The New York Times |
| The Daily Caller        | Washington Post    |

Tab. 2. The American sources selected for the study.

The comments underwent a cleaning process, during which irrelevant content, such as spam, duplicates, and comments consisting only of stopwords, were removed. This resulted in a final dataset of 9,666 comments in Italian and 16,723 comments in English. For the analysis, the Quanteda package

(Benoit et al., 2018) in R (R Core Team, 2021) was employed. Words occurring fewer than 5 times were removed, as well as those with fewer than 3 letters.

The keyness analysis aimed “to identify those words in the text that are unusually frequent as compared to their frequency in the reference corpus” (Bowker, 2018: 362), therefore allowing for an answer to RQ1 and RQ2 (respectively, “Is climate change a politicized topic in both countries?” and “If so, how does the political orientation of sources influence the online public debate?”).

The topic modeling analysis made it possible to identify the main themes discussed within the two national contexts, highlighting the key terms in climate change narratives and providing detailed answers to RQ3 (“What are the main issues covered by the media sources in both countries?”), RQ4 (“What are the main human and non-human actors involved in this topic?”), and adding further insights to RQ2, with specific regard to the major differences between Italy and the U.S. Specifically, the topic modeling sought to uncover the underlying semantic structures within the documents and cluster these themes into distinct topics (Kherwa and Bansal, 2019: 2).

Lastly, a KWIC analysis was conducted on comments related to American sources, enabling the retrieval of contexts for investigating semantic relations within the corpus (Bowker, 2018: 367). This additional step was introduced to explore the U.S. context more thoroughly, as both the keyness and topic modeling analyses revealed a higher degree of polarization. The aim was to gain a clearer understanding of how American media discourse approaches scientific and political themes, especially considering the antagonistic narratives frequently found in conservative outlets. For this step, keywords related to the fields of science, politics, and specific public figures were manually selected. Subsequently, the “ChatGPT Analysis” tool (powered by OpenAI’s GPT-4) was employed to automatically generate concordance lines for each keyword. This process helped identify recurring linguistic patterns and semantic relationships within the corpus. It is important to note that the tool was used solely as a technical support to extract concordance lines, and all interpretations were carried out manually. This approach allowed for a deeper examination of the discursive patterns surrounding key actors and themes in the American discourse, thereby addressing RQ2 in greater detail.

## 2.3. Results

### 2.3.1. Keyness Analysis

To address RQ1 and RQ2, a keyness analysis was conducted according to the political orientation of the sources of each country to identify the words that are more likely to occur in each group. For the Italian words, their English translations are provided.

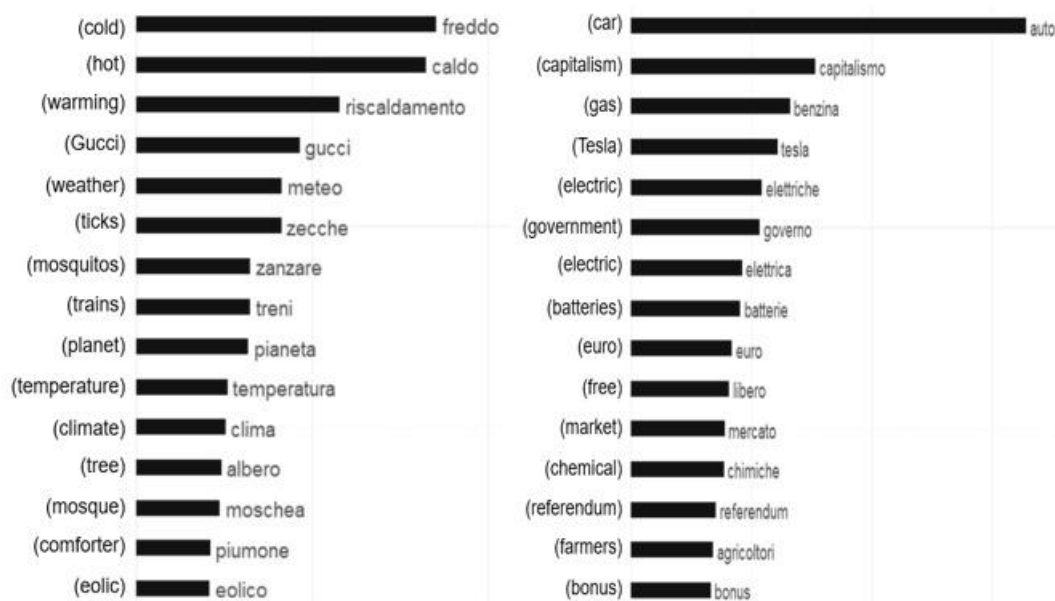


Fig. 1. Keyness analysis of comments from Italian progressive (left) and conservative (right) sources (n = 15).

The keyness analysis (Fig. 1) for the comments on progressive outlets reveals a frequent use of scientific and technical terms such as “weather” and “temperature.” Wind energy is also mentioned. There is also interest in activism. This is evident in references to the Gucci Christmas tree and mosques. The latter case likely carries a negative connotation, as it possibly refers to comments suggesting that activists who interrupted Christmas Mass in a church in Padua should do the same in a mosque. “Comforter” is another interesting word, especially considering that many commentators denied the existence of climate change due to the winter cold.

On the other hand, the comments on conservative sources are mostly focused on the economy, as indicated by words such as “capitalism” and “market.” They are also the ones with the most pronounced degree of politicization, as suggested by the presence of terms like “government” and “referendum.” It is also possible to note the mention of farmers, probably in relation to their protests

throughout Europe in the first months of 2024. The interest toward the electric vehicles is evident, as well as the comparison between those and the traditional engines exemplified by the words “gas” and “batteries.” Unlike the comments on progressive outlets, there is no mention of the activism topic.

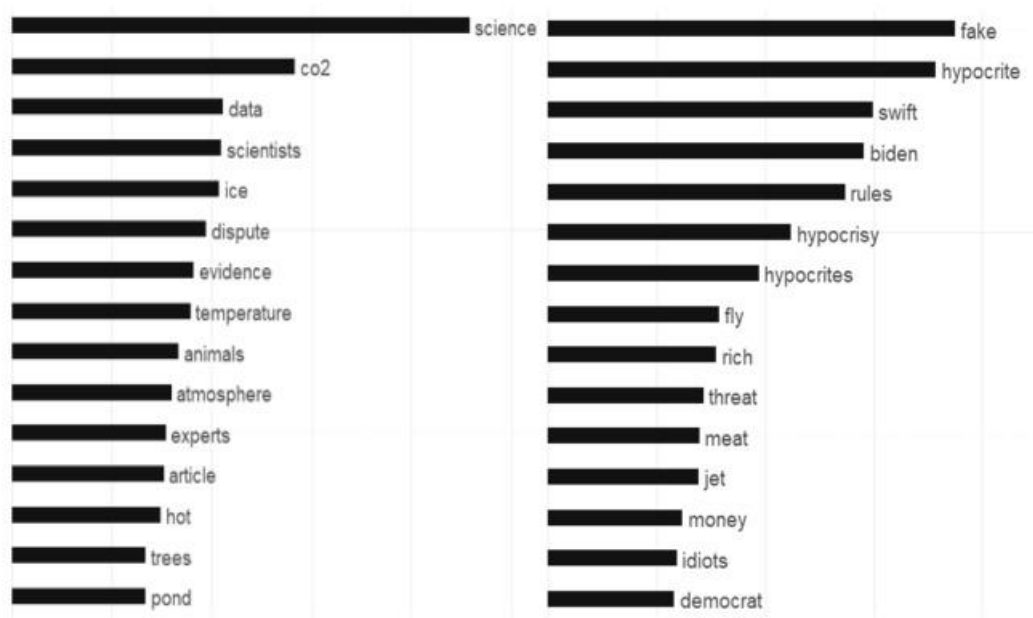


Fig. 2. Keyness analysis of comments from American progressive (left) and conservative (right) sources (n = 15).

Regarding the U.S. (Fig. 2), comments on progressive sources emphasize a greater focus on science. In addition to technical terms and “scientists,” the mention of “experts” is also notable. It is interesting to note the presence of the term “dispute,” indicating a lack of consensus on the issue of climate change. There also appear to be a focus on nature and environment protection, as evident from the terms “animals,” “trees,” and “pond.”

Concerning comments on conservative sources, the keyness analysis shows a strong degree of politicization, as evidenced by the mention of Biden and the Democrat Party, along with accusations of hypocrisy among the wealthier social classes. There is also a focus on economy, as suggested by the word “money.”

The analysis results show that comments on progressive media focus on scientific and environmental themes, while those on conservative media tend to frame climate change as an economic and political issue. This distinction highlights the connection between the politicization of climate change and the political orientation of the media, which shapes public opinion by promoting narratives that align with their audience's ideological values. As a result, RQ1 and RQ2 were addressed, revealing a

significant difference in the language used by media with different political orientations and confirming the politicization of the topic.

### 2.3.2. Topic Modeling

To investigate the major differences between the two countries analyzed (RQ2), the main issues covered by the media sources (RQ3), and the main human and non-human actors involved in the discourse (RQ4), we performed a topic modeling analysis for each country. As previously described (see Chapter 1), the LDA topic modeling approach was employed. Compared to Chapter 1, ten topics, each consisting of twenty words, were selected in this case due to the greater specificity and more detailed results that this configuration was able to provide. A translation of the Italian results is provided.

| Topic 1                   | Topic 2                    | Topic 3                | Topic 4                     | Topic 5                  |
|---------------------------|----------------------------|------------------------|-----------------------------|--------------------------|
| Scienziati (scientists)   | Caldo (hot)                | Governo (government)   | Pannelli (panels)           | Rispetto (respect)       |
| Riscaldamento (warming)   | Freddo (cold)              | Italia (Italy)         | Sistema (system)            | Gucci                    |
| Climatici (climate)       | Clima (climate)            | Legge (law)            | Green                       | Danni (damages)          |
| Cambiamenti (changes)     | Temperature (temperatures) | Politica (politics)    | Alberi (trees)              | Zecche (ticks)           |
| Clima (climate)           | Riscaldamento (warming)    | Politici (politicians) | Problema (problem)          | Città (city)             |
| Aumento (increase)        | Italia (Italy)             | Italiani (Italians)    | Terreno (soil)              | Generazione (generation) |
| Studi (studies)           | Neve (snow)                | Colpa (fault)          | Solari (solar)              | Giovani (young people)   |
| Serra (greenhouse)        | Temperatura (temperature)  | Meloni                 | Pale (turbines)             | Attivisti (activists)    |
| Gas                       | Meteo (weather)            | Lobby                  | Sardegna (Sardinia)         | Dio (God)                |
| Scienza (science)         | Estate (summer)            | Referendum             | Fotovoltaici (photovoltaic) | Zanzare (mosquitos)      |
| Pianeta (planet)          | Dato (data)                | Pubblico (public)      | Agricoltori (farmers)       | Figli (children)         |
| Idea                      | Pioggia (rain)             | Verità (truth)         | Sicilia (Sicily)            | Pubblici (public)        |
| Studio (study)            | Termosifoni (radiators)    | Italiana (Italian)     | Piante (plants)             | Coglioni (moron)         |
| Temperatura (temperature) | Siccità (drought)          | Sicurezza (safety)     | Terreni (lands)             | Palle (balls)            |
| Nobel                     | Inverno (winter)           | Destra (right)         | Eoliche (eolic)             | Moschea (mosque)         |

|                          |                      |                     |                                |                        |
|--------------------------|----------------------|---------------------|--------------------------------|------------------------|
| Effetto (effect)         | Sicuro (safe)        | Lavoro (labor)      | Agricoltura<br>(agriculture)   | Galera (prison)        |
| Scientifica (scientific) | Periodo (period)     | Popolo (people)     | Piantare (to plant)            | Schifo (disgust)       |
| Ricerca (research)       | Sud (south)          | Accordo (agreement) | Fotovoltaico<br>(photovoltaic) | Scusa (excuse)         |
| Prove (evidence)         | Roma (Rome)          | Bonus               | Politica (politics)            | Imbecilli (imbeciles)  |
| Ghiaccio (ice)           | Ghiacciai (glaciers) | Nucleare (nuclear)  | Tasse (taxes)                  | Pubblicità (publicity) |

Tab. 3. The topic modeling analysis performed on the Italian comments (Topic 1 - Topic 5).

The topic modeling analysis provides further insights in the Italian case. Table 3 displays the first five topics.

Topic 1 centers on science and research, featuring words such as “evidence,” “studies,” “Nobel,” along with technical terms such as “greenhouse effect.” This topic deals with the scientific aspect of climate discussions and the formal academic conversation. The focus also lies in how research is conducted, as the importance of data and empirical evidence appears to be a crucial component of the topic.

Topic 2 focuses on climate issues *stricto sensu*, including aspects such as weather, atmospheric phenomena, and temperatures. This topic deals with the actual, observable effects of climate change that are visible and measurable, such as unusual weather patterns and seasonal trends, extreme weather events, atmospheric conditions, and temperature changes. Occurrences such as drought episodes are mentioned, along with references to glaciers, most likely in relation to their melting due to global warming.

Topic 3 addresses political polarization, with terms like “politicians” and “government” highlighting the politicization of climate issues. Words such as “truth” and “fault” reflect how public debate is often framed by commentators, suggesting a lack of a unified, science-based perspective on the phenomenon. This topic references political figures like Meloni and general politics while also touching on the influence of lobbies, offering insight into the perceived impact of economic and political interests on climate issues. Additionally, the topics of labor and nuclear energy are present, highlighting their connection to the political dimension.

Topic 4 explores various renewable energy sources, with particular emphasis on solar panels and wind turbines. The implications for agriculture are also discussed. The terms “politics” and “taxes” highlight the significant connection between this topic and both political and economic dimensions.

Topic 5 explores activism and its criticism. Mentions of groups like Last Generation and actions such as the vandalism of the Gucci Christmas tree in Milan are included. Terms like “prison” and “disgust,” along with insulting language, suggest a generally negative perception of this type of activism and

support for its punishment. The mention of the word “mosque” might relate to the interruption of the Christmas Mass in Padua in 2023, as many commentators provocatively questioned why activists did not stage their protest in a mosque.

| Topic 6                | Topic 7                    | Topic 8                  | Topic 9                             | Topic 10                  |
|------------------------|----------------------------|--------------------------|-------------------------------------|---------------------------|
| Auto (car)             | Capitalismo (capitalism)   | Europa (Europe)          | Scie (trails)                       | Energia (energy)          |
| Elettriche (electric)  | Cazzate (bullshit)         | Italia (Italy)           | Ignoranza (ignorance)               | Nucleare (nuclear)        |
| Elettrica (electric)   | Inutile (useless)          | Cina (China)             | Chimiche (chemical)                 | Elettrica (electric)      |
| Euro                   | Sostenibile (sustainable)  | Pianeta (planet)         | Clima (climate)                     | Carbone (coal)            |
| Benzina (gas)          | Fake                       | Inquinamento (pollution) | Libero (free)                       | Petrolio (oil)            |
| Elettrico (electric)   | Albero (tree)              | Green                    | Nuvole (clouds)                     | Rinnovabili (renewables)  |
| Mercato (market)       | Risposta (answer)          | India                    | Cielo (sky)                         | Fossili (fossil)          |
| Tesla                  | Poveri (poor)              | Europea (European)       | Balle (balls)                       | Gas                       |
| Diesel                 | Difficile (difficult)      | Emissioni (emissions)    | Propaganda                          | Problema (problem)        |
| Batterie (batteries)   | Ricchi (wealthy)           | Problema (problem)       | Idioti (idiots)                     | Fonti (sources)           |
| Macchine (cars)        | Ignorante (ignorant)       | Guerra (war)             | Giornale (newspaper)                | Combustibili (fuels)      |
| Macchina (car)         | Scuola (school)            | Cinesi (Chinese)         | Cloud                               | Eolico (eolic)            |
| Futuro (future)        | Ambiente (environment)     | Trasporto (transport)    | Giornalisti (journalists)           | Nucleari (nuclear)        |
| Costi (costs)          | Intelligente (intelligent) | Guerre (wars)            | Terrorismo (terrorism)              | Produzione (production)   |
| Costo (cost)           | Società (society)          | Europei (Europeans)      | Seeding                             | Centrale (plant)          |
| Incentivi (incentives) | Significato (meaning)      | Treni (trains)           | Fatti (facts)                       | Emissioni (emissions)     |
| Gasolio (diesel)       | Libertà (freedom)          | Treno (train)            | Complottisti (conspiracy theorists) | Elettricità (electricity) |
| Motore (engine)        | Lavoro (labor)             | Aria (air)               | Credere (to believe)                | Scorie (waste)            |
| Prezzi (prices)        | Sapere (to know)           | Inquinare (to pollute)   | Negazionisti (deniers)              | Germania (Germany)        |
| Termico (thermic)      | Diritto (right)            | Inutili (useless)        | Giornali                            | Idrogeno                  |

Tab. 4. The topic modeling analysis performed on the Italian comments (Topic 6 - Topic 10).

Table 4 presents topics six to ten.

Topic 6 centers on electric vehicles and the comparison between electric and non-electric vehicles. It also includes discussions on prices, incentives, and batteries, highlighting the economic and structural concerns underlying the green transition.

Topic 7 focuses on the political and economic dimensions of the climate debate, highlighting wealth disparities and the impact of green policies on different social classes. The topic of labor is also addressed, reflecting commentators’ significant concern about its future developments.

Topic 8 addresses issues related to pollution, as illustrated by words such as “pollution,” “emissions,” and “to pollute.” Particular emphasis appears to be placed on various means of transportation, suggested by words like “trains” and “air”. It also includes international comparisons of sustainable energy between Italy and non-EU countries, especially China and India, as well as discussions of the global context. Mentions of war likely refer to its impact on resource availability.

Topic 9 features debates with climate change deniers and references conspiracy theories, such as chemtrails. Accusations of ignorance are present, along with typical deniers’ terms like “propaganda” and “terrorism.” The topic also touches on experimental strategies, such as cloud seeding.

Topic 10 explores different sources of renewable energy, focusing particularly on wind and nuclear options. Emphasis is placed on the latter, as indicated by terms like “plant” and “waste.” Germany is also mentioned, likely due to its 2023 decision to shut down nuclear energy production across the country.

| Topic 1        | Topic 2     | Topic 3    | Topic 4     | Topic 5     |
|----------------|-------------|------------|-------------|-------------|
| Biden          | Earth       | Hypocrite  | Carbon      | Trump       |
| America        | CO2         | Rules      | Fly         | Right       |
| Country        | Ice         | Liberal    | Jet         | Public      |
| Death          | Global      | Hypocrisy  | Needs       | Cult        |
| Threat         | Weather     | Swift      | Swift       | Truth       |
| Democrats      | Planet      | Hypocrites | Footprint   | God         |
| Democrat       | Atmosphere  | Elite      | Think       | Evil        |
| President      | Humans      | Left       | Jets        | Children    |
| Trump          | Human       | Elites     | Plane       | Free        |
| Corrupt        | Trees       | Liberals   | Job         | Fact        |
| Border         | Carbon      | Shit       | Need        | Law         |
| Illegal        | Hot         | Idiot      | Electric    | Young       |
| Administration | Changes     | Rich       | Pollution   | Need        |
| Rape           | Temperature | Joke       | Fuel        | Fraud       |
| Vote           | Earth       | Stupid     | Preach      | Cause       |
| Mutilation     | Cause       | Leftist    | Walk        | Information |
| Party          | Average     | Peasants   | Environment | Desist      |
| Economy        | Increase    | Bullshit   | Planet      | Maga        |
| Americans      | Past        | Truth      | Travel      | Rights      |
| Race           | Air         | Follow     | Air         | Order       |

Tab. 5. The topic modeling analysis performed on the American comments (Topic 1 - Topic 5).

