Beyond the energy transition: mapping the emerging field of energy communication

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The escalating climate crisis has made the renewable energy transition a must. Yet, communicative efforts often show limited connection to local contexts, hindering the full adoption of sustainable energy solutions. Despite its critical role, energy communication remains underexplored in academia. This study addresses that gap by exploring the interdisciplinary field of energy communication, focusing on how different research disciplines approach, study, and, thus, contribute to a better understanding of communicating (in) the energy transition. This semi-systematic literature review examines 69 peer-reviewed articles on formal (e.g., disciplinary backgrounds) and thematic attributes, such as the role of communication. Findings highlight the field's interdisciplinarity, diverse conceptualizations of communication, a certain narrowness in terms of the communicators and channels analyzed, not acknowledged actor interconnections, and the often-missed relevance of local acceptance. The review provides an overview of the current discourse, aiming to improve the critical theorizing and understanding of renewable energy issues.

KEYWORDS

energy communication, energy transition, local, acceptance, public engagement, sustainability

1 Introduction

Accelerating the renewable energy transition is inevitable (Calvin et al., 2023; United Nations, 2019). However, its advancement depends not only on technological and policy solutions alone, but also on the incorporation of society (Cozen et al., 2018; Endres et al., 2016), public acceptance, social legitimacy (Segreto et al., 2020; Stehle et al., 2025; Sütterlin and Siegrist, 2017), and the communication around renewable energy transition (Corner et al., 2018; Middleton, 2018). This is what *Energy Communication* deals with: It is studying how energy is understood, discussed, and negotiated in society (Cozen et al., 2018; Endres et al., 2016). Although energy issues have been debated a lot over the past years (Elving, 2021; Hellmuth and Jakobs, 2019; Latapí Agudelo et al., 2020; Mayeda and Boyd, 2020; Stehle et al., 2025), energy communication stays underexplored and insufficiently theorized within communication studies (Mast and Stehle, 2016), which is a major research gap that this study aims to address. Consequently, it is essential to conduct more research on energy communication (Rodin and Moser, 2022) and to strengthen the theoretical understanding of how renewable energy is communicated (Cozen et al., 2018), to which this study will contribute.

This paper addresses the research gap by semi-systematically mapping 69 peer-reviewed studies across social sciences, showing how energy communication is conceptualized. While communication remains a marginal

phenomenon in energy research from the point of view of other disciplines (Görland, 2025), this review contributes by foregrounding the communicative dimension and thereby sets a baseline for the field and emphasizes the communicative relevance of energy issues. It shows readers which channels and communicators are involved in communicating energy issues, and how communication more generally is conceptualized within the renewable energy context. In addition, the review emphasizes the role of local settings in the energy discourse, as energy initiatives frequently meet resistance and skepticism, especially at a local level (Segreto et al., 2020; van Prooijen, 2019; Venus et al., 2020). In such local contexts, communication emerges as a bridge between energy issues and society, where the conceptual relevance of energy communication becomes particularly visible (Gislason et al., 2021; Lorenzoni et al., 2007).

2 State of research

This section provides an overview over the state-of-the-art in the field of energy communication and its recent developments: The growing interdisciplinary field of energy communication as an everyday social practice and communication phenomenon is dealing with how energy-related topics are understood, discussed, and negotiated in society (Cozen et al., 2018; Endres et al., 2016). In focus are the social practices around energy resources, production and consumption, such as debates, as well collective and individual decision-making (Cozen et al., 2018; Endres et al., 2016). It is characterized by energy as a content that persists and connects across different theoretical and methodological traditions (Endres et al., 2016), thereby it cannot be attributed to one specific subarea of communication, but it is on the one side strongly related to environmental communication (Cozen et al., 2018; Djerf-Pierre et al., 2016; Endres et al., 2016) and to sustainability communication on the other (Elving, 2021).

From the perspective of communication studies, energy communication deals with the interest in energy content by the share- and stakeholders involved. It is this interest in the energy content that defines the field, not the medium of communication, like e.g., interpersonal, social media, or traditional media, nor the type of communication, like strategic or rhetorical (Endres et al., 2016). Research in recent years has focused on the defining features of energy communication such as its communicators (e.g., Sparkman and Attari, 2020), stakeholders (Hellmuth and Jakobs, 2019; Maqbool et al., 2020); objectives (e.g., Sippel, 2023) and implementation (e.g., Elving, 2021; Hobbs, 2020). From a strategic standpoint, energy communication serves as a "strategic endeavor to catalyze change" (Cozen et al., 2018, p. 289). Given this strategic role of energy communication, literature suggests drawing greater attention to it in the future (Cozen et al., 2018; Patrianti et al., 2021) and strengthen the standing of the field as a highly relevant research area (Mast and Stehle, 2016).

Linking energy communication with environmental communication, they are sharing a focus on studying communication to drive change (Weder et al., 2019). Also, energy communication has developed as one of the main research areas in environmental communication lately (Weder et al., 2019), with the production, supply, and generation of energy
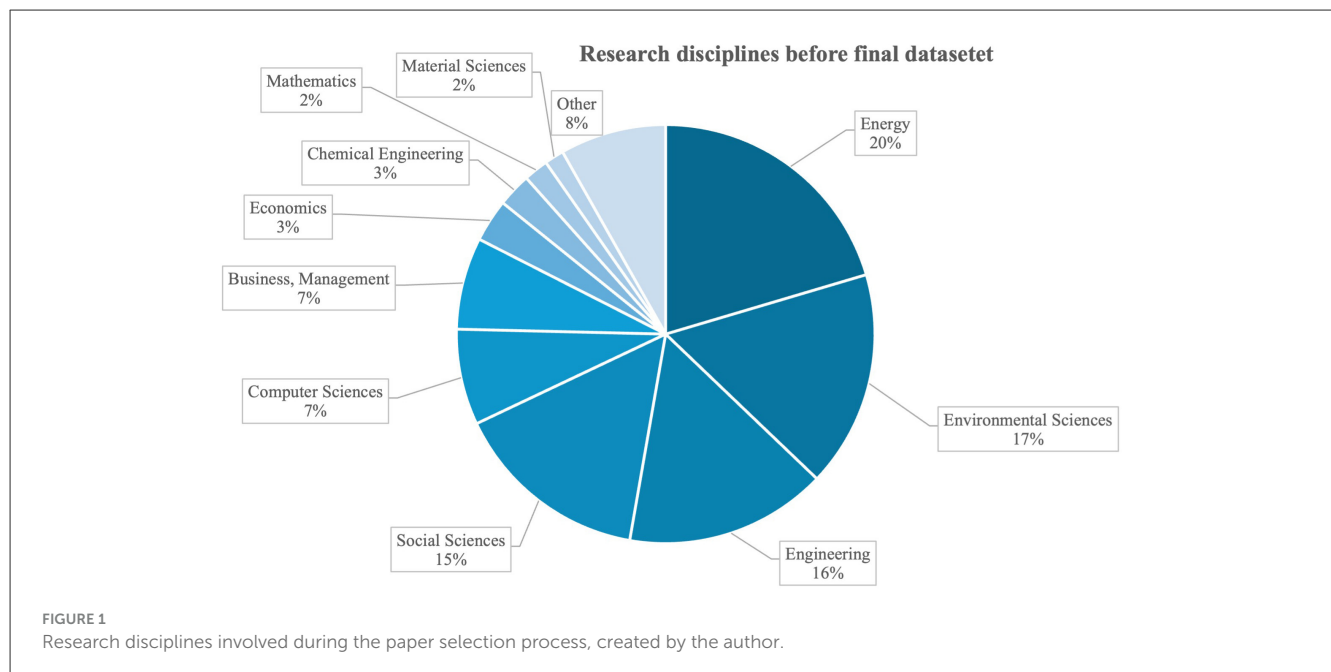
products having an immense impact on the environment (Elving, 2021). Another central element in energy communication is democracy: For achieving a more just and democratic energy system, participatory strategies are required, which engage actors at a local as well as at a global level (Feldpausch-Parker et al., 2019).

Energy communication appears both in crisis contexts and everyday life, but as a current communicative phenomenon, it should move beyond the crisis frame (Endres et al., 2016). While earlier studies focused on energy-related disasters like Fukushima, and examined non-renewables like coal, nuclear power, oil, and fossil fuels (Hornmoen, 2018; Miller and Lellis, 2015; Mitra, 2016; Renzi et al., 2017), renewable energy offers a chance to shift the paradigm from today's world as a permacrisis (Calvin et al., 2023) to one where energy communication also addresses everyday practices, sustainability transitions, and positive futures. Therefore, this literature review focuses on renewables, not solely sticking to a communication and environmental angle, but looking beyond to map the energy communication field and addressing the research gap of strengthening the theoretical understanding of renewable energy communication (Cozen et al., 2018).

3 Methodology

This study uses a semi-systematic literature review approach, aiming to discover how the energy communication concept has been conceptualized within research over the years (Baumeister and Leary, 1997; Snyder, 2019). Despite the large number of articles on renewable energy, there is little literature and no literature review on energy communication. Consequently, this semi-structured literature review aims to close this gap by examining the peer-reviewed literature existing on how energy is communicated in different social contexts (Endres et al., 2016). Thus, the overarching research question (RQ) asks: How is energy communicated from various research perspectives? Based on this, the sub-research questions are: RQ1: (a) Which understandings/interpretations of communication do emerge? (b) Who are the speakers? (c) Which channels are used?; RQ2: What are the characteristics of energy communication?; RQ3: What are the energy topics in focus and how are they communicated in different social contexts?; RQ4: What kind of local connections toward renewable energies are established?

This review is based on peer-reviewed articles retrieved from Scopus on November 26, 2024. While the initial search also included Web of Science, the final dataset was drawn exclusively from Scopus for both practical and substantial reasons. First, Scopus offers broader journal coverage and higher scholarly impact compared to Web of Science, as well as a stronger representation of interdisciplinary research (Powell and Peterson, 2017). This is particularly relevant for the interdisciplinary field of energy communication, which lies at the intersection of communication, environmental studies, business and economics, technology, engineering and policy (Cohen et al., 2021; Endres et al., 2016). Second, test search revealed a high degree of overlap between Scopus and Web of Science results, meaning that the inclusion of both databases would not have substantially increased the breadth or quality of the sample, but would have significantly raised the time and resource demands. For these reasons, Scopus

was selected as the only database, acknowledging, however, that this choice comprises the limitation that some publications outside Scopus may not have been captured.