The topic analysis also provides deeper insight in the American case, with Table 5 displaying the first five topics.

Topic 1 revolves around the general political debate, specifically the Presidential election taking place in November 2024. Both Biden and Trump are mentioned, as well as the verb “vote” and the word “threat”, which commentators often use to describe the opposing party’s candidate. Criticism against the Democrat administration is also detected, particularly regarding illegal immigration and accusations of corruption. There are also traces of antisemitism. The word “rape” likely refers to the sexual violence accusations made against Donald Trump<sup>13</sup>.

Topic 2 specifically addresses climate change from a scientific perspective, as indicated by the presence of words such as “CO2,” “weather,” and “temperature.” This topic focuses on the physical and measurable aspects of climate science, including greenhouse gases such as carbon dioxide, atmospheric conditions, global temperature changes, and the role of natural systems like ice and trees in climate processes. The topic also includes references to the impact of human activities on ecosystems and to the gradual increase in temperatures over time.

Topic 3 entirely revolves around the behavior of wealthy individuals and celebrities regarding climate issues, with a particular focus on the singer Taylor Swift. This topic discusses the perceived hypocrisy of elites, as exemplified by the word “rules”, which likely refers to the numerous comments, especially from conservative outlets, referencing the phrase “rules for thee, not for me”. The political connotations are evident in words like “left,” “Liberals,” and “leftists,” the latter often carrying a denigratory meaning.

Topic 4 focuses on the environmental impact of air travel and is closely connected to Topic 3 and specifically addresses celebrities’ behavior. The focus here is the singer Taylor Swift, whose use of private jets is seen as a symbol of the disconnect between public figures advocating for climate action and their personal carbon footprints. The verb “preach” is also present, often used in a derogatory sense to highlight the perceived hypocrisy of wealthy individuals regarding climate issues.

Topic 5 shifts the political focus to the climate issue, which appears to generate a more intense debate and rhetoric. Notably, the word “cult” is used to describe climate change supporters by conspiracy

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<sup>13</sup> The term “rape” likely refers to the sexual violence accusations made against Donald Trump by the writer Jean Carroll, and the subsequent trial. In May 2023, a civil jury found Trump liable for sexual abuse, forcible touching, and defamation., Green, L. (2025). Not My Type by E Jean Carroll review – memoir takes a hatchet to Trump. *The Guardian*, June 22. <https://www.theguardian.com/books/2025/jun/22/not-my-type-e-jean-carroll-review-trump> (accessed on November 4, 2025).

theorists, alongside terms like “fraud”. The presence of Trump and the slogan “MAGA” suggests a strong connection between this topic and Trump’s supporters. Additionally, the juxtaposition of “God” and “evil” points to a religion-related perspective on the issue. The content of this topic aligns with the development of a distinct anti-climate vocabulary, as suggested by Knüpfer and Hoffmann (2024).

| Topic 6    | Topic 7       | Topic 8 | Topic 9     | Topic 10   |
|------------|---------------|---------|-------------|------------|
| Money      | Life          | Fake    | Power       | Science    |
| Believe    | Oil           | Meat    | Gas         | Scientists |
| Government | Water         | Eat     | Energy      | Read       |
| Hoax       | Wind          | Food    | Coal        | Believe    |
| Control    | Ocean         | Crap    | China       | Understand |
| Crisis     | Whales        | Animals | Green       | Evidence   |
| Tax        | Need          | Right   | Solar       | Facts      |
| Idiots     | California    | Hope    | Need        | Think      |
| Scam       | Dead          | Need    | Wind        | Right      |
| Rich       | Stupid        | Beef    | Oil         | Data       |
| Lie        | Kill          | Cows    | Electric    | Article    |
| Stupid     | Environmental | Feed    | Fossil      | Morons     |
| Lies       | Think         | Gates   | Nuclear     | Research   |
| Life       | Environment   | Bugs    | Cost        | Claim      |
| Waste      | Sea           | Bezos   | Plants      | Global     |
| Planet     | Jail          | Garbage | Electricity | Fact       |
| Poor       | Idea          | Buy     | Natural     | Support    |
| Political  | Farms         | Bill    | Cars        | Ignorance  |
| Dumb       | Right         | Left    | Fuels       | Ignorant   |
| Taxes      | Idiots        | Farmers | Fuel        | Scientific |

Tab. 6. The topic modeling analysis performed on the American comments (Topic 6 - Topic 10).

Table 6 presents topics six to ten.

Topic 6 centers on the economic aspects of green measures, mentioning words such as “money” and “tax”. Climate skepticism is also evident, expressed through terms like “hoax,” “lies,” and “scam.” Another emerging theme is the contrast between the “rich” and “poor” classes in terms of economic access to the green transition.

Topic 7 focuses on the discussion and comparison between fossil fuels and wind energy. It also explores the economic and environmental implications associated with these energy options, as suggested by the terms “kill” and “whales.” These terms likely refer to the potential risks that wind turbines could pose to these animals. California is also mentioned as a state likely to invest in wind energy.

Topic 8 focuses on sustainable eating and its criticism, with specific references to fake meat and bugs. Livestock farming is also discussed, particularly in relation to its negative impact on climate change in terms of water consumption and animal rights. It is also interesting to notice that this topic has a social connotation: the mentions of Gates and Bezos might highlight concerns regarding fake meat being a low-quality food intended for lower classes.

Topic 9 focuses entirely on the comparison between fossil fuels and renewable energy sources. Wind, solar, and nuclear energy are considered, with particular emphasis on the latter, as suggested by the word “plants”. The topic of electric vehicles can also be detected. The mention of China indicates the presence of a debate and comparison regarding the international situation in the field of renewables.

Topic 10 centers on science and research. In addition to mentioning facts, data, and evidence, the topic includes references to language typically used by climate change deniers, such as “think” and “believe”. This suggests that the debate is not only heated in terms of politics but also extends to the strictly scientific aspects of the issue. Specifically, the presence of both scientific terms alongside more subjective language reveals how climate science is often framed ideologically, rather than treated as consensus-based knowledge. The inclusion of emotionally charged words like “morons,” “ignorance,” and “ignorant” shows how these scientific debates often degenerate into personal attacks.

From what has been said so far, it can be argued that American discourse is much more politicized than its Italian counterpart, reflecting clearer partisan divides. In contrast, the Italian debate appears to focus more on technological and policy aspects. Regarding key human actors, politicians and scientists are prominent in both countries. Environmentalists are present only in the Italian discourse, while celebrities play a unique role in the American context. As for major non-human actors, the economy and market, along with fossil and renewable energies, are significant in both countries.

### 2.3.3. KWIC analysis

Shifting to the KWIC analysis, the focus was exclusively on comments from conservative and progressive American sources in order to investigate the higher degree of politicization, already evident in the keyness analysis, compared to Italian outlets, and to explore RQ2 in greater detail.

A total of 130 associations for comments related to conservative outlets and 113 for those related to progressive outlets were identified. The selected keywords, identified through the results of keyness analysis and topic modeling, are as follows: Biden; celebrities; China; cult; Democrats; elite; government; liberals; President; rich; scientists; Swift; Trump.

In conservative sources, the word “government” frequently co-occurs with terms such as “federal” (frequency = 11), “corrupt” (frequency = 9), “money” (frequency = 6), and “threat” (frequency = 2). This suggests concerns regarding the federal government’s actions, particularly in economic management, alongside accusations of corruption and the perception that the government may pose a threat to American citizens.

The term “China” is associated with “India” (frequency = 12), “communist” (frequency = 6), “coal” (frequency = 4), “FJB<sup>14</sup>” (frequency = 3), and “dictator” and “Russia” (both frequency = 2). This indicates a distinctly negative perception of China, which is often compared to India concerning fossil fuel management and is viewed as a supporter of Russia. The presence of the slogan “FJB” suggests that China, perceived as an authoritarian threat, is used as a derogatory rhetorical tool against Biden.

The most notable associations for the word “rich” are with “hypocrite” (frequency = 5), “politicians” (frequency = 3), and “elite” (frequency = 3), reflecting the content of Topic 4. Additionally, “Swift” is associated with “hypocrite” (frequency = 11) and “liberal” (frequency = 9), while “elite” is linked to “hypocrites” (frequency = 5), further confirming this trend.

Interestingly, “Biden” is associated with “threat” (frequency = 10), “dementia” (frequency = 8), and “criminal” (frequency = 6). In contrast, “Trump” is primarily linked to “President” and “2024” (both

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<sup>14</sup> “FJB” is an acronym for “F\*\*\* Joe Biden,” commonly used in right-wing online discourse in the U.S. It is often replaced by its euphemistic slogan, “Let’s go, Brandon,” which originated during a NASCAR race at Talladega Superspeedway on October 2, 2021. An NBC Sports reporter mistakenly assumed that part of the crowd was chanting “Let’s go Brandon” to support the race winner, Brandon Brown, instead of “F\*\*\* Joe Biden.”, Long, C. (2021). How ‘Let’s Go Brandon’ became code for insulting Joe Biden. *AP News*, October 30. <https://apnews.com/article/lets-go-brandon-what-does-it-mean-republicans-joe-biden-ab13db212067928455a3dba07756a160> (accessed on November 4, 2025).

frequency = 14), as well as “vote” (frequency = 6). This suggests a strong deprecation of Biden’s presidency and a consistent campaign for Trump leading up to the November elections.

This trend is further elucidated by the associations found for the word “Democrats,” which include “rich,” “communist” (both frequency = 7), “threat” (frequency = 6), “hypocrite” (frequency = 5), and “elitist” (frequency = 4). Notably, “President” has its highest association (frequency = 8) with “worst,” expressing strong criticism of Biden. It is also noteworthy that “scientists” is linked to “political” (frequency = 4), indicating distrust toward scientific findings.

Both “liberals” and “celebrities” are frequently associated with accusations of hypocrisy (frequencies of 29 and 8, respectively). Finally, “cult” is most frequently associated with “climate” (frequency = 9), highlighting a common accusation directed at climate change supporters.

The frequencies of comments related to progressive sources are significantly lower. The highest frequency (47) is associated with the terms “scientists” and “climate.” “Scientists” is also linked to “reviewed” (frequency = 11), “journal” (frequency = 6), and “evidence” (frequency = 5), indicating that the discourse focuses more on scientific facts than on ideologies and politics.

In contrast, “Biden” is associated with words like “sleepy” and “corrupt” (both with a frequency of 2), but this association is considerably weaker than those found in conservative outlets. Additionally, “government” is linked to “corporations” (frequency = 2), and “China” is associated with “communist,” “coal,” and “blame” (all with a frequency of 2).

It can therefore be concluded that while comments related to progressive sources exhibit some degree of politicization, this phenomenon is much more pronounced in those related to conservative sources. The language used is also different, tending to be more personalized and derogatory in comments related to conservative outlets.

## **2.4. ANT Analysis of Climate Controversies**

To connect the previous results to the theoretical framework and provide a deeper understanding of how climate change narratives are constructed in the media under examination, the findings will now be interpreted through the lens of ANT.

In line with this approach, Besel (2011) offers a valuable perspective for analyzing the patterns identified in Section 3. Within the ANT framework, climate change can be viewed as a “black box”: a stabilized and institutionalized body of scientific knowledge that, having been produced through complex networks of human and non-human actors, is generally treated as an accepted fact by society. However, when this knowledge is challenged in the public arena, the black box is metaphorically reopened, leading to renewed negotiation and controversy where rhetorical tools can play a crucial role in affecting and reshaping the balance within the actor-network.

The present study’s analyses indicate that the process of reopening the black box is predominantly driven by conservative media outlets, particularly in the U.S., which frequently contest established scientific narratives and promote alternative, often antagonistic, interpretations of climate change. These dynamics are especially evident in the rhetorical choices highlighted by both the keyness and KWIC analyses.

Concerning the results of topic modeling, Kukkonen, Stoddart, and Ylä-Anttila (2020) offer a valuable insight into the interconnection between actors and justificatory logics networks. Regarding Italy, it is possible to identify multiple justificatory logics.

The economic-political justification is the most prominent, appearing in the politically charged Topic 3 and Topic 4 (which associate the renewable energy market with politics and taxation). These topics frame climate change, and consequently climate science, as driven by political and economic interests rather than by genuine environmental urgency.

Another relevant justificatory logic is that of social justice, which is somewhat linked to the economic-political one and reflected in Topic 7. Here, climate science is portrayed as a potential threat to social equity and labor. Also related to the economic-political logic is the national interest justification found in Topic 8, which deals with international comparisons (especially with China and India) and resource scarcity, suggesting concerns about geopolitical fairness and environmental accountability.

The delegitimizing logic characterizes both Topic 5 and Topic 9, though it targets different actors. Topic 5 focuses on environmental activists, who are portrayed as criminals or attention-seekers. Topic 9 instead associates climate discourse with propaganda, terrorism, and denialism, aiming to discredit scientific authority.

The technological justification emerges from Topic 6 and Topic 10. Topic 6 focuses on electric vehicles and related infrastructure, highlighting practical and economic concerns. Topic 10 centers

on the comparison between fossil fuels and renewables, with specific reference to nuclear energy, suggesting a cost-benefit logic.

Finally, Topics 1 and 2 reflect a more scientific-institutional logic, as they deal with technical aspects of climate issues and scientific knowledge.

Summarizing, although various justificatory logics emerge from the Italian comments, the economic-political one appears to be the dominant framing, including a broader spectrum of sub-justifications as exemplified by Topics 7 and 8.

Regarding the U.S. case, the broader range of justificatory logics reflects the higher degree of politicization found in the comments. The economic-political justification is the most prominent, clearly emerging in more than half of the topics (1, 3, 4, 5, 6, and 8).

The “corrupted Democrat administration” justification emerges from Topic 1, which includes direct attacks on President Biden and accusations such as favoring illegal immigration and acting against American interests. Topics 3 and 4 reflect the logic of elite hypocrisy, highlighting the contradiction between the environmental advocacy of wealthy elites and celebrities and their polluting lifestyles.

Topic 5 is specifically interesting, as it combines economic-political justifications (support for Trump, climate as a fraud) with a moral-religious logic, framing the debate through references to “God” and “evil,” and portraying environmentalists as a cult.

Topic 6 reinforces the narrative of climate change as an economic scam and a tool for governmental control, which extends into Topic 8, where even discussions around sustainable eating are reframed through accusations of elite interests and hypocrisy, citing figures such as Bill Gates and Jeff Bezos. Topic 6 also includes the justification of social equity, as it references wealth inequality.

The delegitimizing logic is addressed by Topics 5, 6, and 10. In Topic 5, environmental supporters are discredited as a fanatical cult. Topic 6 delegitimizes climate science by portraying it as a lie and a fraud. Topic 10 furthers this narrative by depicting scientific research itself as contested.

Technological justifications are evident in Topics 7 and 9, both of which address renewable energy. Topic 7 discusses potential negative environmental impacts of renewables, while Topic 9 adopts a cost-benefit logic, comparing renewables and fossil fuels and introducing international comparisons (especially with China), similarly to the Italian case.

Finally, Topic 2 reflects a scientific-institutional logic, as it focuses on the technical and scientific aspects of climate science.

In conclusion, while different justificatory logics emerge in the U.S. case, the economic-political one is the most prominent and appears even more strongly than in the Italian comments. A particularly interesting aspect is the frequent condemnation of elites, which mixes economic criticism with moral accusations.

## **2.5. Discussion**

In conclusion, there will be now an attempt to provide an answer to the research questions. Regarding RQ1 (“Is climate change a politicized topic in both countries?”), the keyness analysis suggests that climate change appears to be more politicized in the U.S. than in Italy. This is indicated by significant references to American political figures and themes, as well as the more heated tone observed in the U.S. debate. These findings appear to be consistent with Jasanoff’s (2003) findings on the politicization of scientific facts along ideological lines and with Rekker and Hartevelde’s (2024) connection between the politicization of climate change and factual beliefs polarization. They also seem to align with Jasanoff’s (2004) co-productionist framework, according to which climate science is inherently intertwined with political ideologies.

As for RQ2 (“If so, how does the political orientation of sources influence the online public debate?”), the keyness analysis provides insight into how the political orientation of media sources may influence the tone and thematic focus of online discussions.

In the analyzed sample, comments related to progressive sources in Italy tend to focus on the scientific and environmental dimensions of climate change. On the other hand, comments tied to conservative outlets seem to focus more on political and economic issues, as illustrated by terms such as “government,” “referendum,” and “market.” Additionally, comments linked to conservative sources also show greater interest in the electric vehicle sector.

The politicization in the U.S. case is particularly evident in comments related to conservative sources. These comments appear to have a stronger focus on economic issues compared to that related to progressive outlets, as well as more heated tones and an overall more politicized approach. Meanwhile, comments associated with progressive sources display a stronger orientation toward science and research, mirroring the trend observed in Italy.

The KWIC analysis provides further depth to these results. Comments on American conservative sources seem to be the most politicized, featuring derogatory associations with the government, accusations of corruption, and criticisms of Biden. Furthermore, the slogan “FJB” is linked to China, and seems to portray Biden as a supporter of the perceived Chinese authoritarian threat. Elements of pro-Trump campaigning are also present, along with accusations of hypocrisy directed at celebrities and wealthy elites, and connecting the Democratic agenda to communist ideologies. These narratives often reflect a broader distrust toward science, particularly when it is perceived as politically compromised. In contrast, comments on progressive sources tend to lack these highly politicized tones, focusing instead on research data and scientific evidence.

Such a distinction, with the comments on progressive outlets being more focused on science and those on conservative sources being the most politicized in both countries, appears to support the findings of McCright and Dunlap (2011) and Castillo Esparcia and López Gómez (2021). Moreover, the framing of Democrats as communists and the association of Biden with Chinese authoritarianism seem to be consistent with Hoffarth and Hodson’s (2016) findings on the right-wing portrayal of environmentalists.

Regarding RQ3, the topic analysis helps identify the main themes covered by the media sources in both countries. Economic and political themes are present in both cases, along with environmental and scientific perspectives. Another important topic is the debate between fossil fuels and renewable energies, as well as that of electric vehicles.

The topic modeling analysis also provides valuable insights for addressing the fourth research question (RQ4) regarding the main human and non-human actors.

In the Italian case, the key human actors are politicians (both national and EU), scientists, environmentalists, and denialists. It is interesting to note that the consistent presence of denialism and conspiracy theories may be seen as aligning with Zehr’s (2000) claim that uncertainty can undermine the perceived authority of science and lead to challenges in knowledge production. Campbell’s (2022) findings on the correlation between skepticism and the risks associated with climate policies also appear relevant, especially given the prominence of economic concerns highlighted by the topic modeling analysis. As for the major non-human actors, climate naturally stands out, along with newspapers, fossil fuels, renewable energy, electric cars, and the market.