The database search process is based on terms derived from the key literature reviewed in the literature *State of research* section. The selected terms are chosen according to whether they are keywords in the core literature. Initially, a broader set of keywords was considered; however, this led to a higher number of results, which was too wide for a qualitatively rich and in-depth analysis (Snyder, 2019). The final keyword selection is therefore refined to ensure that the research questions can be addressed appropriately. A distinction is made between *must* terms, which consistently appear in the preliminary review of energy communication literature, and *variable* search terms, which are combined with the mandatory ones to capture different dimensions of the topic. The *must* search terms are renewable energy, communicat*ing, sustainab* and strategic/strategy (AND function within the search database). For the *variable* search terms, at least one needed to be included additionally to the obligatory search terms (OR function within the search database): renewable transition, climate communication or change, public engagement or perception, sustainable development, community identity, citizen participation, social acceptance, local or region* or place; thereby asterisk was used to avoid missing multiple variations of a word. These criteria resulted in 128 articles, from which further barriers were excluded: The articles were limited to being in a for the author readable language (English, Spanish, or German) and without a paywall, leading to 126 articles within a wide range of research disciplines. In October 2025, a robustness check was conducted: The original Scopus search was repeated with the same keywords that had been applied in November 2024. The robustness check search led to 185 results. This increase might reflect the rapid growth of publications on the renewable energy discourse within just 1 year, which is not surprising considering

the urgency of the topic. Another explanation might be that some articles published earlier were only recently added to Scopus. The robustness check demonstrates both the increasing relevance of energy communication research and the timeliness of this literature review.

All articles from the different categories are shown in Figure 1, demonstrating the high diversity of the field. However, some existing research disciplines (e.g., engineering, chemical engineering, mathematics, computer science) are not fully tackling this study's topic of energy communication as a "continuous communication phenomenon" (Cozen et al., 2018, p. 289) and also are lacking an extensive examination of the social aspects of energy communication as an "everyday social practice" (Cozen et al., 2018, p. 289). Therefore, the above-mentioned categories are excluded and instead the research disciplines closest to communication are included: environmental sciences, social sciences, business, management and accounting, economics, econometrics and finance, arts and humanities, and decision sciences. Further, the interdisciplinary term "energy" is included, since in energy communication, energy and subareas like energy resources, energy consumption, and energy understanding play a major role (Cozen et al., 2018).

This led to 69 articles being imported into the literature administration tool Zotero and from there to the analysis tool NVivo. According to Sovacool et al. (2018), a semi-structured literature review uses themes, theories, or disciplines to organize the data; thus, themes around energy and communication are explored. To organize the occurring themes, an inductive approach is applied. Unlike deductive research, which is based on predefined and already existing theories, inductive research is developed on themes and theories emerging from the available data (Thomas, 2006). Specifically, the analysis was guided by Mayring's qualitative content analysis, which is an exploratory qualitative research approach emphasizing inductive

category development driven by empirical data (Mayring, 2015).

Regarding analysis, first, all selected articles were read, then the coding scheme's main structure was established: First, this includes formal elements (referring to structural and descriptive attributes of the analyzed studies, like Journals, publication type, keywords, methodology, disciplinary background, and geographical context). The second part of the coding scheme is the content-specific elements "communication," "energy-specific," and "location-based," which are based both on literature research and the research questions. Thereby, each main topic includes several categories (see Appendix for all details). The formal part was coded *deductively*, among others, to journal, type of paper (e.g., empirical, theoretical, conceptual), method used (e.g., qualitative, quantitative, mixed methods), geographical context, research discipline, and language used. An *inductive* process was conducted for the other three main parts (communication, energy specifications, and local connection) to discover relevant key elements. The inductive approach supports evaluating the articles throughout the coding process for upcoming categories and codes, emerging from the data (Mayring, 2015; Richards, 2020; Sovacool et al., 2018). For the inductive procedure, several initial sub-categories, based on similarities and overlaps in the literature, were established (Mayring, 2015). Throughout the reading and scanning-for-relevant-elements process, codes and categories were distinguished from each other: To the *categories*, relevant aspects occurring from the papers were drawn by summarizing them with a few (one to three) words (see Appendix for the final category scheme). For relevant elements that couldn't be easily summarized, *codes* were created, each gathering key passages from the papers, ensuring that the coding matrix is organized and that no findings are lost (Mayring, 2015; Schreier, 2012). Table 1 illustrates examples from the sections on *communication* and *renewable energies' local connection*, showing how codes were inductively created. Relevant elements from the literature were then assigned to these codes. After the first coding round, the articles were revisited with the categories and codes in mind. Polishing, fine-tuning, and finalizing the analysis system were done by checking that everything is clearly defined and the findings are attributed to the categories and codes appropriately. This set the base for analyzing the results and for further interpretation (Mayring, 2015). To increase the reliability of the results, an intra-coder reliability check was conducted. This is to test the reliability of the coding protocol and to check whether a consistent categorization of the dataset's content was made. The goal is to replicate a range of relevant content; for this purpose, the same design and measures were applied to the same content (Lacy et al., 2015; Rössler, 2017). The results of the initial coding were consistent with those of the intra-coder reliability check.

4 Results

Within the formal analysis, the narrowing-down process from over 20,000 papers to 128 and then 69 demonstrates that there are generally many publications on the topics of energy, communication and sustainability, but only a small number of studies directly address *energy communication*—defined here as how energy is understood, debated, and negotiated in society

TABLE 1 Exploratory coding scheme, selection from "communication" and "renewable energies' local connection" section.
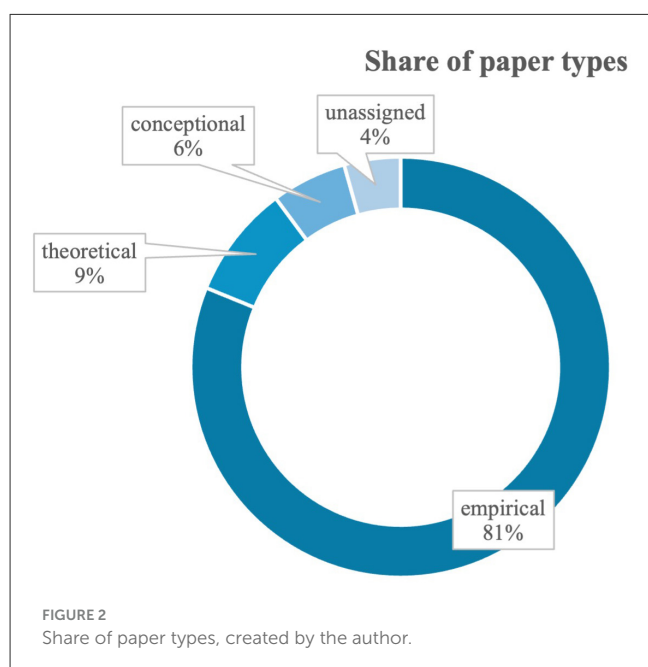
Communication aspects	Location based energy-specific
Communication as…	*Which kind of local energy connection is mentioned…*
Abstract theory	Acceptance
Application	Attitude
Awareness raising	Barrier
Barrier	Building plan
Boundary spanner	Carbon footprint
Common ground	Citizen engagement
Community building	Commitment
Convincing	Communication
Data visualization	Communities
Effective tool	Consequence
Engagement	Cooperation
Framing	Creating synergies
Gate keeper	Csr
Goal	Cultural
Governance mechanism	Democracy
Green communication	Discussion

(Endres et al., 2016). Particularly noteworthy is the finding that no energy communication articles—except for Endres et al., 2016—were returned within the communication SJR journal ranking search (search terms: renewable energy, communicat*ing, sustainab*, strategic/strategy). This shows that the topic is not yet anchored in the research discipline of communication. At the same time, there is a need to expand the communicative element in the energy discourse to neighboring disciplines (Görland, 2025), for an integrated and transdisciplinary communication science, and for including disciplines such as psychology, sociology, education, and market research (Rusch, 2002). Therefore, this review extends to neighboring fields in social sciences, humanities and business, which on one side led to a greater number of search results, on the other side it demonstrates the lack of literature in the communication field in particular: The initial search for energy communication articles with search terms from communication science, like "framing," only led to eight results, although a strong rise in publications occurred once other research fields were incorporated, reflecting the high relevance of energy. The initial Web of Science search using the terms ener*, communicat*, sustain* and renewable pointed to an exponential increase in publications from one publication in 1996 to four publications in 2006, 55 publications in 2016 and 179 publications in 2024. Within Scopus, the final search terms indicate a similar rise in publications on energy communication from one publication in 2008, five publications in 2017, 13 in 2021 and 36 in 2024.

In the final dataset, 47 different *journals* are included; those that appear more than once are listed below. The journals

TABLE 2 Selection of included journals, created by the author.

Journal	Number of publications within analyzed set of papers (N = 69)
Sustainability	6
Energy Research & Social Science	5
Journal of Cleaner Production	5
Resources Policy	3
International Journal of Energy Sector Management	2
Energy, Sustainability and Society	2
Energies	2
Renewable and Sustainable Energy Reviews	2
Energy Policy	2

FIGURE 2
Share of paper types, created by the author.

on the qualitative side. Rare methodological approaches (each 1×) are experiments, text-mining, indicator analysis and niche appearances like data visualization modeling technique, Innovation Policy Road Mapping (IPRM) methodology, Corpus-Assisted Discourse Analysis and Multifactorial Evolutionary Algorithm. Case studies, like mixed-methods projects appear as well as techniques commonly used in communication studies like social media analysis (Corbett and Savarimuthu, 2022), social network analysis (Nikolaidou et al., 2024) and media analysis (Sadat-Razavi et al., 2024) demonstrating a broad range of methods.

The *research disciplines*, from which the authors of the papers are approaching energy communication, cover a wide range too. Research does not always belong 100% to one research discipline (Kuntsman and Rattle, 2019), and therefore the most closely fitting discipline is mentioned. The distribution of research areas to which the papers from the data set most closely belong is shown in Figure 3, illustrating communication (11) and business appeared most frequently, with the latter divided into various sub-categories, such as management, business information systems, marketing and supply chain management. Further disciplines are sociology and linguistics, as well as interdisciplinary research disciplines such as sustainability sciences/environmental sciences.