In the American sample, politicians, particularly Trump and Biden, scientists, and celebrities appear to be the primary human actors. Key non-human actors include the climate, the economy, carbon dioxide levels, fossil fuels, and renewable energy sources.

The following table (Tab. 7) summarizes the main human and non-human actors identified in both national contexts, highlighting how they contribute to the construction of climate change narratives and their related justificatory logics, in accordance with Section 2.4.

| Actor             | Category  | Role in Italy                                                                                                           | Role in the U.S.                                                                                                    | Justificatory logics                                     |
|-------------------|-----------|-------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|
| Politicians       | Human     | Framed as prioritizing political and economic interests over environmental concerns                                     | Democrats (especially Biden) portrayed as corrupt and anti-American; Trump framed as protector of national interest | Economic-political                                       |
| Scientists        | Human     | Generally perceived as neutral; denialist discourse is kept separate                                                    | Often depicted as politically biased or influenced by economic and political interests                              | Delegitimization of science and scientific-institutional |
| Denialists        | Human     | Challenge the scientific consensus by reopening the “black box” of climate change and promoting antagonistic narratives | Same as Italy                                                                                                       | Delegitimization of science                              |
| Activists         | Human     | Depicted as criminals or attention-seekers                                                                              | Largely absent from the discourse analyzed                                                                          | Delegitimization of environmentalism                     |
| Celebrities       | Human     | Absent from the discourse analyzed                                                                                      | Portrayed as hypocritical elites advocating green agendas while acting in contradiction                             | Economic-political (elite criticism)                     |
| Climate           | Non-human | Mentioned as a scientific and technical aspect                                                                          | Same as Italy                                                                                                       | Scientific-institutional                                 |
| CO2/emissions     | Non-human | Framed as an environmental issue and a target under EU policies                                                         | Mentioned as a scientific and technical aspect                                                                      | Economic-political and scientific-institutional          |
| Electric vehicles | Non-human | Frequently debated, especially in relation to costs, efficiency, and infrastructure needs                               | Marginal in the discourse; mostly discussed among renewable energies                                                | Economic-political and technological                     |
| Fossil fuels      | Non-human | Discussed in terms of comparison to renewables                                                                          | Same as Italy                                                                                                       | Economic-political and technological                     |
| Market/economy    | Non-human | Mostly addressed in terms of implications on labor and social equity                                                    | Addressed as a concern due to Biden’s environmental policies                                                        | Economic-political                                       |
| Newspapers        | Non-human | Referenced critically in denialist discourse                                                                            | Absent from the discourse analyzed                                                                                  | Delegitimization of science                              |

|                  |           |                                                                      |                                               |                                      |
|------------------|-----------|----------------------------------------------------------------------|-----------------------------------------------|--------------------------------------|
| Renewable energy | Non-human | Discussed in terms of comparison to fossil fuels and economic impact | Same as Italy; environmental concerns as well | Economic-political and technological |
|------------------|-----------|----------------------------------------------------------------------|-----------------------------------------------|--------------------------------------|

Tab. 7. Main human and non-human actors and their roles in climate change discourse.

The findings discussed so far can also contribute to addressing RQ2 in greater detail concerning the main differences between the two contexts. As previously noted, the politicization of climate discourse seems more marked in the U.S., and it often assumes a more personalized form, with Trump and Biden frequently referenced.

The topic analysis reveals an important distinction. In the U.S., the debate between climate change supporters and denialists appears within a politically charged Topic 5 characterized by intense tones. Conversely, in the Italian case, denialism is addressed in a completely separate topic (9), suggesting a different discursive configuration. It is also worth noting that environmental activism receives less attention in the American sample, while references to celebrities are largely absent from the Italian one.

These results may suggest that political orientation appears more deeply intertwined with the individual approach to climate change in the U.S. than in Italy. The language used in American comments also appears more polarized, while Italian discourse tends to cover a broader range of themes, often focusing on the scientific aspects and the impacts of European policies and regulations. Overall, the data suggest that the level of politicization is notably higher in the U.S. case.

## 2.6. Conclusions

This chapter explored how climate change appears to be politicized in online debates and to polarize public opinion in two countries through a comparative study of the Italian and American discourse on Facebook. Drawing from Jasanoff's (2004) concept of co-construction, a mixed-methods approach was adopted to provide deep and detailed answers to the four research questions. Keyness analysis and topic modeling reveal the influence of political orientation on public discourse, the main themes in the press, the key human and non-human actors involved, and the notable differences between the

two countries. The KWIC analysis offered a deeper understanding of the issues, particularly providing insights into RQ2 concerning the U.S.

Summarizing these findings, it seems that the most polarized debate in both countries is stimulated by conservative sources, while comments on progressive sources tend to focus more on scientific and environmental aspects.

The degree of politicization appears to be notably higher in the U.S., while Italian discourse seems to be more varied and focused on topics such as scientific aspects of climate-related issues and European green policies. Activism appears marginal in the U.S., whereas the Italian debate seems to lack references to celebrities entirely.

The higher politicization in the U.S. is further illustrated by what appears to be a connection between denialism and partisanship, particularly among Trump supporters. Moreover, the American debate seems to display more personalized and derogatory language, especially in comments related to conservative sources. Therefore, it may be suggested that in the U.S., climate change is more closely tied to political identity than it is in Italy.

Finally, the politicization of climate change cannot be fully understood without considering its implications for democratic norms and deliberative processes. As demonstrated by Knüpfer and Hoffmann (2024), far-right digital networks use frames such as “climate cult” or “totalitarianism” to delegitimize scientific expertise and portray climate advocacy as a threat to national identity, personal freedom, and economic sovereignty. These framing cascades appear to contribute to an increase in the polarization of climate-related issues and the significant reduction of public trust in science.

This perspective aligns with the results of the QCA presented in the previous chapter, as it highlighted a significant academic interest toward populist narratives and dynamics that affect climate discourse. In particular, it is coherent with the centrality of the code “Political and Voting Behavior” in the sub-analysis of content explicitly related to populism. The proximity of this code to “Elite vs People” and “Science and Expertise Skepticism” ones may further support the assumption that populist discourse contributes to the erosion of core democratic values, in line with Bennet and Livingston (2025).

The next chapter will analyze the media contents from which the comments were retrieved, in order to provide a comprehensive understanding of both sides of public opinion and how narratives on climate-related issues are framed and presented to the general public.

### **3. Polarization and Politicization in Media Discourse: Climate Change Narratives in Italy and the U.S.**

#### **3.1. Introduction**

In connection with the previous chapter, this one aims to investigate the constructive side of public opinion, and specifically how discourse is framed and disseminated through the media. Such a goal will once again be pursued through a mixed-methods approach, including both quantitative and qualitative analyses of the same media contents from which the comments examined in Chapter 2 were retrieved.

The following section discusses in detail the material used and the methodological phases employed in this final part of the study. In this introductory paragraph, a new set of empirical research questions is formulated, as to better fit the different scope of this chapter and to clearly distinguish the focus on media discourse from that on general public opinion.

These new research questions are designed to reflect the complementary perspective of the study, focusing on media discourse as the source side of the public debate and exploring how climate narratives are constructed across politically oriented news media.

RQ1. Are the media narratives regarding climate change politicized in both countries?

RQ2. If so, how does the political orientation of sources influence the language and rhetoric of the media sources and shape the main differences between the two countries?

RQ3. What are the issues that capture media interest the most?

RQ4. Which human and non-human actors are the most prominent in media discourse?

To ensure a coherent comparative perspective, the analytical structure mirrors that used for the comments. A keyness analysis provides a quantitative basis to address RQ1 and RQ2, allowing the

identification of politicized patterns and the influence of political orientation on issue framing. Topic modeling offers a comprehensive and detailed basis to answer RQ3 and RQ4 by identifying the most prominent topics and actors in media content.

The part of RQ2 focused on the key differences between the Italian and American cases is addressed through a combined application of topic modeling and qualitative analysis. A further KWIC analysis is conducted to support a QCA, allowing for a more in-depth examination of this corpus, smaller than the comment dataset discussed in Chapter 2, and to refine the interpretation of the findings. QCA also enriches the response to RQ2 by offering insights into the rhetorical and narrative structures employed.

The chapter is structured as follows: after this Introduction, the next section presents the materials and methods. The results are then presented and discussed in detail, followed by concluding reflections on their broader socio-political implications.

### **3.2. Material and Methods**

The analysis is based on a total of 71 media content items (36 for Italy and 35 for the U.S.), equally divided between the two political orientations within Italy (18 conservative and 18 progressive). In the U.S. subset, 17 conservative and 18 progressive items were available because one conservative post from The Daily Caller was no longer accessible and its content could not be retrieved.

Items range from news articles to posts, images, and short videos, originally selected for their potential to stimulate public discussion on climate-related issues (with a minimum of 40 comments per item) and published between October 2023 and June 2024. Nine items were retrieved for each media source with the exception of The Daily Caller (eight items).

The corpus was constructed using the keywords listed in the Materials and Methods section of Chapter 2 and classified according to the political orientation of the sources. This material aligns with the aim of the present chapter: while the previous one focused on public responses to these contents, the current one turns its attention to the media narratives themselves.

To ensure the clearest possible description of the process, the names of the selected sources, along with their political orientation, are recalled here. For the Italian case, the conservative sources are Il

Sole 24 Ore and Libero Quotidiano, while the progressive ones are Il Post and La Repubblica. In the American case, the conservative sources are Breitbart and The Daily Caller, and the progressive sources are The New York Times and The Washington Post.

The items were saved in .txt format. Each file includes the title, the body, and, when applicable, the subheading of the articles or the caption of posts and short videos, depending on the type of content. These files were subsequently imported in R (R Core Team, 2021) in the same format. The Quanteda package (Benoit et al., 2018) was employed to preprocess the data by removing standard and user-defined stopwords, as well as words occurring fewer than five times and those shorter than three characters.

As in Chapter 2, a mixed-methods approach combining quantitative and qualitative techniques was employed to explore the polarization of climate discourse in the media and to identify the key actors and narratives involved. While the previous chapter focused on public opinion by analyzing user comments on Facebook, the present chapter shifts attention to the production side of discourse, the media content published by politically aligned news sources.

A keyness analysis was first conducted to highlight words that occur with statistically significant frequency in conservative versus progressive media sources. This step allowed for the identification of distinctive rhetorical and terms and provided an answer to RQ1 (“Are the media narratives regarding climate change politicized in both countries?”) and RQ2 (“If so, how does the political orientation of sources influence the language and rhetoric of the media sources?”).

Subsequently, topic modeling analysis was performed to identify the most common narratives and the key issues prioritized in both countries, as well as the main actors involved in the discourse. This technique addressed RQ3 (“What are the main issues covered by the media sources in both countries?”), RQ4 (“What are the main human and non-human actors involved in this topic?”), and added further insights to RQ2, with regard to the major differences between Italy and the U.S

Finally, a KWIC analysis supported the qualitative phase of the study providing the base for a QCA. Specific keywords related to science and politics were selected and examined in context to better understand how these concepts were articulated across politically oriented sources. The subsequent QCA ensured a more detailed interpretation of the results, providing a deeper understanding of RQ2.

### 3.3. Results

#### 3.3.1. Keyness Analysis

To address RQ1 (politicization of climate change) and RQ2 (how the political orientation of sources influences their language and rhetoric), a keyness analysis was performed based on the political orientation of sources from each country. The analysis aimed to identify the words most likely to appear in each group, with Italian terms accompanied by their English translations.

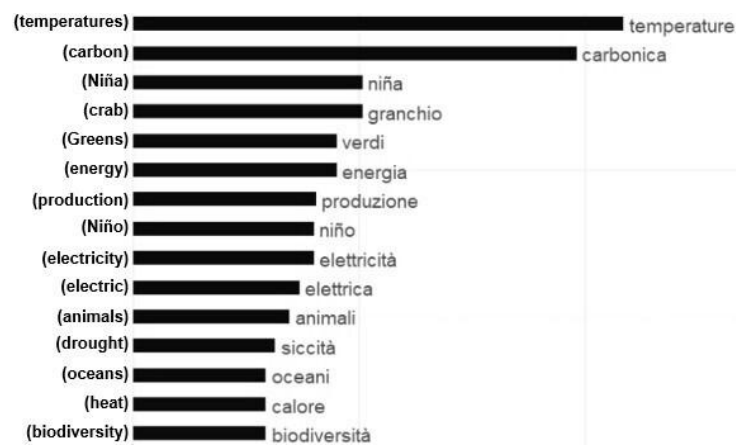


Fig. 1. Keyness analysis of contents from Italian progressive sources (n = 15).

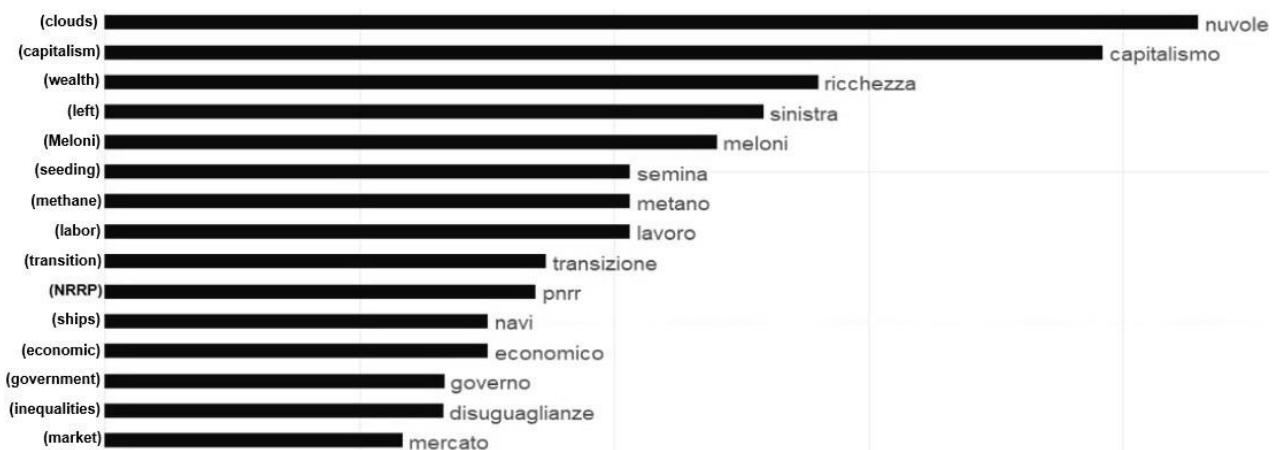


Fig. 2. Keyness analysis of contents from Italian conservative sources (n = 15).

The analysis of the sample of Italian media contents reveals a pattern similar to that observed in user comments. Figure 1 displays the top 15 keywords by keyness in progressive sources, which appear to be primarily focused on scientific and environmental topics. Words such as “temperatures,” “Niña,” “Niño,” and “drought” suggest a discourse centered on the technical aspects of climate, weather, and the environment, including extreme phenomena.

Energy also constitutes a significant part of the discussion, as indicated by terms such as “energy,” “production,” and “electricity.” Another notable aspect is the presence of biodiversity and faunal themes, highlighted by words like “biodiversity,” “crab,” and “animals.” Political references are present as well, though likely still linked to environmental issues, particularly in the context of the 2024 European elections, as the only explicit mention is that of the Green Party.

According to Figure 2, media content from Italian conservative sources appears to focus more on political and economic aspects. Technological themes are also present, as evidenced by references to cloud seeding<sup>15</sup>, specifically, “nuvole” (clouds) and “semina” (seeding). The words “Meloni,” “left,” and “government” suggest that climate-related discourse is framed in more political terms, which also intersect with economic considerations and policy implementation. The prominent presence of “capitalism,” alongside terms such as “labor,” “NRRP<sup>16</sup>” (National Recovery and Resilience Plan), and “market,” may indicate an economic framing of climate issues. This economic perspective also appears intertwined with social concerns: the keywords “wealth” and “inequalities” reflect attention to disparities in access to environmental resources or policies.

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<sup>15</sup> “Cloud seeding is a method of weather modification focused on producing short-term changes in precipitation. [...] The most frequently used cloud seeding approaches rely on the introduction of tiny particles (nuclei) into certain cloud types to trigger the formation of ice crystals (glaciogenic seeding) or rain droplets (hygroscopic seeding) from water already carried in the cloud that is not being efficiently turned into precipitation.”, U.S. Government Accountability Office. (2024). Cloud Seeding Technology. Assessing Effectiveness and Other Challenges (GAO-25-107328). *U.S. Government Accountability Office*, p. 3. <https://www.gao.gov/assets/gao-25-107328.pdf> (accessed on August 13, 2025).

<sup>16</sup> The National Recovery and Resilience Plan (NRRP) is part of the EU’s Next Generation EU (NGEU) program, a €750 billion package created in response to the COVID-19 crisis. Its core instrument is the Recovery and Resilience Facility (RRF), active from 2021 to 2026, with €672.5 billion in total funding, including €312.5 billion in grants and €360 billion in low-interest loans., Ministry of Economy and Finance. (2021). The National Recovery and Resilience Plan (NRRP). *Ministry of Economy and Finance*, May 26. <https://www.mef.gov.it/en/focus/The-National-Recovery-and-Resilience-Plan-NRRP/> (accessed on August 11, 2025).

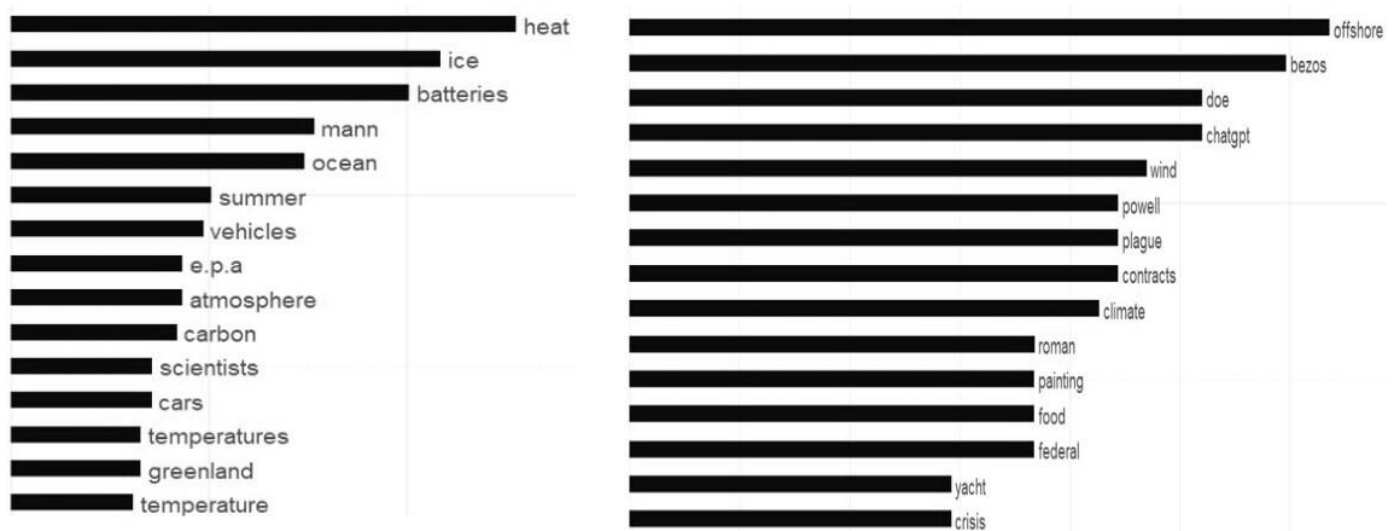


Fig. 3. Keyness analysis of contents from American progressive (left) and conservative (right) sources (n = 15).