Figure 4 illustrates that the *geographical areas* cover all continents, with Europe and Asia appearing especially often and varying geographical extension: worldwide energy issues (e.g., Kinefuchi, 2024) are tackled just as much as a comparison of energy initiatives in different geographical locations (e.g., Linton et al., 2020). Other papers focus on regional localities and their specifications, like local energy characteristics, the involved actors (firms, government, stakeholders and citizens, etc.) and the challenges they are facing (Paniagua-Rojano and Durán-Mañes, 2023; Ramirez et al., 2022; van Dijk et al., 2024). A third geographical focus was on specific energy projects (Dóci, 2021; Fouché and Brent, 2019). It is striking that the Global South has been almost completely overlooked within the analyzed dataset, although it is particularly hit hard by climate change (Calvin et al., 2023).

4.1 The role of communication

This section answers **RQ1a**: "Which understandings/interpretations of communication do emerge?". Findings on the understanding of communication in the context of energy reveal diverse manifestations. To capture the diverse communicative understandings, they are clustered into themes in the analysis; the most notable themes are introduced below. A first pattern is the *strategic* interpretation of communication (e.g., van Prooijen, 2019). Literature on climate change highlights the need for effective communication strategies that convey relevant and comprehensible messages, both in terms of content and audience (Alessandri, 2019). Within specific local energy projects, communication strategies are not only aimed at improving (project communication) information flows but also at strengthening long-term advancements in renewable energy development (Fouché and Brent, 2019). When it comes to the drivers of sustainable energy improvements, communication strategies

range from Geography and Finance-oriented journals to natural science/technical journals to interdisciplinary sustainability and energy-related journals. The journals, in which the papers from the dataset were most frequently published, are listed in Table 2 to show which journals predominantly address the topic. Despite this, only three papers out of 69 were published in core Communication journals.

The share of the different *paper types* from the data set is illustrated in Figure 2, showing that the majority (56 of 69 papers) conducts empirical research, while only a few are theoretical (6) and conceptual (4) papers. Out of the empirical papers, 27 are quantitative, 15 qualitative, 12 mixed-methods; the remaining ones are not definable.

In terms of the concrete *methods* applied, the classical ones are also the most frequent ones: Survey and statistical analysis on the quantitative side; interviews and qualitative content analysis
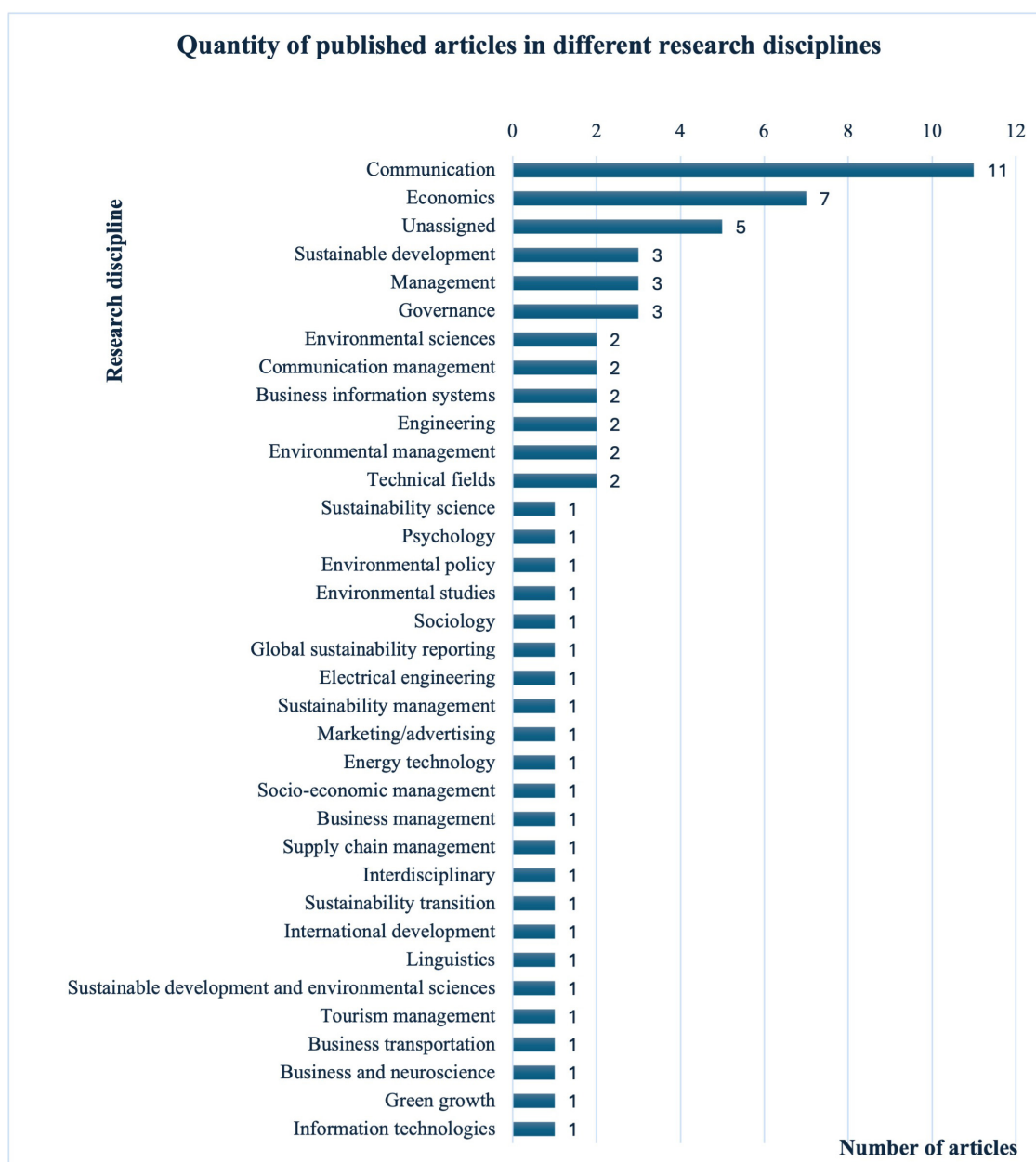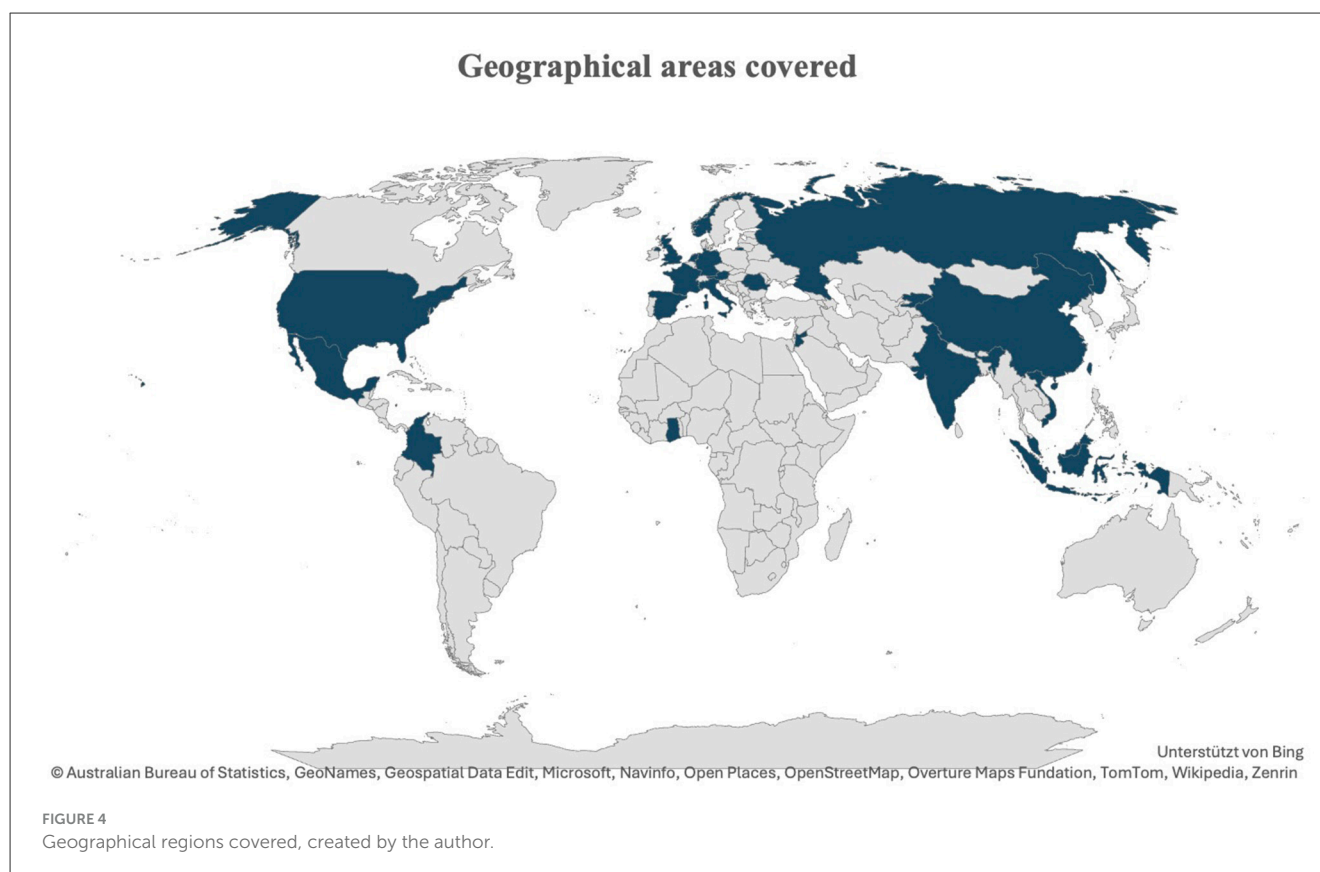
FIGURE 3
Research disciplines, created by the author.