A similar observation can be made regarding the media content in the American sample, which largely reflects the same dynamics observed in the comments in Chapter 2. On the left side of Figure 3, similarly to the Italian sample, the keywords from the progressive sources seem to be mostly focused on science and technical aspects of climate change, as illustrated by words like “heat,” “ice,” “temperatures,” “atmosphere,” and “carbon.” A notable detail is the presence of the word “Mann,” likely referencing to Michael E. Mann, climatologist and IPCC author among the shared winners of the 2007 Nobel Peace Prize (Mann, 2025). It is likely that the presence of his last name among the keywords references to his lawsuit against two right-wing bloggers who accused him of academic fraud (The Guardian, 2024).

“E.P.A.<sup>17</sup>” (U.S. Environmental Protection Agency) and “scientists” are also mentioned, highlighting a discourse focused not only on science and research, but also on their defense against politically motivated climate skepticism. As suggested by the presence of the words “batteries,” “vehicles,” and “cars,” the discourse of the analyzed progressive media content may also be focused on electric vehicle options.

<sup>17</sup> “EPA is responsible for measuring greenhouse gas emissions using two programs designed to help the public and policymakers understand the nation’s total emissions as well as the sources and types of these emissions at individual facilities. [...] EPA conducts analyses to understand the physical and economic impacts of climate change under different emission scenarios and to quantify the economic impacts and effectiveness of proposed climate policies.”, EPA. (2025). What EPA Is Doing About Climate Change. *EPA*, March 25. <https://www.epa.gov/climate-change/what-epa-doing-about-climate-change> (accessed on August 10, 2025).

In line with the comment analysis, the discourse in conservative American media appears more political and includes economic considerations. The keyword “offshore” likely refers to large-scale investments in wind energy, particularly in California, supported by the presence of “wind,” “DOE” (U.S. Department of Energy), and “contracts.”

Mentions of “Bezos” and “yacht” suggest criticism of wealthy elites, while “food” may be linked to investments in sustainable food systems, reinforcing narratives of social and economic inequalities. The reference to Federal Reserve Chair Jerome Powell may relate to his statement that the Fed is not a climate policymaker, as such decisions fall under the authority of elected officials (Board of Governors of the Federal Reserve System, 2023).

Another interesting term is “ChatGPT,” which may be connected to claims that the tool is biased in favor of environmental policies and promotes mainstream scientific narratives (Williams, 2024). The keyword “painting” likely refers to climate activism protests involving artworks, while “Roman” and “plague” may refer to historical analogies used in climate change narratives.

Aligning with the results of the analysis performed on the comments in Chapter 2, the findings suggest that, in both countries, the progressive media analyzed focus primarily on scientific and environmental themes, whereas conservative media tend to frame climate change as a political and economic issue. This distinction suggests a connection between the politicization of climate change and the political orientation of the sources, especially in the American context.

As a result, RQ1 and RQ2 were addressed, supporting the politicization of the topic and revealing significant differences in the language used by media with different political orientations, even in relation to the formation of public opinion.

### **3.3.2. Topic Modeling**

To investigate the major differences between the two countries analyzed (RQ2), the main issues covered by the media sources (RQ3), and the main human and non-human actors involved in the discourse (RQ4), a topic modeling analysis was performed on the Italian and U.S. media samples with the aim of examining the public opinion formation side and complementing the analysis of user comments in Chapter 2. Following the procedure described in Chapter 1, the LDA topic modeling

approach was applied again in accordance with the criterion outlined in Chapter 2, using R to generate ten topics, each consisting of twenty words. For the Italian results, an English translation is also provided.

| Topic 1                            | Topic 2                   | Topic 3                    | Topic 4                        | Topic 5                             |
|------------------------------------|---------------------------|----------------------------|--------------------------------|-------------------------------------|
| Auto (car)                         | Nucleare (nuclear)        | Attivisti (activists)      | Media (average)                | Europea (European)                  |
| Temperature (temperatures)         | Meloni                    | Generazione (generation)   | Caldo (hot)                    | Sostenibile (sustainable)           |
| Niña                               | Italia (Italy)            | Governo (government)       | Temperature (temperatures)     | Capitalismo (capitalism)            |
| Niño                               | Transizione (transition)  | Verde (green)              | Temperatura (temperature)      | Trasporto (transportation)          |
| Strade (streets)                   | Energia (energy)          | Vernice (paint)            | Mediterraneo (Mediterranean)   | Futuro (future)                     |
| Circolazione (traffic circulation) | Energetica (energetic)    | Elettrica (electric)       | Estremo (extreme)              | Ricchezza (wealth)                  |
| Inquinanti (pollutants)            | Tecnologia (technology)   | Elettrogeni (generators)   | Ciclone (cyclone)              | Social (social)                     |
| Veicoli (vehicles)                 | Risorse (resources)       | Gucci                      | Neve (snow)                    | Economico (economic)                |
| Riscaldamento (heating)            | Produzione (production)   | Galleria (gallery)         | Fiumi (rivers)                 | Mediterraneo (Mediterranean)        |
| Surriscaldamento (overheating)     | Gas                       | Supermercato (supermarket) | Coste (coasts)                 | Dati (data)                         |
| Europa (Europe)                    | Lavoro (labor)            | Natale (Christmas)         | Grandine (hail)                | Ferrovioario (railway)              |
| Parigi (Paris)                     | PNRR                      | Acque (waters)             | Freddo (cold)                  | Disuguaglianze (inequalities)       |
| Studio (study)                     | COP28                     | Sicurezza (security)       | Lombardia (Lombardy)           | Successo (success)                  |
| Legge (law)                        | Enel                      | Società (society)          | Pioggia (rain)                 | Decarbonizzazione (decarbonization) |
| Calore (heat)                      | Francia (France)          | Terra (soil)               | Siccità (drought)              | Mercato (market)                    |
| Siccità (drought)                  | Emissioni (emissions)     | Fossili (fossil)           | Piogge (rains)                 | Report                              |
| Meteorologico (weather)            | Ministro (minister)       | Messa (mass)               | Milano (Milan)                 | Risorse (resources)                 |
| Terra (soil)                       | Elettricità (electricity) | Venezia (Venice)           | Preindustriale (preindustrial) | Acque (waters)                      |
| Acque (waters)                     | Generazione (generation)  | Grave (severe)             | Toscana (Tuscany)              | Politica (politics)                 |
| Serra (greenhouse)                 | Sicurezza (security)      | Riscaldamento (heating)    | Copernicus                     | Veicoli (vehicles)                  |

Tab. 1. The topic modeling analysis performed on the Italian media contents (Topic 1 - Topic 5).

Table 1 displays the topics related to the Italian sample from one to five.

Topic 1 appears to be centered on pollution and weather conditions. The references to the cyclones “Niña” and “Niño,” together with “temperatures,” seem connected to a broader discussion on pollution and emissions. “Car,” “traffic circulation,” and “vehicles” are mentioned alongside “pollutants,” highlighting concerns about the link between private transport and air quality. This link also seems to extend to rising temperatures, as shown by the presence of “overheating” and “greenhouse,” most likely in relation to the greenhouse effect caused by vehicles. The discourse on pollutants appears to include “soil” and “waters” as well. Together with “Paris” (likely the Paris Agreement), “Europe,” and “law,” these terms point to calls for regulations on a European scale to counter the negative impacts of climate change. The presence of “drought” signals attention to extreme weather, while “study” points to scientific evidence as part of the discussion.

Topic 2 seems to be focused on the ecological transition in its multiple dimensions. The central element appears to be the energy transition, with a particular emphasis on “nuclear,” “gas,” and “electricity,” likely tied to the broader discourse on sustainable technologies, as suggested by the presence of “technology,” “production,” and “generation.” The latter may refer not only to energy generation, but also to the activist group Last Generation, which could help explain the mention of “security,” as such groups are sometimes portrayed as disruptive or problematic. The topic also connects the energy transition to social concerns, as indicated by “labor,” and to the political sphere: “Meloni” appears alongside “NRRP” and “COP28,” suggesting national, European, and international engagement in climate policies. The inclusion of “emissions,” “Enel<sup>18</sup>,” and “France” further points to connections between national policies, European strategies, and international cooperation in promoting environmental protection.

Topic 3 seems to center on environmental activism and its underlying motives. As in Topic 2, “generation” likely refers to the activist group Last Generation, here framed mainly from a security perspective: the presence of “security,” together with “Gucci,” “gallery,” “mass,” and “paint,” points to high-profile demonstrations in symbolic locations or during public events. This framing seems to present these actions more as security issues than as expressions of environmental advocacy. “Government” may relate either to demands for political action to tighten security against such initiatives, or to protests directly targeting governmental policies. The mention of “fossil” further supports this reading, as fossil fuels remain one of the group’s main targets.

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<sup>18</sup> Enel is a leading multinational energy company. It produces, distributes, and sells electricity and gas, and also invests in and promotes renewable energy sources.

Moving to Topic 4, the focus appears to be primarily on weather conditions in Italy, as indicated by terms such as “average,” “temperatures,” “rains,” and “snow.” Extreme events are also present, including “drought,” suggesting attention to severe meteorological phenomena. The mention of the EU project “Copernicus<sup>19</sup>,” together with the adjective “preindustrial,” likely relates to Copernicus’s role in providing historical climate data and reports. This reference suggests that the analyzed media may cite such data as a benchmark for research and public communication.

Topic 5 focuses on sustainable mobility and the potential socio-economic implications of the green transition. Along with “decarbonization,” the topic includes terms related to different types of transport, such as “railway” and “vehicles.” The presence of “capitalism,” “wealth,” “inequalities,” “market,” and “future” may suggest an attention not only to the expected development brought by the transition, but also to the disparities in access to its benefits and in sustaining its costs. This socio-economic perspective appears to be further framed within a political dimension: the words “politics” and “European” suggest that the green transition is often discussed in a European, rather than purely national, context. Practical concerns about the transition’s feasibility emerge as well, as indicated by “resources” and “waters,” which may reflect debates on the availability and management of key assets. Finally, the presence of “data” and “report” hints at the possible use of research sources to reinforce media narratives.

| Topic 6               | Topic 7                      | Topic 8                 | Topic 9                         | Topic 10                  |
|-----------------------|------------------------------|-------------------------|---------------------------------|---------------------------|
| Carbonica (carbon)    | Granchio (crab)              | Verdi (Greens)          | Nuvole (clouds)                 | Rinnovabili (renewables)  |
| CO2                   | Animali (animals)            | Sinistra (left)         | Siccità (drought)               | Produzione (production)   |
| Emissioni (emissions) | Biodiversità (biodiversity)  | Europee (European)      | Crisi (crisis)                  | Emissioni (emissions)     |
| Anidride (dioxide)    | Insetti (insects)            | Europa (Europe)         | Dubai                           | Combustibili (fuels)      |
| Energia (energy)      | Mediterraneo (Mediterranean) | Elezioni (elections)    | Clima (climate)                 | Solare (solar)            |
| Gas                   | Dati (data)                  | Seggi (seats)           | Precipitazioni (precipitations) | Fonti (sources)           |
| Costi (costs)         | Dato (datum)                 | Parlamento (Parliament) | Sicilia (Sicily)                | Elettricità (electricity) |
| Ricerca (research)    | Granchi (crabs)              | Green                   | Semina (seeding)                | Energetico (energetic)    |
| Orca                  | Giardini (gardens)           | Crisi (crisis)          | Grave (severe)                  | Energie (energies)        |
| Pirolisi (pyrolysis)  | Milano (Milan)               | Spagna (Spain)          | Cambiamenti (changes)           | Fossili (fossil)          |
| Oceani (oceans)       | Piante (plants)              | Partiti (parties)       | Pioggia (rain)                  | Carbone (coal)            |

<sup>19</sup> “We provide authoritative information about the past, present and future climate, as well as tools to enable climate change mitigation and adaptation strategies.”, Copernicus. (2025). Homepage. *Copernicus*. <https://climate.copernicus.eu/> (accessed on August 8, 2025).

|                           |                            |                                |                            |                           |
|---------------------------|----------------------------|--------------------------------|----------------------------|---------------------------|
| Metano (methane)          | Temperature (temperatures) | Parlamentare (Parliamentarian) | Acqua (water)              | Rinnovabile (renewable)   |
| Serra (greenhouse)        | Studio (study)             | Stima (esteem)                 | Agricoltori (farmers)      | Potenza (power)           |
| Temperatura (temperature) | Ricerca (research)         | Governo (government)           | Italia (Italy)             | Energia (energy)          |
| Navi (ships)              | Ricercatori (researchers)  | Dato (datum)                   | Meteorologico (weather)    | Dati (data)               |
| Elettrica (electric)      | Studi (studies)            | Agricoltori (farmers)          | Ricerca (research)         | Cina (China)              |
| Studio (study)            | Trend                      | Ministro (minister)            | Acque (waters)             | Venezia (Venice)          |
| Trasporti (transport)     | Primavera (spring)         | Politica (politics)            | Francia (France)           | COP28                     |
| Vulcaniche (volcanic)     | Rischio (risk)             | Media                          | Temperature (temperatures) | Ricercatori (researchers) |
| Calore (heat)             | Messa (mass)               | Verde (green)                  | Pioggie (rains)            | Successo (success)        |

Tab. 2. The topic modeling analysis performed on the Italian media contents (Topic 6 - Topic 10).

Table 2 displays the topics from six to ten.

Topic 6 appears to focus on climate research and technology-based solutions, as suggested by the presence of “research” and “study.” Central to the topic are sustainable transportation and alternative fuel sources, with terms like “CO<sub>2</sub>,” “emissions,” and “greenhouse” likely referring to the greenhouse effect. Words such as “gas,” “methane,” and “electric” point to alternative energy options for vehicles, while “ships” may be connected to gas transport. The mention of “costs” suggests economic considerations tied to sustainable fuels, and “pyrolysis” refers to a process that can generate energy from waste materials<sup>20</sup>. Overall, the topic seems to suggest a highly technology-oriented approach to climate science in the analyzed media content.

Topic 7 deals with the effects of climate change on biodiversity in various settings. The references to “crabs,” “animals,” and “insects” hint at concerns regarding the protection of biodiversity, with the Mediterranean Sea likely being cited as a particularly vulnerable area, which may represent a pressing concern for the national ecosystem. This topic is also connotated by a research orientation, as words like “data,” “research,” “researchers,” and “studies” are mentioned. This is likely in connection with research on how to minimize the negative impact of climate-related issues on biodiversity, specifically in urban areas: “Milan” is in fact mentioned, along with “gardens” and “plants,” seemingly suggesting attempts to preserve ecosystems through eco-friendly interventions such as

<sup>20</sup> “A chemical process consisting in the decomposition of a complex substance through thermal treatment, mainly used in industrial applications, for example for the decomposition of certain constituents of petroleum (cracking), in the disposal of municipal solid waste with energy recovery, and for the production of carbon black and biphenyl.”, Oxford Languages. (2025). Pyrolysis. *Google Dictionary*. <https://languages.oup.com/google-dictionary-it/> (accessed on August 12, 2025).

increasing urban green areas. The words “risk” and “mass” may hint at a connection to environmental activism, as it is likely that biodiversity protection remains one of its main goals.

As in Topic 5, the politically connotated Topic 8 appears to focus on European rather than national dynamics, specifically on the 2024 European elections. This may support the idea that environmental issues are framed more as a European matter requiring coordinated action than as something within the nation’s exclusive scope, as “government” and “minister” are the only terms that may refer to domestic institutions.

In this context, “Parliament” and “parties” are most likely referencing European candidates and factions. The Greens are mentioned, likely reflecting their prominence in the media discourse around the 2024 elections, while the term “left” may indicate a stronger involvement of this political orientation in environmental issues. The presence of “farmers” could be related to the farmers’ protests that took place across Europe in early 2024, possibly in connection with the elections’ outcome. “Media” may refer to coverage of the campaign and updates about parties and candidates, whereas “datum” and “esteem” are here more plausibly tied to electoral projections than to climate science, particularly given the presence of the word “seats.”

Topic 9 appears to be primarily focused on precipitation and its relationship with climate change. Particular emphasis is placed on extreme phenomena such as “drought,” as well as on the severity of the situation, reflected in terms like “crisis” and “severe.” The mention of the Italian region “Sicily” may relate to its specific vulnerability to severe water shortages. The presence of “farmers” suggests that the agricultural impact of these phenomena is also part of the discourse. Another notable focus is research on cloud seeding, as indicated by terms such as “cloud,” “seeding,” “research,” and “Dubai,” the latter likely referring to the United Arab Emirates, one of the first countries in the Persian Gulf region to adopt this technology.

Moving to Topic 10, the focus seems to be the debate between fossil fuels and renewable energy sources, as suggested by the simultaneous presence of terms like “renewables” and “fossil.” Within renewables, solar and electric energy appear most prominent, as indicated by “solar” and “electricity,” while “coal” stands out among fossil fuels. The mention of “emissions” likely ties the discourse on electric energy to broader goals of sustainability, possibly in connection with cleaner transport options. Energy production and the relative power of different sources also seem to be part of the discussion. The presence of “China” may suggest international comparisons, while terms like “data,” “COP28,” and “researchers” indicate a reference to scientific work and, more broadly, to the international dimension of environmental policymaking.

Overall, the discourse in the analyzed Italian media sample seems to mirror the results of the topic modeling performed on user comments in Chapter 2. Media content appears broad and multi-dimensional, focusing on European and international policies rather than domestic politics, as well as on renewable energy sources and their comparison with fossil fuels. Electric vehicles, and sustainable mobility more generally, particularly in relation to their impact on carbon dioxide emissions, seem to constitute a significant portion of the discourse. Research is also widely present (Topics 1, 5, 6, 7, 9, and 10), with references to climate history through the EU’s Copernicus program in Topic 4. Notably, research is portrayed more in connection with practical and technological applications than with theoretical dimensions. Environmental activism appears framed within security issues, in line with what emerged from the analysis of user comments.

| Topic 1     | Topic 2        | Topic 3    | Topic 4       | Topic 5    |
|-------------|----------------|------------|---------------|------------|
| Ice         | Biden          | Climate    | Heat          | Climate    |
| Ocean       | Emissions      | School     | Climate       | Gas        |
| Sea         | E.P.A.         | States     | Temperature   | Energy     |
| Greenland   | Electric       | Science    | Scientists    | Federal    |
| Glaciers    | Vehicles       | Children   | Summer        | Political  |
| Scientists  | Administration | Cold       | Temperatures  | Fossil     |
| Meteorites  | Pollution      | Scientific | Weather       | Right      |
| Study       | Cars           | Neumeister | Record        | Policies   |
| Circulation | President      | Teachers   | Travel        | Europe     |
| Gigatons    | Climate        | ChatGPT    | Fossil        | Buildings  |
| Glacier     | Regulation     | Students   | Europe        | DOE        |
| Water       | States         | Study      | Hot           | November   |
| Atlantic    | United         | Plague     | Fuels         | Powell     |
| Freshwater  | Auto           | Public     | Waves         | Transition |
| Scientist   | Car            | York       | Preindustrial | Security   |
| Researchers | Air            | Roman      | Threshold     | Benefits   |
| Future      | Standard       | Summer     | Travelers     | Economic   |
| Space       | Regulations    | Lesson     | Copernicus    | Report     |
| Antarctic   | Plants         | Book       | Paris         | Heat       |
| Research    | Campaign       | Education  | Athens        | Green      |

Tab. 3. The topic modeling analysis performed on the American media contents (Topic 1 - Topic 5).

Moving to American media content, Table 3 displays the topics from one to five.

Topic 1 mostly revolves around the impact of climate change on glaciers and the subsequent rise in sea levels, as indicated by words like “ice,” “ocean,” “sea,” and “glaciers.” The focus seems to be on the melting ice of Antarctica and Greenland and its impact on the Atlantic Ocean. Drinking water availability and shortage may be another theme, as suggested by the word “freshwater.” Scientific references are present, as indicated by words like “scientists,” “study,” “researchers,” and “research,”

as well as by technical expressions such as “gigatons<sup>21</sup>.” Notably, the dimension of space research also appears, possibly linked to space-based climate monitoring or related scientific investigations, as illustrated by the words “space” and “meteorites.”

Topic 2 appears more politically situated and policy-oriented, as indicated by the references to “Biden,” “administration,” and “president,” signaling a focus on the Democratic administration. The word “campaign” may hint at the presidential elections held in November 2024, suggesting that climate change featured prominently in Biden’s electoral platform. The policy dimension also emerges clearly: alongside the reference to the “E.P.A.,” terms such as “emissions,” “regulations,” and “standard” indicate an emphasis on emissions reduction, further supported by mentions of “pollution” and “air” in connection with air quality. Consistently with this policy focus, attention also appears directed toward electric vehicles, as shown by the presence of “electric,” “vehicles,” and “cars.”

Topic 3 deals with climate education, as evident from words like “school,” “teachers,” “students,” “lesson,” and “education.” References to science such as “science,” “scientific,” and “study” are predictably present, as they provide the foundation for climate education in schools. In this context, the reference to “ChatGPT” may be related to the AI tool aligning with mainstream scientific views, as already emerged from the keyness analysis. The words “Roman” and “plague” may refer to historical events or periods mentioned in connection with climate change.

Topic 4 mostly revolves around the discussion of weather conditions, as indicated by words like “temperatures” and “record.” The research dimension also appears prominent, with the term “scientists” alongside “Copernicus” and “preindustrial,” likely signaling references to climate history. Another theme seems to concern the impact of climate change on international tourism, particularly in Europe: words like “travel,” “travelers,” “Paris,” and “Athens” suggest a link between weather conditions and the tourism industry. The mention of “fossil” and “fuels” may reflect a broader discourse on the relationship between climate change and tourism flows, possibly in connection with transportation.

Moving to Topic 5, it focuses on various aspects of energy transition policymaking, framed primarily within an economic and political perspective. The presence of “economic” and “political,” together with “November,” the month of the presidential election, possibly suggests that this theme was a

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<sup>21</sup> “A unit of mass equal to one billion metric tons (= units equal to 1,000 kilograms), used especially when talking about the amount of ice melting at the North and South Poles or the amount of carbon dioxide (= a gas formed when carbon burns) in the atmosphere.”, Cambridge Dictionary. (2025). Gigaton. *Cambridge Dictionary*. <https://dictionary.cambridge.org/us/dictionary/english/gigaton> (accessed on August 10, 2025).

notable element in the electoral campaign. The words “DOE,” “federal,” and “policies” point to a discussion situated at the federal level rather than within individual states. The mention of “Powell,” also observed in the keyness analysis, may indicate a perception that the Federal Reserve should refrain from direct environmental policymaking, as this is considered a governmental responsibility. The inclusion of “Europe” suggests that international comparisons in environmental policy may also be part of the discourse. The presence of fossil fuels, specifically “gas,” alongside “benefits,” points to cost-benefit considerations regarding green energy. The term “security” likely reflects concerns over the economic and social implications of the energy transition, while “report” may refer to scientific data used to support these policy discussions.

| Topic 6     | Topic 7     | Topic 8    | Topic 9    | Topic 10    |
|-------------|-------------|------------|------------|-------------|
| Wind        | Power       | Mann       | Carbon     | Painting    |
| Offshore    | Batteries   | Climate    | Emissions  | Food        |
| Power       | Electricity | Science    | Atmosphere | Paris       |
| Turbines    | California  | University | Climate    | Soup        |
| Electricity | Grid        | Rotation   | Greenhouse | Lisa        |
| Jersey      | Battery     | Pond       | Dioxide    | Mona        |
| Contracts   | Solar       | Water      | CO2        | Bezos       |
| Company     | Companies   | Scientists | Air        | Activists   |
| Energy      | Gas         | Plants     | Energy     | Meat        |
| Fork        | Energy      | Court      | Experts    | Fund        |
| Turbine     | Texas       | Pools      | Plant      | Women       |
| Farms       | Storage     | Institute  | Beef       | Glass       |
| Future      | Plants      | Hockey     | Gases      | Louvre      |
| Farm        | States      | Studies    | Land       | Climate     |
| Rates       | Wind        | Data       | Research   | Protesters  |
| Blades      | Costs       | Professor  | Water      | Museum      |
| Ship        | Work        | Backyard   | Plants     | Security    |
| Costs       | Coal        | Ponds      | Scientists | Agriculture |
| California  | Technology  | Rome       | Climeworks | Sustainable |
| Green       | Fuels       | Scientist  | Mammoth    | Attack      |

Tab. 4. The topic modeling analysis performed on the American media contents (Topic 6 - Topic 10).

Table 4 displays topics from six to ten.

Topic 6 is entirely focused on wind energy, specifically on offshore turbines: the words “wind,” “offshore,” and “turbines” are in fact mentioned. The emphasis seems to be mostly on California and New Jersey, likely due to their consistent investment in wind energy. Another emerging dimension is that of economic concerns, as indicated by the term “costs,” as well as that of technological nature, with the word “power” likely pointing to practical considerations regarding the capacity of such infrastructures. The presence of terms like “company,” “contracts,” and “rates” may further suggest

a commercial and regulatory framing, possibly referring to agreements for the development of offshore projects and to debates over electricity rates.

Topic 7 focuses entirely on the comparison between fossil fuels and renewable energy sources. The emphasis is specifically on solar, wind, and electric options, as indicated by the words “electricity,” “solar,” and “wind.” On the fossil fuel side, the attention seems to be on “coal” and “gas.” The topic appears to have a strong economic and technological orientation, revolving around the comparison between the two options in both financial and infrastructural terms. Among the words included, “costs” and “companies” point to the economic dimension, while “power,” “batteries,” and “storage” suggest discussions about infrastructure performance, indicating a debate grounded in cost-benefit considerations.

Topic 8 appears to be predominantly research-oriented, as suggested by words like “science,” “university,” “scientists,” “studies,” “data,” and “professor.” References to scientific theories also emerge, with “rotation” and “hockey” likely alluding to the hockey stick graph<sup>22</sup>, a view reinforced by the mention of “Mann,” who contributed to developing such theory. The presence of “court” may indicate a denialist reference within this topic, possibly connected to the lawsuit won by Mann against climate change denialists, as already discussed in the keyness analysis. Lastly, the topic seems to touch on a specific application of research concerning urban ecosystem improvements: terms like “plants,” “pools,” “ponds,” and “backyard” may point to adjustments in private households aimed at greater sustainability.

Topic 9 appears to be strongly science-oriented, with climate science as its main focus. Technical terms such as “CO<sub>2</sub>,” “greenhouse,” and “atmosphere,” paired with “emissions” and “air,” point to a focus on air pollution driven by carbon dioxide. The mention of “experts,” “scientists,” and “research” reinforces the reference to expert knowledge. Another notable theme concerns the impact of livestock farming on carbon dioxide levels and the use of water and soil, as suggested by “beef,” “gases,” “land,” and “water.” Technological solutions to reduce emissions also appear to be part of this topic, as illustrated by the reference to “Climeworks,” a company developing carbon removal technologies.

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<sup>22</sup> “The hockey stick graph is a visual representation of historical average temperatures in the Northern Hemisphere, characterized by a long period of stability followed by a sharp increase in temperatures around 1900. Its shape resembles a hockey stick, with the vertical spike symbolizing the recent rise in temperatures attributed to industrial activity and potentially anthropogenic causes. First published in 1998 by researchers Michael E. Mann, Raymond S. Bradley, and Malcolm K. Hughes, the graph became a focal point in discussions about climate change, particularly regarding the debate over whether current temperatures are historically abnormal.”, Green, K.P. (2024). Hockey stick graph. *EBSCO*. <https://www.ebsco.com/research-starters/earth-and-atmospheric-sciences/hockey-stick-graph> (accessed on November 4, 2025).

Lastly, Topic 10 centers on environmental activism, with clear references to specific events and locations, such as “Paris” and the “Louvre.” The mention of “painting,” “soup,” “agriculture,” and “Mona Lisa” points to the protest by two Riposte Alimentaire activists, who in January 2024 threw soup at the Mona Lisa to advocate for healthy and sustainable food (Slow, 2024). This topic appears to frame environmental activism within a critical and security-oriented perspective: terms like “security” and “attack” suggest a narrative portraying such actions as threats to public order.

The food-related dimension seems to connect activism to elite criticism, as the topic also includes references to sustainable food development. Terms like “food,” “fund,” “Bezos,” and “meat” appear to focus on the development of lab-grown meat financed by Bezos, potentially interpreted within the broader critique of wealthy elites already identified in the keyness analysis. Notably, the coexistence of activism and elite criticism within the same topic may indicate that climate concerns are framed by the analyzed media as inherently tied to elite interests, potentially dismissing them as an elitist preoccupation.

Overall, the analyzed American media sample appears to focus primarily on science, research, and climate education (featured in Topics 1, 3, 4, 8, and 9, with smaller references in Topic 5); on renewable energy sources and their comparison with fossil fuels (Topics 4, 5, 6, and 7); on emissions and air pollution (Topics 2 and 9); and on environmental policymaking (Topics 2 and 5). Elite criticism emerges as closely connected to environmental activism (Topic 10), suggesting that the delegitimization of environmental concerns can be framed within a broader discourse of elite criticism. Compared with the American user comments discussed in Chapter 2, the media discourse generally adopts a less heated tone and contains fewer overt political references.

In conclusion, and in line with user comments, American media content appears more politically oriented than the Italian sample, while the latter tends to focus more on the broader European policymaking dimension. References to research are more frequent in the American sample and include theoretical aspects, whereas Italian coverage seems to focus on technological applications of climate science.

Both samples discuss climate history, but climate education in schools emerges only in the American content. Renewable energy and its comparison with fossil fuels are relevant components in both cases. Electric vehicles seem to receive more attention in Italian media than in American outlets, while the theme of sustainable food is largely absent from Italian discourse. In both countries, environmental activism is framed within security narratives, and concerns about wealth inequalities emerge in both, though they appear more politicized in the American content through the “elite vs people” frame. Denialism seems more typical of user comments than of media coverage and, within the media

sample, it appears to be limited to the American content. Even there, it seems to be mentioned indirectly, such as in reference to the Mann defamation case.

### 3.3.3. KWIC and QCA

In order to provide an enriching and more in-depth perspective on the research questions, and specifically on RQ2 (main differences between the two countries), a KWIC analysis and a QCA were carried out on the items in the dataset.

This time, the analyses were not limited to the American sources, as was the case with the comments in Chapter 2, for two reasons: first, the nature of the material (media content rather than user comments); second, the distinctive political orientation of each source, which ensures a clearly different political stance and makes a more detailed investigation worthwhile. All the available text was taken into account: titles, subheadings (where present), and body for articles, captions for posts and short videos.

Drawing on the results of the keyness analysis and the topic modeling, a set of keywords related to the fields of science and politics was selected for each country. The theme of populism was also taken into account in order to investigate whether media content included such narratives: for the U.S. additional words that had emerged in Chapter 2 were included, such as references to celebrities and to the major American political parties.

In the Italian case, the keywords were as follows: “agricoltori” (farmers), “attivista\*” (activist\*), “COP28,” “destra” (right), “élite\*/élite\*,” “esperto\*” (expert\*), “Europa/europe\*” (Europe/European), “Generazione” (Generation, referring to the activist group Last Generation), “governo” (government), “Meloni,” “mercato” (market), “negare/negazionis\*” (deny/denial\*/denier\*), “politic\*,” “popol\*” (people\*), “populism\*,” “ricerc\*” (research), “ricercat\*” (researcher\*), “scettic\*” (skeptical\*), “scientific\*” (scientific), “scienz\*” (science\*), “scienziat\*” (scientist\*), “sinistra” (left), “sovrano\*” (sovereign\*), “studio/studi” (study/studies), “Verdi” (Greens).

For the U.S., the keywords were as follows: “activist\*,” “Bezos,” “Biden,” “celebrit\*,” “conservative\*,” “Democrat\*,” “denial\*/denier\*/deny,” “DOE,” “elite\*,” “E.P.A./EPA,” “Europe/European\*,” “expert\*,” “globalis\*,” “left,” “liberal\*,” “Mann,” “people\*,” “politic\*,” “populism\*,” “president,” “protester\*,” “Republican\*,” “research,” “researcher\*,” “right,” “science\*,” “scientific,” “scientist\*,” “skeptic\*,” “sovereign\*,” “study/studies,” and “Trump.”

Once again, asterisks were used to cover all different word forms; the keyword “E.P.A./EPA” was included in both versions to ensure that no significant associations were missed due to different spellings, while the keyword “Europe/European,” in both languages, was included to avoid missing any reference to the European Union due to different wording. The keyword “elite\*/élite\*” was used in both forms, as the second is commonly used in Italian writing.

For both analyses, given that the focus is on long and complex texts, a 10-word window before and after each keyword was selected to provide a more comprehensive and detailed context.

For Italian content, MAXQDA extracted 323 associations through its “Keyword in Context” option. After downloading the table in .xlsx format, 202 irrelevant entries were manually removed, resulting in a final total of 116 associations, distributed between 56 for progressive sources and 60 for conservative ones, as presented in Table 5.

| Keyword                                      | Progressive sources | Conservative sources |
|----------------------------------------------|---------------------|----------------------|
| Agricoltori (farmers)                        | 2                   | 2                    |
| Attivist* (activist*)                        | 8                   | 7                    |
| COP28                                        | 2                   | 3                    |
| Destra (right)                               | 1                   | 1                    |
| Elite*/élite*                                | 0                   | 1                    |
| Espert* (expert*)                            | 0                   | 3                    |
| Europa/europe* (Europe/European*)            | 17                  | 8                    |
| Generazione (Generation)                     | 2                   | 4                    |
| Governo (government)                         | 3                   | 6                    |
| Meloni                                       | 1                   | 6                    |
| Mercato (market)                             | 1                   | 3                    |
| Negare/negazionis*<br>(deny/denial*/denier*) | 0                   | 0                    |
| Politic*                                     | 3                   | 0                    |
| Popol* (people*)                             | 1                   | 3                    |
| Populism*                                    | 0                   | 0                    |
| Ricerc* (research)                           | 3                   | 1                    |
| Ricercat* (researcher*)                      | 4                   | 0                    |
| Scettic* (skeptic*)                          | 0                   | 0                    |
| Scientific* (scientific)                     | 2                   | 0                    |

|                              |   |   |
|------------------------------|---|---|
| Scienz* (science*)           | 0 | 0 |
| Scienziat* (scientist*)      | 0 | 0 |
| Sinistra (left)              | 1 | 8 |
| Sovran* (sovereign*)         | 0 | 1 |
| Studio/studi (study/studies) | 0 | 1 |
| Verdi (Greens)               | 5 | 2 |

Tab. 5. Associations for the Italian keywords.

For the U.S., MAXQDA provided 526 associations. After manually deleting 332 irrelevant entries in the exported .xlsx file, the final number of associations was 190, distributed between 119 from progressive sources and 71 from conservative ones, as presented in Table 6.

| Keyword              | Progressive sources | Conservative sources |
|----------------------|---------------------|----------------------|
| Activist*            | 2                   | 6                    |
| Bezos                | 0                   | 6                    |
| Biden                | 10                  | 7                    |
| Celebrit*            | 0                   | 3                    |
| Conservative*        | 1                   | 0                    |
| Democrat*            | 1                   | 1                    |
| Denial*/denier*/deny | 1                   | 3                    |
| DOE                  | 0                   | 4                    |
| E.P.A./EPA           | 5                   | 0                    |
| Europe/European*     | 19                  | 1                    |
| Expert*              | 8                   | 2                    |
| Globalist*           | 0                   | 1                    |
| Left                 | 0                   | 0                    |
| Mann                 | 9                   | 0                    |
| People*              | 0                   | 6                    |
| Populism*            | 0                   | 0                    |
| Politic*             | 5                   | 4                    |
| President            | 3                   | 4                    |
| Protester*           | 2                   | 4                    |
| Republican*          | 1                   | 1                    |
| Research             | 5                   | 2                    |
| Researcher*          | 6                   | 0                    |
| Right                | 10                  | 0                    |
| Science              | 5                   | 3                    |
| Scientific           | 0                   | 4                    |
| Scientist*           | 17                  | 3                    |
| Skeptic*             | 0                   | 2                    |
| Sovereign*           | 0                   | 0                    |
| Study/studies        | 7                   | 4                    |
| Trump                | 2                   | 0                    |

Tab. 6. Associations for the American keywords.

Drawing on the results of the two KWIC analyses, a manual coding process for each country was then performed in MAXQDA. The cleaned Italian KWIC analysis file (.xlsx format) was imported into MAXQDA for the coding phase.

Three macro-categories of codes were developed according to the main topics that emerged from the previous analyses: “Political Behavior,” “Science and Expertise,” and “Social Behavior.” Further subcodes were developed inductively through a comprehensive reading of the material under investigation. This method was adopted to ensure that any specific topic of interest was adequately taken into account and to avoid missing significant interpretative material.

For “Political Behavior” four subcodes were developed: “(De)politicization of Climate Issues,” “European and International Politics,” “Ideological Narratives,” and “Partisanship and Political Conflict.”

Four subcodes were also developed for the macro-category “Science and Expertise”: “Data and Research,” “Distrust in Science/Climate Skepticism,” “Extreme Weather Events,” and “Sustainable Technologies and Clean Energy.”

Lastly, three subcodes were developed to explore the dimension of “Social Behavior” in greater detail: “Activism and Collective Action,” “Economic Dimensions,” and “Public Opinion.”

It is worth noting that these codes could be used simultaneously within the same association to effectively capture all the dimensions potentially present.

“Political Behavior” is the macro-category with the highest number of coded segments (73). Specifically, they are distributed as follows: “(De)politicization of Climate Issues” was used 21 times; “European and International Politics” was used 12 times; “Ideological Narratives” was used 27 times; “Partisanship and Political Conflict” was used 13 times.

“Social Behavior” follows, with 56 coded segments distributed as follows: “Activism and Collective Action,” occurring 32 times; “Economic Dimensions,” used 16 times; “Public Opinion,” used 8 times.