are ranked among the top three, alongside strong policies and adopting sustainable energy indicators (Frimpong et al., 2024). Communication strategies (in an energy project context) need to be *all-rounders*, ranging from direct and indirect communication (Dóci, 2021), over internal and external communication (Dóci, 2021), to more technical measures such as data visualization for renewable energy development decisions in the context of corporate change processes (Lea et al., 2018). Closely related is the framing of communication as a *goal* for advancing renewable energy adoption, for example through media channels and online platforms (Khai et al., 2024) or by providing clearer information on renewable energy costs and benefits for policymakers, stakeholders

and educators, and consequently improving public perception and acceptance of renewable energy technologies and practices (Burgos Espinoza et al., 2024). In the analyzed literature communication is also put in the status of a *solution*, like increased (sustainability) communication alongside renewable infrastructure as a necessity for achieving local climate action (plans) and thus energy transition (Bickel, 2017); or for community building, where communication bridges between a municipality and citizens, helping to implement local energy programs (Miron, 2014). These findings highlight that communication as a strategy, goal, or solution does not represent separate roles, but rather overlapping and intertwined dimensions. These overlapping dimensions share the understanding that

FIGURE 4
Geographical regions covered, created by the author.

communication fulfills a strategic function, serving to facilitate the renewable energy transition.

In contrast to that stands the *technical* understanding of communication. Here, communication does not only involve interpersonal, verbal dimensions, but also needs to be transported and transmitted, covered by research on communicating about energy with the help of technical tools. This is less about meaning-making and more about transmission, such as through annual reports (Falk and Hagsten, 2021), low-carbon communication infrastructure (Israr et al., 2023), or smart technologies (van de Kaa et al., 2019). This functional understanding might stand in contrast to the strategic one. Yet, both are connected; with technical tools often building the infrastructure on which strategic communication is based.

Theoretical perspectives, such as *framing*, add another aspect to the dataset, understood as a strategic approach to legitimize or to contest, represent a particularly sensitive function among the identified roles, as their application depends on both the communicator and the intended purpose (Bjerregaard and Jeppesen, 2023; Gier et al., 2023). The data shows that framing is applied in its core function of persuading audiences of (renewable) energy (van Dijk et al., 2024). Specifically, for example, to convey that a company is acting responsibly and to construct an image of sustainability, however, at the same time, leaving unclear how concerned communities are addressed (Kinefuchi, 2024). Framing also plays a role in studies on local attitudes toward renewable energy transition, where actors enabling energy transitions in local settings are asked to frame their communication (Weko and

Schuch, 2024). Apart from framing, only systems theory (Hall et al., 2017) as a communication theory was employed in the dataset. This is noteworthy, as it illustrates that a solid theoretical foundation for energy communication has not yet been established.

Beyond these categories, communication emerges as an *interconnection creator*, building relationships between sectors like energy, environment, economy and society (Middleton, 2018), and facilitating engagement across diverse—partly opposing—stakeholders by creating participatory processes that allow them to coordinate efforts toward the shared goal of a renewable energy future (Rama Mohan, 2016). In this context, communication processes can be used as a connecting element between stakeholders (e.g., policymakers and regulatory agencies) in which information about intentions is exchanged (Kim et al., 2024). The interconnecting role fulfills an integrative function by bringing together divergent stakeholders, sectors, or interests and coordinating them through communication toward a shared understanding or common ground.

Figure 5 illustrates that the reviewed papers assign different roles to communication. In some cases, communication is conceptualized as a technical tool, fulfilling a rather standardized function. In others, it is given a broader meaning, for example, as an interconnection creator that links diverse actors and stakeholders. Communication also takes on considerable responsibility when it is framed as an objective or a strategy—an understanding that implies achieving broader goals through communicative processes. These perspectives are not isolated; instead, communication takes on an overarching and comprehensive character.
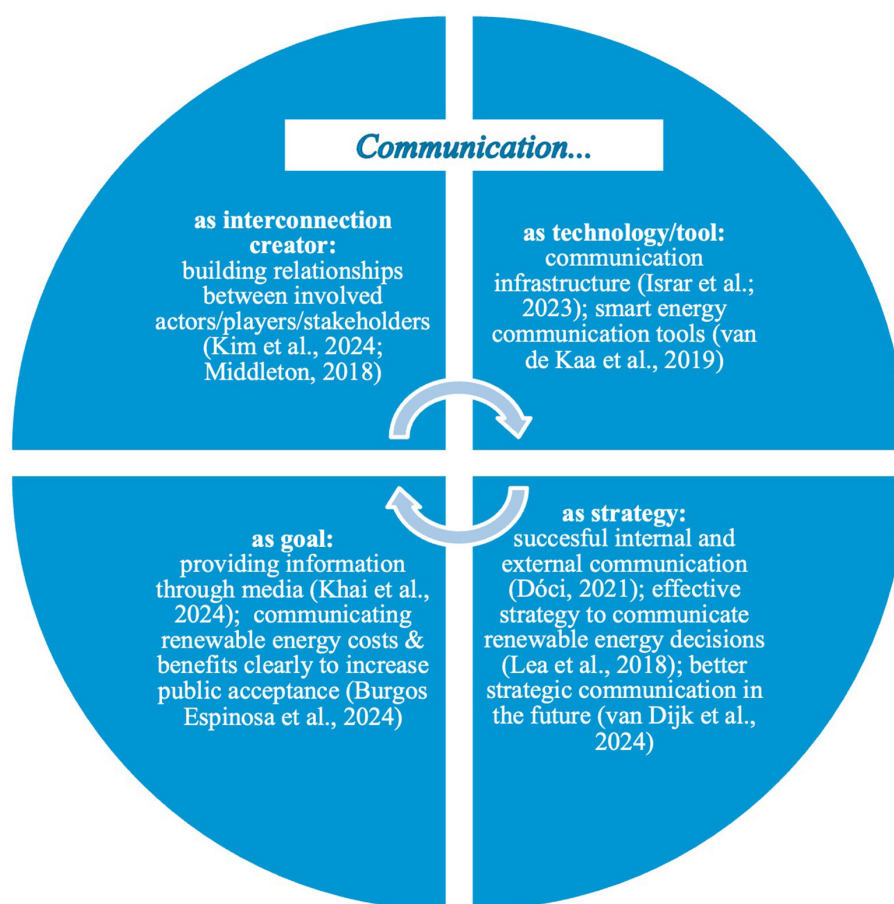
FIGURE 5
The role of communication, created by the author.