Lastly, the macro-category with the lowest number of occurrences (53) is “Science and Expertise.” The subcode “Data and Research” presents 19 occurrences; “Distrust in Science/Climate Skepticism” shows a comparatively low frequency (4), together with “Extreme Weather Events,” that was only used 5 times. “Sustainable Technologies and Clean Energy” was instead used 25 times, emerging as the most discussed topic of this category.

It is also worth looking at the political orientation of the sources behind each coded segment, to see how the different dimensions are discussed across the sample.

In total, 75 codes were applied to segments from progressive sources. Within this group, the macro-category “Political Behavior” appears 21 times: 4 with “(De)politicization of Climate Issues,” 8 with “European and International Politics,” 3 with “Ideological Narratives,” and 6 with “Partisanship and Political Conflict.”

The macro-category “Social Behavior” was applied 20 times, with the code “Activism and Collective Action” applied 11 times, “Economic Dimensions” 4 times, and “Public Opinion” 5 times.

The category “Science and Expertise” was used most often, with 34 coded segments. Among these, “Data and Research” occurs 16 times. “Distrust in Science/Climate Skepticism” appears only once, in a segment also coded as “Public Opinion” that reports a decline in public support for green policies in Europe. “Extreme Weather Events” is found 4 times, and “Sustainable Technologies and Clean Energy” 13 times.

Regarding Italian conservative sources, a total of 107 code applications were assigned to the related segments. Within this subset, the macro-category “Political Behavior” was applied 52 times, making it the most frequent: 17 applications concerned “(De)politicization of Climate Issues,” 4 “European and International Politics,” 24 “Ideological Narratives,” and 7 “Partisanship and Political Conflict.”

The macro-category “Social Behavior” was applied 36 times, with 21 applications of “Activism and Collective Action,” 12 of “Economic Dimensions,” and 3 of “Public Opinion.”

The macro-category “Science and Expertise” was less frequent, with 19 applications in total. Within it, “Data and Research” and “Distrust in Science/Climate Skepticism” were each applied 3 times, “Extreme Weather Events” only once, and “Sustainable Technologies and Clean Energy” 12 times, making it the most discussed topic within this category.

Overall, these results appear consistent with those of the quantitative analyses presented in the previous sections. Content from conservative sources seems to be more politically connoted, as highlighted by the strong prevalence of the category “Political Behavior” in the related coding system. Progressive sources appear instead to focus more on scientific and technological topics, in line with the results of the keyness analysis.

The differences in approaching these two specific categories also deserve a more detailed look. When it comes to political matters, conservative sources appear to privilege discussions concerning phenomena of (de)politicization of science (17) and, especially, ideological narratives (24).

By contrast, the main political focus of progressive sources seems to be on European and international politics (8), with specific attention to the EU’s environmental policies and comparatively less to the

politicization of climate issues (4) and ideological narratives (3). This difference is also compatible with “Science and Expertise” being the most used category to code progressive content.

Attention to partisanship does not appear crucial for either of the two political orientations, as suggested by the fact that the related subcode was only used 6 times for progressive content and 7 for conservative content.

Regarding the approach to science and expertise, it is also possible to detect significant differences. For progressive content, the most used subcode was “Data and Research” (16), indicating a consistent tendency to refer to data and research in their discourse. Conservative content, instead, shows a more pronounced overall attention to energy- and technology-related aspects (12). Progressive content also pays attention to this topic, as the related subcode occurs 13 times. This overall focus on technological and energy aspects of the green transition is consistent with the findings from topic modeling, which suggest a strong presence of these themes in the Italian media discourse.

On the other hand, extreme weather events do not appear consistently in the coded segments: only once in conservative content and 4 times in progressive content. The subcode “Distrust in Science/Climate Skepticism” has very low occurrences in both subsets as well: a single one in progressive content and 3 in conservative content. This likely suggests that the denialist elements observed in user comments in Chapter 2 are not present to the same extent in the media content to which they refer, which appears more focused on political and techno-scientific aspects than on promoting overtly denialist views of climate-related issues.

Conservative sources also seem to discuss a higher number of topics related to the category “Social Behavior,” with a major focus on activism (21). This may be due to the fact that such a theme often appears framed as a security issue and discussed under an ideological perspective, consistent with the already mentioned high occurrence of the subcode “Ideological Narratives.” Nevertheless, activism seems to be the main focus within this category of progressive content as well, though with a significantly lower number of occurrences of the related subcode (11).

Another notable difference is that “Economic Dimensions” was used 12 times for conservative segments, three times as often as for progressive ones (4). This seems to match the results of the keyness analysis and also the comparatively stronger attention to economic aspects shown by the analyses of Italian user comments referring to conservative media content in Chapter 2. Lastly, public opinion itself does not appear to be a significant discussion topic overall, as this subcode was only used 5 times for progressive segments and 3 for conservative ones.

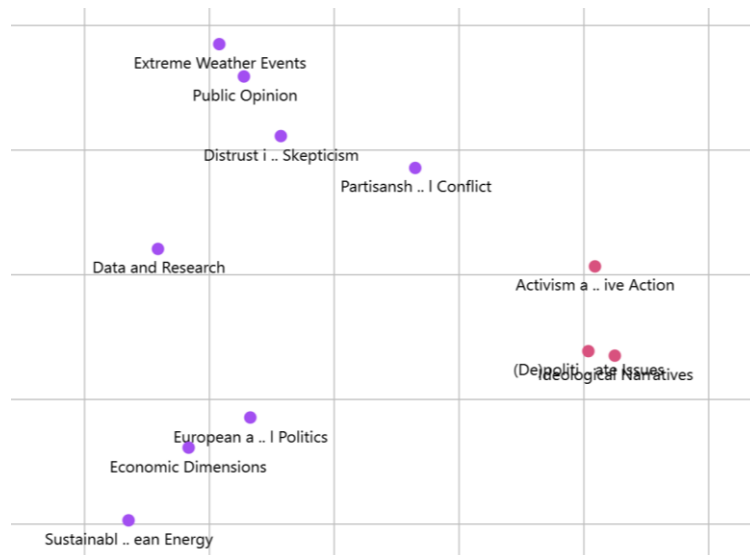


Fig. 4. Map of the subcodes used for the analysis on Italian media content.

Further interesting insights emerge from the map of the subcodes used for the QCA (Fig. 5), which suggests the presence of three main clusters. The map is based on the co-occurrence patterns of the codes across the corpus: codes that tend to occur in similar contexts are placed closer together, while those that rarely share contexts are positioned farther apart.

A first cluster, comprising the subcodes “Extreme Weather Events,” “Public Opinion,” “Distrust in Science/Climate Skepticism,” “Partisanship and Political Conflict,” and “Data and Research,” seems to suggest that the discourse on public opinion is mostly linked to that on extreme weather events, while the topic of distrust in science appears close, yet slightly more distant, to that of partisanship. The reference to data and research is also present, yet as the most distant within this cluster, which likely contributes to shaping public opinion together with partisanship.

A second cluster seems to group the subcodes “Activism and Collective Action,” “(De)politicization of Climate Issues,” and “Ideological Narratives.” This positioning appears to support the suggestion that the theme of activism is often politically and ideologically framed in the sample analyzed, as shown by the low distances of 31 with “Ideological Narratives” and 37 with “(De)politicization of Climate Issues,” and by the co-occurrences of 18 and 12, respectively. Furthermore, this closeness may also hint at the ideological background of activist groups and their framing of climate change as a political issue. The topics of politicization of climate science and ideological narratives are also close, with a distance of 32 and 17 co-occurrences. This seems to suggest the crucial importance of ideological frames and narratives in the process of politicization of climate-related issues, in line with the relevance of populist narratives in the scientific literature highlighted in Chapter 1.

The third and last cluster groups the subcodes “European and International Politics,” “Economic Dimensions,” and “Sustainable Technologies and Clean Energy.” This suggests that the environmental measures taken by international politics, and specifically by the EU, may be approached mainly from an economic perspective, indicating that economic concerns are central in climate discourse, in line with the previous analyses and with user comments in Chapter 2. Sustainable technologies and the production of clean energy appear to constitute another significant component of this cluster: this topic is likely addressed mostly from a broader European perspective and from a point of view attentive to its economic aspects and potential market impact.

Switching to American content, the cleaned American KWIC analysis file (.xlsx format) was also imported into MAXQDA for the coding phase. In order to ensure the highest degree of comparability, the same macro-categories and subcodes were used for American segments as well, with a single difference: the subcode “European and International Politics” was replaced by “Presidential Climate Regulations,” to better capture the specific features of U.S. climate politics. As in the Italian analysis, these codes could be used simultaneously within the same segment.

A total of 276 code applications were assigned to the American segments, distributed between 180 applications to progressive sources and 96 to conservative sources.

Once again, “Political Behavior” emerged as the most frequently used macro-category, appearing 129 times, distributed as follows: 48 for “(De)politicization of Climate Issues,” 22 for “Ideological Narratives,” 32 for “Partisanship and Political Conflict,” and 27 for “Presidential Climate Regulations.”

The macro-category “Social Behavior” proved to be more marginal, being applied only 39 times: 16 for “Activism and Collective Action,” which is the most present subcode within this category, 13 for “Economic Dimensions,” and 10 for “Public Opinion.”

The macro-category “Science and Expertise” shows a stronger presence, with the segments coded a total of 108 times with its related subcodes: 44 with “Data and Research,” 22 with “Distrust in Science/Climate Skepticism,” 7 with “Extreme Weather Events,” and 35 with “Sustainable Technologies and Clean Energy.”

Looking more in detail at the distinctive codes for each political orientation of the sources, progressive outlets display a total usage of “Political Behavior” of 79 times: “(De)politicization of Climate Issues” was used 33 times, “Ideological Narratives” 6 times, “Partisanship and Political Conflict” 26 times, and “Presidential Climate Regulations” 14 times.

Predictably, given its overall low number of occurrences, “Social Behavior” appears significantly less than “Political Behavior,” for a total of 22 times: 6 for the subcode “Activism and Collective Action,” 10 for “Economic Dimensions,” and 6 for “Public Opinion.”

Interestingly, “Science and Expertise” appears at exactly the same level as “Political Behavior,” with 79 code applications: 35 related to the subcode “Data and Research,” 14 to “Distrust in Science/Climate Skepticism,” all 7 occurrences of “Extreme Weather Events,” and, lastly, 23 to “Sustainable Technologies and Clean Energy.”

Turning to conservative sources, a higher topic homogeneity is noticeable, as the majority of the codes belong to “Political Behavior” (50 code applications): “(De)politicization of Climate Issues” was used 15 times, “Ideological Narratives” 16 times, “Partisanship and Political Conflict” 6 times, and “Presidential Climate Regulations” 13 times.

Concerning “Social Behavior,” it appears a total of 17 times: the subcode “Activism and Collective Action” was used 10 times, “Economic Dimensions” only 3 times, and “Public Opinion” 4 times.

Finally, “Science and Expertise” was applied 29 times in total: 9 with the dimension “Data and Research,” 8 with “Distrust in Science/Climate Skepticism,” and 12 with “Sustainable Technologies and Clean Energy,” making it the most discussed topic within this macro-category. Notably, no segment was coded with “Extreme Weather Events.”

These results seem to support the quantitative findings for the U.S. as well. First, it is worth noting that, compared to conservative sources, progressive media show a consistently higher number of associations in the KWIC analysis and a greater number of code applications in the QCA. This pattern may reflect the stronger presence of scientific topics in their discourse, as shown in Table 6 and confirmed by the higher frequency of the code “Science and Expertise” in the QCA, which is consistent with the stronger scientific focus revealed by the keyness analysis when compared with conservative sources.

This could help explain the high frequency of the subcode “(De)politicization of Climate Issues” (33 occurrences), which was mostly applied to content narrating episodes of skepticism and climate denialism rather than supporting these views. Moreover, such content was often closely tied to the defense of scientists from politically motivated denialist attacks, which helps to clarify how the subcode “Partisanship and Political Conflict” (26) was used. This stance toward climate skepticism and denialism may also account for the balanced proportion between the categories “Political Behavior” and “Science and Expertise,” offering a clearer picture of the approach to climate issues adopted by the American progressive sources analyzed. It could likewise explain the high number of

associations with the keyword “Europe/European,” which was mainly treated as a continent facing the effects of climate change.

By contrast, it is worth noting that, although conservative sources show a comparatively more consistent use of the macro-category “Political Behavior” than progressive ones (50, accounting for more than half of the code applications within this subcorpus), the subcode “Partisanship and Political Conflict” appears only six times. Since this subcode was mostly applied to segments from progressive sources, it can be hypothesized that political conflict is a more prominent feature of the progressive material than of the conservative one, likely because of its specific connection to climate skepticism and science denialism.

Another noteworthy point is that, although the subcode “Extreme Weather Events” appears seven times in progressive sources, it does not occur at all in the conservative segments analyzed. This absence may reflect a weaker emphasis on science, as suggested by the relatively low use of the macro-category “Science and Expertise” (29 occurrences) and, in particular, the subcode “Data and Research” (9). It may also indicate a tendency to downplay the effects of climate change, as suggested by the frequent use of “Ideological Narratives” (16) and the presence of denialist-related elements within the conservative subcorpus. This interpretation appears consistent with the keyness analysis, which highlighted the words “Roman” and “plague,” possibly pointing to historical analogies used in climate narratives to normalize or tone down the phenomenon.

Also consistent with the keyness analysis is the extensive use of the subcode “Data and Research” in progressive content (35), which suggests the strong emphasis on science, research findings, and scientific figures. By contrast, the most frequent science-related subcode in conservative segments was “Sustainable Technologies and Clean Energy” (12), in line with the prominence of clean energy sources, particularly wind, highlighted by the keyness results. Considering both the relatively high number of occurrences of “Ideological Narratives” (16) and the presence in the keyness analysis of likely critiques of wealthy elites connected to technological innovation (for instance, the lab production of sustainable food), it seems plausible that, in the sample analyzed, conservative discourse on sustainable technologies is closely intertwined with broader political and economic interests.

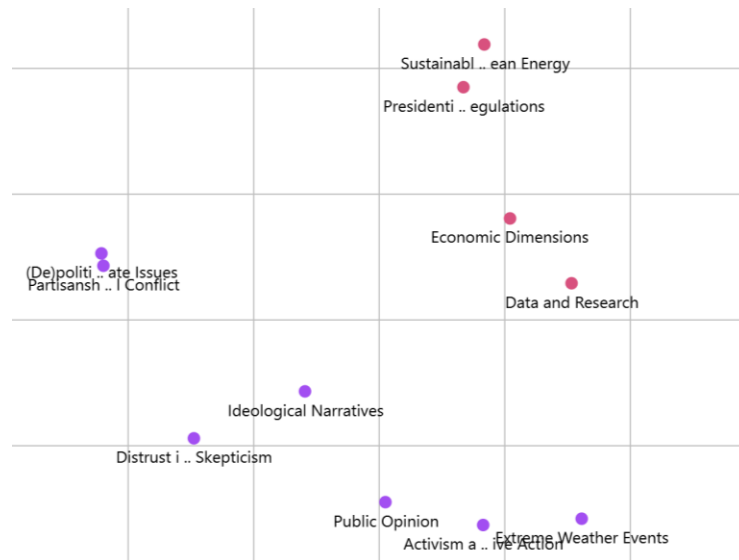


Fig. 5. Map of the subcodes used for the analysis on American media content.

According to the map of the codes used for the American segments (Fig. 5), three distinct clusters can once again be identified, offering further insights into how the codes relate to each other within the analyzed sample.

The first cluster, comprising the subcodes “(De)politicization of Climate Issues,” “Partisanship and Political Conflict,” “Ideological Narratives,” and “Distrust in Science/Skepticism,” appears to support the previously noted connection between distrust in science, the politicization of climate-related topics, and political orientation. Within this cluster, it is noteworthy that processes of politicization are most closely associated with partisanship, with a distance of 52 and 27 co-occurrences across the segments, supporting the assumption that climate change is framed as a matter of political conflict. The proximity of “Ideological Narratives” and “Distrust in Science/Skepticism” also seems consistent with this interpretation, as the two may be linked both by the elite criticism already highlighted in conservative sources’ keyness results and by the condemnation of climate skepticism found in the progressive content analyzed. Overall, this first cluster reinforces the idea that climate change is closely tied to political orientation rather than being addressed primarily in scientific terms.

Moving to the second cluster, which brings together the subcodes “Public Opinion,” “Activism and Collective Action,” and “Extreme Weather Events,” the focus shifts from political conflict to the societal dimensions and perceptions of climate change. Collective action and extreme weather conditions appear to be closely intertwined with public opinion, likely playing a significant role in shaping it. A possible explanation is that activist demonstrations and climate extremes affect

individuals more directly, thereby influencing the formation of public attitudes toward climate-related issues.

The third cluster provides additional perspectives, bringing together the subcodes “Sustainable Technologies and Clean Energy,” “Presidential Climate Regulations,” “Economic Dimensions,” and “Data and Research.” Notably, the first two subcodes show the closest proximity, with a distance of 68 and 11 co-occurrences. To better contextualize this result, it is important to note that the material under investigation was collected during the Democratic administration of Joe Biden (January 20, 2021 - January 20, 2025), specifically covering the period between October 2023 and June 2024.

Therefore, it can be assumed that the closeness between these two subcodes reflects Biden’s regulations aimed at supporting the green transition, such as stricter rules promoting electric vehicles (Nilsen and Christensen, 2024) and funding for the production of clean energy, particularly wind (U.S. Department of the Interior, 2023). This interpretation appears consistent with the keyness analysis for both political orientations: results for progressive outlets included frequent references to electric vehicles, while those for conservative outlets highlighted wind energy development and the DOE. Within the same cluster, “Economic Dimensions” also appears, with 7 co-occurrences with “Sustainable Technologies and Clean Energy.” This suggests that economic concerns constitute a significant part of the media discourse on sustainable development and climate measures. Finally, the presence of “Data and Research” in this cluster may suggest not only a role for scientific findings in supporting technological development, but also that such development could be assessed in relation to cost-benefit considerations as well as to scientific evidence, given the cluster’s economic component.

In conclusion, the results of the KWIC and qualitative content analyses appear consistent with the tendencies already highlighted by the keyness analysis and the topic modeling.

In both Italy and the U.S., content from conservative sources tends to show a stronger political connotation compared to that from progressive ones. At the same time, however, some important differences emerge across the two contexts. In Italy, progressive outlets seem comparatively less politicized, as their discourse is largely oriented towards references to scientific data and to European environmental policies, which suggests a preference for framing climate change through empirical evidence and institutional measures.

The American case appears different. Here, progressive sources appear to display a more visible degree of politicization, often engaging with partisanship in their discussion of climate skepticism. This pattern may be linked to the fact that, in the U.S. context, skepticism about climate change is itself strongly associated with political orientations and frequently framed as a partisan matter. Such dynamics could help explain the comparatively greater relevance of partisanship in the American QCA results, where climate change tends to be debated more often as a political rather than primarily a scientific issue.

Another important detail in both countries is that the topic of sustainable innovation appears closely connected with political and institutional measures (the EU in Italy, presidential regulations in the U.S.). This may suggest that climate change and the green transition are framed above all as political matters, shaped by decision-making institutions.

In Italy, especially among conservative sources, this link also acquires an economic dimension, as market implications are frequently emphasized. In the U.S., conservative outlets also refer to economic aspects, though not as extensively as in the Italian case, which may further reflect a stronger politicization of climate-related issues, where political conflict tends to outshine alternative perspectives or potential positive economic impacts.

This interpretation is consistent with the broader presence of ideological narratives in American content compared to Italian, where such narratives seem mainly tied to the theme of eco-activism. Activism itself is more present in the Italian discourse, often politically framed, while in the American case it appears marginal, in line with the evidence discussed in Chapter 2.

Finally, both countries share the tendency to present public opinion as shaped by extreme weather events, consistent with the literature on risk perception and the local dimension discussed in Chapter 1.

Overall, Italian discourse appears broader, more varied, and less politicized than the American one, in line with the previous analyses and with the picture already outlined in Chapter 2 for user comments.

### 3.4. ANT Analysis of Climate Controversies

In line with Chapter 2, the results are here interpreted through the lens of ANT, in order to examine how the investigated media sources construct narratives on climate change.

Besel's (2011) notion of climate change as a "black box" of consolidated scientific knowledge offers once again a useful bridge between the empirical findings and the theoretical framework. When this knowledge is contested in the public sphere, its stability is disrupted, opening space for renewed debate in which rhetoric becomes crucial in shaping the configuration of the actor-network.

The analyses suggest that, as already noted in Chapter 2, this reopening of the black box appears to be predominantly driven by conservative media sources, particularly in the U.S. These outlets seem not only to propose alternative narratives of climate change but also to challenge, at least to some extent, established scientific positions.

Political interpretations appear especially prominent, suggesting that climate science is often portrayed as surrounded by broader political-economic interests. This tendency is further supported by the qualitative results: the relatively limited use of science-related codes suggests a preference for framing the issue in political and frequently antagonistic terms.

A further perspective is provided by applying Kukkonen, Stoddart, and Ylä-Anttila's (2020) framework of justificatory logics networks, which, when applied to topic modeling, may offer insights into how different logics connect with the actors involved.

Italian sources display a rather varied landscape of justificatory logics. Topic 1 seems to suggest a scientific-institutional logic, centered on data and pollutants. At the same time, elements such as references to the European Union, the Paris Agreement, and legal frameworks may also signal a political justification, with climate issues framed in terms of governance and regulation.

Topic 2 appears to combine economic-political and economic-technological logics, oriented toward cost-benefit calculations regarding different energy sources. A social justice justification also seems to emerge in connection with labor and activism. The latter is also central in Topic 3, which can be read as shaped by a mix of social justice and political-delegitimizing justifications, with activism framed as a security concern requiring government responses.

Topics 4 and 7 appear as more aligned with a scientific-institutional logic, as their emphasis seems to be primarily on meteorological and empirical data as well as scientific authority, rather than on political or economic considerations.

Topic 5 seems to be the most diverse, as it brings together several justificatory logics. Economic-political elements may be suggested by the references to politics and market dynamics, while a social justice dimension is suggested by the mentions of wealth and inequalities. A technological justification also seems to be present, given the focus on decarbonization and sustainable transportation.

Topic 6 can be read as combining scientific-institutional, technological, and economic justifications, given its focus on research, its applications for emissions reduction and pyrolysis, and the references to costs associated with technological development.

Topic 8 appears predominantly political, dealing with European elections and the role of Green Parties, suggesting a frame of climate issues as a matter of collective political responsibility.

Topic 9 seems to adopt primarily scientific-institutional and technological logics, with attention to meteorological data and cloud seeding technologies. An economic dimension also appears present, as these developments may be discussed in connection with agriculture. Similarly, Topic 10 can be interpreted as shaped by both scientific-institutional and technological logics, given its focus on renewable energy in both theoretical and practical terms.

Taken together, these results suggest that economic-political justificatory logics, with their associated sub-justifications, represent a dominant frame in the Italian media discourse. At the same time, scientific and technological justifications also appear to play a relevant role, indicating that the debate is varied and not exclusively centered on political and economic dimensions.

Turning to the American topics, a different configuration of justification logics can be observed, similarly to the Italian discourse but with specificities grounded in the American context.

From Topic 1, a predominantly scientific-institutional logic seems to emerge, with a focus on data, scientific observation, and technical terminology. Topic 3 may be read in the same way, as it revolves around climate education within formal institutions.

Topic 2 suggests both political and technological logics, centered on Biden's Democratic administration, climate regulations, and electric vehicles. This is particularly relevant as it highlights how sustainable technological development appears tied to political and presidential regulations, as also noted in the QCA. The association between the Democratic administration and climate regulation further suggests the salience of partisanship in framing climate change in the U.S.

Topic 4 also seems to reflect a scientific-institutional logic, with references to meteorological observations, extreme weather, and scientific data. At the same time, economic logics can also be observed, suggested by the links to tourism and fossil fuel consumption associated with travel.

Topic 5 stands out for the variety of justificatory logics it contains. Political justification seems predominant, with references to federal government and the likely allusion to the November 2024 elections. These elements suggest that climate regulations are framed as a partisan issue and may be perceived as being influenced by broader political interests. Moreover, another shade of political logic may be that of internationalization, as the reference to Europe suggests potential geopolitical considerations. An economic logic, cost-benefit oriented, also appears in the comparison between fossil fuels and renewables. In addition, a social justice perspective may be present, suggested by mentions of security and buildings, pointing to concerns about the social impact of climate policies.

Topics 6 and 7 seem to be framed mainly through technological and economic logics, with their focus on clean energy development and the related financial aspects.

Topic 8 seems to be shaped primarily by a scientific-institutional logic, with emphasis on research, universities, and academic settings. At the same time, the contested authority of science also appears relevant, as illustrated by the reference to Mann's lawsuit. This may point to a political dimension, suggesting that climate science can itself become an object of political contestation, in line with what emerged in the QCA.

Topic 9 appears to combine scientific-institutional and technological logics, revolving around data and emission-related technologies, with possible links to agriculture and farming.

Lastly, Topic 10 appears to reflect a political logic, including its social justice dimension, as it focuses on activism. It also features an element of elite criticism, suggested by the mention of Bezos. In addition, a technological justification seems to emerge in relation to sustainable food. This is particularly interesting, as it may indicate that such technologies are perceived as politically motivated and supported by wealthy elites.

Overall, the American topics suggest a discourse in which economic-political logics play a prominent role, while scientific-institutional and technological logics also seem to remain significant. A distinctive element in the U.S. sample is the political sub-justification of elite criticism, which does not seem to emerge in the Italian discourse.

### 3.5. Discussion

In conclusion, an attempt will now be made to answer the research questions.

The keyness analysis provides useful insights to address RQ1 (“Are the media narratives regarding climate change politicized in both countries?”), suggesting a seemingly stronger politicization of climate change in the U.S. compared to Italy. This interpretation is supported by the presence of politically situated references, such as the EPA and the DOE, which, as indicated by the broader analyses, appear connected to Biden’s climate regulations and may therefore point to a closer link between climate discourse and partisan dynamics. In the Italian case, political references are also present, but they seem to reflect a more institutional framing of climate change as a matter of policymaking and economic management rather than a subject of ideological contention.

As for RQ2 (“How does the political orientation of sources influence the language and rhetoric of the media sources?”), the keyness analysis highlights different discursive emphases according to political orientation: in both countries, progressive outlets appear more focused on scientific aspects, while conservative ones tend to emphasize political and economic themes, often including economic dimensions linked to the green transition.

In line with the findings from the analysis of user comments in Chapter 2, these results appear consistent with Jasanoff’s (2003) observations on the politicization of scientific facts along ideological lines, as well as with Rekker and Hartevelde’s (2024) discussion of the link between the politicization of climate change and the polarization of factual beliefs.

The distinction whereby comments associated with progressive outlets tend to emphasize scientific aspects, while those linked to conservative sources show a stronger political connotation, seems to align with McCright and Dunlap’s (2011) finding that Democrats in the U.S. tend to be more likely than Republicans to agree with the scientific community’s positions. It may also reflect the tendency identified by Castillo Esparcia and López Gómez (2021), according to which denialist narratives are more commonly promoted by conservative media than by progressive ones.

Concerning the differences between the two countries, the topic modeling and QCA analyses provide a more detailed overview of the issue. In both contexts, conservative sources tend to exhibit a stronger degree of politicization of climate-related issues compared to progressive ones.

However, the analyzed American progressive sources seem to display a more pronounced political connotation than their Italian counterparts. This may be explained by the fact that, in the U.S., climate skepticism is more closely intertwined with partisanship; consequently, progressive outlets might adopt a more explicitly political stance to counter politically motivated denialist attacks on scientists. This interpretation appears consistent with Feinberg and Willer's (2013) argument that liberals tend to perceive environmental issues through a moral lens more than conservatives, as well as with Jasanoff's (2003) observations on the politicization of scientific themes along ideological lines. Conversely, the analyzed Italian progressive sources seem to adopt a discourse more strongly based on references to scientific research and European climate policymaking.

Another relevant difference concerns how sustainable technologies are approached by the conservative sources analyzed. Although sustainable technologies generally appear to be framed within a political-institutional context in both countries (the EU in Italy and presidential regulations in the U.S.), the Italian conservative sources in the sample seem to place stronger emphasis on their economic dimensions and implications for the broader market.

While American conservative sources also acknowledge the economic aspects related to sustainable technologies, the political dimension appears to prevail, suggesting that it may overshadow the consideration of alternative perspectives. These technologies also seem to be associated with wealthy elites and are therefore perceived as expressions of broader political and economic interests.

This observation appears consistent with the results of topic modeling, as the Italian topics seem to emphasize the technological applications of research more than the American ones. References to sustainable technologies and the generation of clean energy can in fact be found in more than half of the topics (Topics 2, 3, 5, 6, 9, and 10) related to the Italian sample, whereas the American sample appears to refer to these themes in Topics 2, 5, 6, and 7.

Conversely, the American topics appear to exhibit a stronger orientation toward theoretical research and the technical dimensions of climate science, likely due to the broader references emerging from the analyzed American progressive content. Such themes, in fact, occur in half of the topics, specifically Topics 1, 3, 4, 8, and 9. In the Italian case, instead, only Topics 4 and 7 appear exclusively focused on research and on the technical and meteorological aspects of climate issues.

The discussion of activism likewise shows distinctive features in the American case. While the samples of both countries suggest a shared framing of activism in security and political-ideological terms, consistent with Hoffarth and Hodson's (2016) observations on the tendency of right-wing discourse to depict environmentalists as threatening figures, in the U.S. it also appears more marginal

and seems to acquire a class dimension, likely being connected to the previously mentioned frame of criticism against elites, which is instead lacking in the Italian sample.

This difference is also noticeable in the topic modeling results, as the Italian analysis includes an entire topic specifically focused on activism (Topic 3), with Topics 2 and 7 also likely containing minor references to this theme. In contrast, in the American case, Topic 10 combines references to activism with elements of elite criticism concerning investments in sustainable food, a theme that appears to emerge only in the American sample, together with that of climate education in formal institutions (Topic 3).

Another relevant difference concerns how the theme of climate history appears to be framed within the two national samples. In the Italian case, climate history seems to emerge indirectly in Topic 4, which appears scientifically oriented and primarily focused on meteorological and empirical observations. The reference to the EU's Copernicus program, aimed at systematically monitoring and reconstructing climate trends over time, suggests that the analyzed Italian media tend to frame climate history through an institutional and technical perspective. Such framing seems consistent with the overall Italian orientation toward empirical, policy-based, and European-level approaches to climate issues emerged from the previous analyses.

In contrast, the discussion of climate history in the American sample appears to assume a more political shade. As suggested by the QCA, references to historical climatological cycles often seem to aim at normalizing or minimizing current climate change, framing it as a natural and recurrent phenomenon rather than as a primarily anthropogenic one. In this sense, while Italian sources seem to employ the historical dimension as a means of basing the debate on data and scientific trends, American sources appear to use it within politically polarized discussions. The contrast between these two framings further supports the assumption of a higher degree of politicization in the U.S., with climate change being more ideologically polarized rather than purely viewed as a scientific fact.

Further supporting this interpretation is the way climate policymaking is represented in the two contexts. In the American sample, climate policymaking tends to appear within explicitly political topics, closely linked to the Democratic administration and its environmental agenda. This association emerges, for instance, in Topic 2, where references to Biden and the EPA are found alongside mentions of climate regulations and electric vehicles, and in Topic 5, which includes the Department of Energy together with economic and political considerations about the green transition. These elements suggest that, in the U.S., climate policy is perceived largely as a partisan matter included in the broader dynamics of federal governance and electoral competition.

It is noteworthy that Zehr's (2000) claim that uncertainty can undermine the perceived authority of science and generate challenges in knowledge production appears to be reflected in the findings of this chapter as well. Denialist arguments, particularly those with a political dimension, such as those connected to Mann's lawsuit, may indeed align with broader contestations of scientific authority. These results also seem consistent with Jasanoff's (2004) co-productionist framework, according to which climate science is inherently intertwined with political ideologies. At the same time, the prominence of themes related to sustainable technologies, environmental policymaking, and the market seems to align with Campbell's (2022) findings on the link between skepticism and the perceived risks of climate policies. Such dynamics also appear relevant here, consistent with what had already emerged from the analysis of user comments.

The Italian sample, on the other hand, presents a different configuration. Political references appear mainly in Topic 2, where Giorgia Meloni is mentioned within broader discussions of economic and social implications of European climate policies and clean energy generation, and in Topic 8, which focuses on the European elections and the political role of the Green parties.

From this comparison, another interesting detail emerges. The Italian sources appear to frame climate policies within a broader, international, and science-based policymaking discourse. This is suggested by the references to COP28 found in two distinct topics (2 and 10), as well as by the general association of the theme with the EU. In contrast, the American sample seems to portray climate policymaking primarily as a federal issue, as indicated by its strong connections to the Democratic administration and by the absence of references to supranational institutions or international conferences. These differences suggest that climate change appears more politicized in the U.S., where it is closely intertwined with domestic political dynamics. Conversely, the Italian media seem to reproduce what Swyngedouw (2010) describes as the dominant framing of climate action as a technical and managerial issue.

Through topic analysis, it is also possible to see the main issues emphasized in media coverage across the two contexts (RQ3). In both countries, economic and political themes appear alongside scientific and technological perspectives. Much space is also given to the debate between fossil fuels and renewable energies, as well as to environmental policymaking. Activism is discussed in both cases, though, as previously mentioned, in the American sample it seems to adopt a class dimension and, as a consequence, appears to be linked to criticism of elites.

The topic modeling analysis also provides valuable insights for addressing RQ4 ("Which human and non-human actors are the most prominent in media discourse?").

In the Italian sample, the main human actors appear to be politicians at both the national and European levels, together with scientists and activists. Unlike what emerged from the user comments in Chapter 2, explicit denialist voices do not seem to constitute a prominent part of the discourse. Among the non-human actors, fossil fuels, renewable energy sources, electric vehicles (including issues related to emissions), climate policies, climate history, and the market emerge as particularly relevant, reflecting both the economic and technological dimensions of the debate.

In the American sample, the main human actors seem to include political and institutional figures, such as President Biden and the Department of Energy, alongside scientists, activists, and wealthy individuals like Bezos, who seems to be referenced in the context of elite criticism. Among the key non-human actors are climate policies and regulations, carbon dioxide levels, fossil fuels, renewable energy sources, the economy, climate history, and clean technologies such as wind turbines and electric vehicles.

The following table (Tab. 7) provides an overview of the main human and non-human actors identified in the two national contexts, suggesting how they may contribute to shaping climate change narratives and their related justificatory logics, as outlined in the previous paragraph.

| Actor               | Category | Role in Italy                                                                                                                     | Role in the U.S.                                                                                                                            | Justificatory logics                             |
|---------------------|----------|-----------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------|
| Politicians         | Human    | Referenced mainly in relation to EU and national climate governance; focus on policy implementation rather than partisan conflict | Linked to the Democratic administration and federal institutions, often in connection with the promotion and regulation of climate policies | Economic-political                               |
| Scientists          | Human    | Generally perceived as neutral                                                                                                    | Portrayed either as politically influenced actors or as targets of politically motivated attacks                                            | Scientific-institutional and political           |
| Activists           | Human    | Framed as a security issue and as politically motivated                                                                           | Similar framing in the U.S., with a possible class dimension and perceived ties to elite criticism                                          | Political (delegitimization of environmentalism) |
| Wealthy individuals | Human    | Absent from the discourse analyzed                                                                                                | Associated with technological innovation and sustainable development, likely mentioned in connection with elite criticism                   | Economic-political (elite criticism)             |

|                                                       |           |                                                                                                          |                                                                                                                    |                                                                      |
|-------------------------------------------------------|-----------|----------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------|
| Climate policies/regulations                          | Non-human | Mentioned as a scientific and technical aspect; linked to broader European policymaking                  | Discussed either through research data or as politically connoted, particularly in relation to Biden's regulations | Scientific-institutional and economic-political                      |
| Climate history                                       | Non-human | Mentioned as a scientific aspect, often referencing European projects                                    | Apparently mentioned to minimize and normalize the scope of climate change                                         | Scientific-institutional and political (delegitimization of science) |
| CO2/emissions                                         | Non-human | Framed as an environmental issue and a target under EU policies                                          | Mentioned both as a scientific and technical aspect and as a target under Biden's policies                         | Economic-political and scientific-institutional                      |
| Clean technologies (Electric vehicles, wind turbines) | Non-human | Debated mainly in cost-benefit terms, emphasizing efficiency, applied research, and market opportunities | Discussed mostly from an economic and regulatory perspective, linked to Biden's policies                           | Economic-political and technological                                 |
| Fossil fuels                                          | Non-human | Compared to renewable energy and considered from a technological and cost-benefit perspective            | Same as Italy                                                                                                      | Economic-political and technological                                 |
| Market/economy                                        | Non-human | Addressed in terms of implications for labor, social equity, and cost-benefit logic                      | Addressed as a concern linked to Biden's environmental policies                                                    | Economic-political                                                   |
| Renewable energy                                      | Non-human | Discussed in relation to fossil fuels and economic impact, framed as potential market opportunity        | Similarly discussed, though more tied to political narratives and federal regulations                              | Economic-political and technological                                 |

Tab. 7. Main human and non-human actors and their roles in climate change discourse.

In summary, the analyses conducted in this chapter suggest that the Italian discourse within the sample tends to include a broader variety of climate-related themes, adopting a less politicized approach compared to the American one. This finding is consistent with the trends already observed in user comments in Chapter 2.

In both contexts, conservative sources appear to adopt more politically connoted framings, often emphasizing economic considerations and cost-benefit perspectives regarding sustainable technologies and renewable energy. Nevertheless, in Italy this politicization appears less pronounced, with the discourse reflecting what Swyngedouw (2010) describes as a technocratic and managerial approach to climate action.

In the U.S., by contrast, the political dimension seems to prevail, as indicated by the close association between climate policymaking and the Democratic administration, as well as by stronger challenges to the authority of scientific expertise (Zehr, 2000).

The table above provides a concise overview of the main human and non-human actors emerging from the discourse, which likely play a central role in shaping public opinion. Overall, the findings indicate that political actors seem to play a key role in shaping the ways in which climate change is framed and discussed in the analyzed discourse, aligning with Jasanoff's (2004) co-productionist perspective, which emphasizes the reciprocal shaping of scientific knowledge and political worldviews.

### **3.6. Conclusions**

Specularly to Chapter 2, Chapter 3 examined public opinion from the perspective of its formation, with the aim of understanding how selected media sources from both Italy and the U.S. frame climate change and whether this constitutes a politicized topic. Through a mixed-methods approach combining keyness analysis, topic modeling, KWIC analysis, and QCA, the chapter attempted to provide detailed and comprehensive answers to the four research questions included in the Introduction, also drawing on the ANT framework to identify the roles of each actor involved.

The keyness analysis offered insights into the degree of politicization of the topic in both countries, as well as into the influence of political orientation on language and rhetorical features. Topic modeling contributed to identifying the main issues and actors involved in these dynamics and, together with the KWIC analysis and QCA, added further depth to the understanding of cross-national differences.

The findings once again suggest that, in both countries, conservative sources tend to display a stronger politicization of climate-related issues. However, politicization appears overall higher in the U.S., including within progressive sources, indicating that climate change is primarily framed as a partisan matter of political contestation, closely tied to the Democratic administration and domestic policies.

This seems accompanied by the construction of alternative narratives challenging scientific authority, as described by Knüpfer and Hoffmann (2024). Such tendencies also appear consistent with Bennett

and Livingston's (2025) reflections on how these narratives may weaken democratic deliberation by delegitimizing opposing voices, including scientific expertise and environmental activism, the latter also observed in the Italian discourse.

Conversely, the analyzed Italian discourse tends to approach the issue from a more technical, Europe-oriented, and managerial perspective, focusing more on climate policymaking and technological applications than on ideological polarization, in line with Swyngedouw's (2010) notion of technocratic processes.

Overall, the results appear to support the findings from Chapter 2, suggesting a stronger politicization of the topic in the U.S., where it seems more deeply intertwined with individual political orientation, whereas in Italy climate change appears primarily framed within the broader context of European policymaking.

The next section will focus on the general discussion of the present work in light of the findings of these three empirical studies.

## Conclusions

This final section aims to summarize and discuss the main findings that emerged from the three analytical chapters, in order to better situate them within the broader scientific debate on the polarization and politicization of climate change in Italy and the U.S.

This objective is pursued by linking the empirical findings to the theoretical framework outlined in Chapter 1 and to the wider body of literature identified through the bibliometric analysis, with the aim of illustrating how the interconnections between science, politics, and the media contribute to shaping public opinion and understanding of climate-related issues.

As for the first research question presented in the Introduction of the present work (“Is climate change politicized in the two national contexts, and what differences can be observed between them?”), both empirical Chapters, 2 and 3, provide valuable insights into the processes through which climate-related issues become politicized, both at the level of public opinion and at the level of opinion formation.

From the analyses conducted in both chapters, the answer appears to be affirmative, as climate change seems to emerge as a politically contested issue in both countries, although to varying degrees. As observed in Chapters 2 and 3, although both national contexts, in both the analyzed samples of user comments and media content, tend to frame climate change through political lenses, this tendency appears stronger and more closely associated with individual political ideologies in the U.S. than in Italy, where the link seems weaker and discussions more often revolve around scientific aspects and policymaking considerations.

The fact that, particularly in the U.S., climate change appears both politically and scientifically disputed aligns with Jasanoff’s (2003) concept of “accounting for expertise,” according to which scientific knowledge operates as a form of social governance and, as such, can become a site of ideological conflict. This dynamic also aligns with Jasanoff’s (2004) co-productionist framework, which highlights the close and reciprocal relationship between science and political ideologies, and with the link between the politicization of climate change and factual beliefs polarization suggested by Rekker and Hartevelde (2024).

By contrast, the Italian case points to a different orientation, one more consistent with Swyngedouw’s (2010) description of the technocratic and managerial approach to climate change, where attention is focused on technical policymaking rather than ideological divisions. This interpretation is also in line

with d’Albergo and Moini’s (2019) understanding of depoliticization as a transformation in how public issues are defined and addressed.

This distinction seems to emerge from both the comment and media analyses. In the first case, the American user comments appear to contain more frequent political references, a generally more confrontational tone, and a more personalized focus on major political figures. The Italian discourse, by contrast, seems to be more frequently oriented toward references to European policymaking, scientific issues, and technological applications.

It can also be observed that, in the U.S. sample, climate denialism tends to appear within a politically connoted topic (Topic 5), whereas in the Italian case it is addressed in a more distinct and separate way (Topic 9). This difference suggests a stronger tendency in the U.S. to frame climate change in political rather than scientific terms, as climate skepticism in user comments also appears accompanied by accusations portraying environmental advocates as part of a “cult,” in line with the vocabulary described by Knüpfer and Hoffmann (2024). The fact that from Topic 5 emerges a connection between skeptic vocabulary and support to Trump also appears in line with Leiserowitz et al.’s (2012) findings about trust in science declining more among conservative individuals in the aftermath of Climategate controversy.

The analysis of media content in Chapter 3 also seems to support this distinction. The American material appears more politicized, although it adopts considerably less heated and denigratory tones than those observed in user comments, while the Italian content seems to focus more consistently on policy-related and technological dimensions. This difference is also suggested by the fact that climate history, present in both Italian and American media content, is presented in different ways. The Italian material, in fact, tends to refer to it from a data-oriented perspective, often in connection with the EU’s Copernicus project, likely to support the discussion with scientific evidence. Conversely, in American media content, climate history appears to be mentioned to draw analogies with past phenomena, potentially to tone down the discussion of climate issues. This seems to align, at least in part, with Giddens (2008), particularly regarding climate skeptics who reject scientific evidence on climate change or consider it exaggerated.

Another notable distinction concerns how environmental activism is discussed in both countries. Drawing on the results of the two empirical chapters, in Italy it appears to constitute a relevant portion of the discourse, both in public discussions and in the media. Furthermore, it tends to be framed as a political and security issue. This also appears to be true for the American samples, but overall the topic seems more marginal and less visible than in Italy and, in the media content, it often appears in connection with elites.

In connection with this reasoning, the American samples reveal the presence of a topic that does not seem to emerge in the Italian ones, namely that of elite criticism. In the analyzed user comments, this critical stance also extends to celebrities, who are accused of hypocrisy and of leading unsustainable lifestyles while promoting environmental causes.

In the media content, on the other hand, the frame of elite criticism mainly highlights the links between elites and the funding of sustainable technologies. The relevance of this framing appears consistent with the significant number of studies examining this rhetoric in the context of climate change, as discussed in Chapter 1.

A further difference concerns how climate policymaking is understood in the two countries. In the analyzed Italian discourse, the main policymaker appears to be identified with the European Union. Consequently, climate-related issues tend to be viewed within a broader European perspective rather than as a purely national matter of governance, and they are approached from a more technical point of view, in line with Swyngedouw's (2010) description of technocratic processes.

In the American sample, by contrast, the federal government is more frequently presented as the main policymaking actor. This, together with the comparatively limited references to supranational or international institutions, suggests that climate change may be primarily perceived as a national issue. Moreover, this framing may help explain the higher level of politicization observed in the American samples, as environmental policymaking appears more directly linked to the current administration and therefore more closely connected to political orientations. This might also account for the emphasis on economic considerations and cost-benefit discussions surrounding environmental policies and sustainable innovations.

Switching to RQ2 ("How does political orientation influence the framing of climate change in both public and media discourse?"), it is possible to identify notable differences in how climate change is discussed within and across both countries, depending on political orientation.

In both contexts, the main finding seems to be that the analysis of progressive material - both user comments related to progressive sources and the progressive media content itself - reveals a stronger focus on scientific evidence and technical aspects of climate change, such as meteorological observations and related environmental issues.

Conversely, both the user comments associated with conservative content and the conservative media material appear to emphasize economic and political dimensions. In particular, the American sample of comments related to conservative sources displays a high degree of politicization, marked by personalization, a confrontational tone, and references to conspiracy narratives connected to broader climate denialism. This seems consistent with McCright and Dunlap (2011), who note that Democrats tend to align more closely with the scientific community than Republicans, and with Castillo Esparcia and López Gómez (2021), who found that Democratic media were more likely to prioritize scientific facts on climate change during COP25 than right-leaning outlets, which tended to express more denialist perspectives. It also appears consistent with Campbell (2022), given the stronger focus on economic concerns related to environmental policies emerging from the conservative samples, which could lead to greater politicization compared to the progressive ones.

Furthermore, a relevant insight can be drawn from the fact that, given the overall higher degree of polarization observed in the American material, this tendency also seems to apply to American progressive media content. These sources, in fact, tend to display more politicized narratives than their Italian counterparts. This appears consistent with the stronger interconnection between climate change and political ideologies observed in the U.S., as the American progressive outlets in the sample may adopt a more politicized stance on climate science when reporting on politically motivated attacks against scientists and on climate skepticism more broadly.

Likely due to the same reason - the higher degree of politicization observed in the analyzed American content - American conservative material, both user comments and media content, appears to contain more political references and to be more strongly ideologically oriented than its Italian counterpart. An interesting manifestation of this difference can be found in how the media sources in the sample address the topic of sustainable technologies and the production of renewable and clean energy.

In the Italian case, these themes seem to represent a significant part of the debate and to be often discussed from an economic perspective, likely with regard to their potential impact on national, European, and international markets. On the other hand, American conservative sources appear to prioritize politically oriented narratives overall, to the extent that such narratives tend to overshadow other possible approaches to the subject.

Therefore, this distinction may support the assumption that the Italian debate analyzed here is broader and more diversified than the American one, as well as less politicized, further suggesting a clearer polarization of opinions on climate issues rooted in political ideologies in the U.S.

Overall, political orientation seems to influence both the themes and rhetorical strategies used to represent climate change, affecting which actors and arguments receive attention in public and media discussions.

Turning to RQ3 (“Which are the main human and non-human actors emerging from these discourses, and how do they contribute to shaping the narratives around climate change?”), the presence of human actors related to politics appears to be relevant for both countries, although reflecting the differences observed so far.

In the Italian samples, user comments and media content appear to point to differing interpretations: while the latter mostly seem to consider national and EU politicians as the main actors in environmental policymaking, and therefore adopt a rather neutral and technical perspective, user comments tend to perceive them as politically and economically, rather than environmentally, motivated.

This second interpretation is closer to the view observed in the U.S. material, where user comments and media content appear to display a higher degree of convergence on the topic. In both samples, in fact, environmental policies appear to be linked to Biden’s Democratic administration, with user comments showing a stronger tendency to accuse it of acting against national interests and to promote Trump instead as a national protector.

Focusing on scientists, this aspect more clearly reflects the differences in the politicization of science observed in the two countries. In the Italian case, both user comments and media content in the sample tend to refer to scientific expertise in a neutral way, mostly with regard to research and technology.

In the U.S., a pattern similar to that observed for politicians seems to emerge. Both user comments and media content appear to portray scientists as being influenced by broader political and economic interests, while the analyzed progressive sources also seem to display politicization by portraying scientists as targets of politically motivated attacks. This situation provides further support for the previous assumptions, as it seems to highlight that climate change is perceived as an inherently political issue in the U.S. to a greater extent than in Italy.

Activists also seem to be mostly understood from a political perspective, and in a similar way across the two countries. This appears to apply particularly to media content: both Italian and American media in the sample, in fact, tend to frame environmentalists primarily as a security issue requiring an appropriate governmental response, as well as as politically motivated, with the aforementioned potential link to elite criticism in the U.S.

User comments appear less consistent. In particular, Italian ones tend to adopt a more denigratory tone than the media content, accusing environmentalists of being attention-seekers or even outright criminals. In the analyzed American user comments, by contrast, activism seems to represent a rather marginal part of the online discourse.

On the other hand, denialists do not appear to constitute particularly relevant actors in the discourse of either country concerning the analyzed media content. They seem to emerge only from user comments, in both contexts, as actors who challenge dominant narratives on climate change while actively promoting alternative ones. This difference between the two sides of the analyzed public opinion and opinion formation may suggest that media sources do not express denialism as overtly as individual users, likely opting instead for more moderate or covert forms of dissent or alternative narratives.

This assumption also seems to be supported by the absence of denialism-related vocabulary in the results of the analyses of media content from both countries, unlike user comments, where climate-skepticism-related topics were more easily identifiable in the discourse. The fact that newspapers emerge as a non-human actor from the analyses of Italian user comments, but not from those of either Italian or American media content, may further contribute to explaining this issue, as they are likely being referenced by climate denialists in a critical way, probably accused of supporting mainstream climate narratives. This seems consistent with the idea that uncertainty can weaken the perceived authority of science and create challenges in knowledge production (Zehr, 2000).

As previously mentioned, human actors related to celebrities and wealthy individuals seem to emerge only from the analyzed American discourse, suggesting a component of elite criticism that appears to be lacking in the Italian discourse and providing further support for the higher politicization of the topic in the U.S.

When it comes to the major non-human actors, in user comments from both countries climate mostly emerges as a scientific benchmark within the discourse, with no visible secondary interpretations.

CO<sub>2</sub> emissions seem to be understood in a similar way across both countries' user comments and media content, with one relevant difference: both Italian user comments and media content, as well as American media sources, appear to include a political interpretation. Emissions are framed, on the one hand, as a target under European policies and, on the other, as a target under Biden's regulations. In this way, this actor seems to acquire a political connotation, as it appears directly linked to the policymaking dimension.

Climate policymaking itself, which stands out as a main non-human actor only in the discourse of media sources, tends to be framed either as a technical aspect grounded in scientific evidence or as a topic related to the broader political dimension, closely connected to either the EU or Biden's administration. This may suggest that the political aspect is crucial in how environmental policies are understood and publicly debated, further supporting the co-productionist approach (Jasanoff, 2004).

Climate history also seems to be discussed mainly by media sources rather than by user comments. It appears to be understood primarily as scientific evidence in Italy, while in the U.S. it is more likely discussed with political implications probably aimed at delegitimizing science.

Regarding fossil fuels and renewable energy, user comments and media content across both countries seem to offer a coherent interpretation. These topics appear to be discussed mostly in terms of technological comparison and economic impact in user comments, while the media content samples provide a more nuanced approach. Media sources also seem to consider the topic from a cost-benefit perspective, but renewable energy in particular is additionally debated in terms of new market opportunities in Italy and from a more political perspective in the U.S., where the analyzed sources tend to link clean energy to Biden's administration and, more broadly, to the Democratic Party.

Sustainable technologies are discussed mainly in relation to electric vehicles in user comments from both countries. Similarly to clean energy, attention in the Italian case appears to focus primarily on their technological and economic dimensions, while the analyzed American user comments tend to group electric cars within the broader category of renewable energy and therefore link them to Biden's political measures. In media content, a wider range of clean technologies is covered, as wind turbines are discussed alongside electric vehicles. Economic dimensions appear to be central in both countries' samples, but the Italian one also emphasizes technological and scientific aspects, while in the American case, consistently with the differences observed so far, this topic tends to be politically framed and connected to Biden's regulations.

Lastly, another non-human actor that emerges from both user comments and media content across the two countries is the market and the broader economy. In this case, user comments and media content seem to share similar perspectives. In the Italian case, the topic appears to be addressed not only from a cost-benefit perspective but also from a social justice outlook, suggesting that the green transition may be understood as potentially affecting labor and social equity. The American material, by contrast, seems to adopt a more politicized perspective, focusing on economic and political concerns regarding the potential effects of Biden's climate policymaking on the national economy.

Taken together, these findings suggest that the ways in which human and non-human actors are represented within the analyzed discourse further support the political nature of public opinion towards climate change, highlighting the interconnection between policymaking, political ideologies, and scientific expertise in the public debate.

Overall, this prevalence of political themes and justificatory logics seems to support the findings presented in Chapter 1, which identified the political dimension as crucial in the public debate on climate issues. The close connection between political and scientific aspects in the analyzed debate also appears to confirm these findings, showing how political dimensions are intertwined with trust in science, as highlighted in the scientific literature. These conclusions suggest that adopting a co-productionist approach to climate change is essential to understanding public opinion on this topic. The analyses discussed so far indicate a largely political understanding among the general public, one that places particular emphasis on political and economic perspectives and on the implications of environmental policymaking and technological innovation for these areas.

The findings discussed so far may also open new directions for research, especially regarding the relationship between organized climate denialism and both electoral and collective political behavior, including its offline dimensions.

Another possible path would be to develop new political and scientific communication strategies that can promote a broader and more accurate understanding of climate issues. As suggested by Bolsen and Druckman (2018), clearer and politically sensitive scientific communication that explicitly addresses uncertainty may help strengthen public trust in science. In addition, country-specific climate communication strategies could enhance public support for environmental policymaking (Lee et al., 2015). Communication approaches that take into account the perceived fairness and effectiveness of climate policies may also prove effective, as suggested by Drews and van den Bergh (2015).

Nevertheless, this study presents some limitations. First, it is based on the analysis of selected user comments and media content retrieved from Facebook, which, while providing valuable insights into how climate-related topics are discussed and debated, cannot fully reflect the diversity of online debate or of other social media platforms.

Second, it should be noted that the findings of the analyses are limited to the topics discussed in the collected articles and posts, which were selected because they generated a higher number of comments. This, however, may offer a relevant indication of the themes that are most salient within this sample of public opinion.

The material also refers only to a specific period of time, meaning that the future evolution of these topics should be monitored in order to update the scientific understanding of the issue. Moreover, due to the comparative scope of the study and its focus on only two national contexts, the results should be interpreted with caution when considering broader generalizations.

Further research could also explore the relationship between how elites are perceived as involved in practical climate policymaking and technologies, and both individual and collective political behavior. This line of inquiry would build on the apparent link between elites and the funding of sustainable innovation observed in Chapter 3.

Overall, the results presented here may contribute to a broader understanding of how climate change is constructed and discussed within public opinion, from both political and scientific perspectives. By addressing the interconnection between political ideology, scientific expertise, and communication, this research highlights the relevance of the co-productionist approach for understanding the dynamics of climate polarization and politicization, and for designing future strategies aimed at preserving democratic balance and debate.

The contrast between populist and technocratic framings indicates that climate communication is an important arena where scientific authority, policymaking, and political identities meet and keep being negotiated. This interaction highlights how polarization affects both the perception of science and the political debate on climate action, especially considering how antagonistic narratives may negatively affect democratic deliberation (Bennett and Livingston, 2025).

The comparison between Italy and the U.S. also suggests that the politicization of science depends on national political and cultural contexts, shaped by media environments and sometimes reinforced by populist rhetoric. Understanding these dynamics can help design clearer and more effective climate communication strategies and strengthen public trust in science and policymaking institutions.

This research may also contribute to developing a more inclusive political approach to climate science and environmental policy, one that considers the well-being and needs of all social groups. Promoting such alternative narratives could help reduce populist discourses, encourage wider participation, and support a more open and plural public debate based on democratic values and shared responsibility. In doing so, it may help institutions promote a public culture of sustainability based on inclusiveness and dialogue, while also supporting greater stability, inclusiveness, and effectiveness in line with SDG 16.

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## **Data Availability**

The datasets, scripts, and analytical materials supporting this thesis are openly available at the following link: [https://drive.google.com/drive/folders/1hWMrmkF9g0swZ4I6ehM68-3XA2PJXXuV?usp=drive\\_link](https://drive.google.com/drive/folders/1hWMrmkF9g0swZ4I6ehM68-3XA2PJXXuV?usp=drive_link).