In the following, answers are given to **RQ1b**: "Who are the speakers in the energy communication process?". Across the data, *communicators* acting as speakers range from individuals (Ahmad and Mokhchy, 2023), such as a scientist (Alessandri, 2019), to organizations (Cheng et al., 2024; El Hajj et al., 2020), political communicators like parties or policy actors (Corbett and Savarimuthu, 2022; de Oliveira and Oliveira, 2023), corporates (Kratschmann and Dütschke, 2021), municipalities (Fouché and Brent, 2019), to technical tools (Lea et al., 2018). Local communicators are designated as local communities (e.g., Kinefuchi, 2024; Sadat-Razavi et al., 2024), cooperatives (Rodin and Moser, 2022) and ecosystems (Pulselli et al., 2019), as well as local governments and policies (Linton et al., 2020). This indicates that various levels of communication contribute to a shared understanding (Kluge et al., 2021).

Findings to **RQ1c** "Which channels are used?" show, that *channels* communicating the renewable energy transition are diverse, spanning mass media, email, newspaper (Paul and Uhomoibhi, 2012; Sadat-Razavi et al., 2024), policy documents and annual reports (Falk and Hagsten, 2021; Kikuchi, 2011), strategic communication (Weder et al., 2019) and campaigns (Kim et al., 2024), technical instruments such as cycle assessment data and microgrids (Peng et al., 2023; Vizzoto et al., 2021). Social media/digital communication/networks serve as a major channel (Corbett and Savarimuthu, 2022; Weder et al., 2019), including exemplarily X (Nikolaidou et al., 2024), Twitter, Facebook, and Instagram (Paniagua-Rojano and Durán-Mañes, 2023; van Prooijen, 2019). In addition to these channels, forms of verbal communication such as discussions and rhetorical operations also play a role (Ihlen, 2009; Thomas et al., 2018).

4.2 Characteristics of energy communication

This section answers the question, "What are the characteristics of energy communication?" (**RQ2**). According to Weder et al. (2019) energy communication "captures all communicative activities by energy suppliers, whereby it is predominantly concerned with the issues of energy production and energy supply" (p. 373). As such, it is attached to the field of environmental communication and has been rising in importance over the last few years, although the discussion is often emotional and complex (Bigl, 2017; Weder et al., 2019), an observation consistent with the findings of earlier studies (Endres et al., 2016). To

tackle these difficulties, scholars suggest increasing communication about the interconnection between energy, environment, and economy, but also respectful listening and sharing success stories to demonstrate the possible positive outcome of a renewable future (Middleton, 2018). The energy discourse typically also involves various stakeholders like policymakers, industry, media and the public (Nikolaidou et al., 2024). Analysis further emphasizes that data alone does not support climate change, but it needs to be communicated in relation to renewable energy solutions (Corner et al., 2018; Middleton, 2018). Accordingly, it is important to carefully develop a message about the energy transformation to "appeal to more universally shared intrinsic values" (Middleton, 2018, p. 1017). However, analysis shows that such a message for climate change communication in the energy sector has not yet been developed, which might be due to a lack of strategic communication (Patrianti et al., 2021). Figure 6 shows connotations made with both renewable energy and communication and compares these associations with explicit definitions on Energy Communication. It visualizes energy communication as an overarching framework that is consistent with previous understandings of how energy is discussed, negotiated, and understood in society (Cozen et al., 2018; Endres et al., 2016).

4.3 Energy issues in focus

Results on **RQ3**, "What are the energy topics in focus and how are they communicated in different social contexts" indicate varying *perspectives on energy* taken by the papers, as transitioning and transformation (10), energy as a solution (6), energy efficiency (4), production (3), adoption (2), communicating (2), and as storage (1) (Ihlen, 2009; Li et al., 2023; Nikolaidou et al., 2024; Tran et al., 2024; Weder et al., 2019). The specific renewable energy (re)sources approached in the papers cover a wide range from common ones like solar/PV solar, biomass, and wind, but also lithium-ion batteries, CO_2-based jet fuel, wind turbines, biodiesel, geothermal energy, biomass, and solar radiation are tackled, representing renewable energy's diversity.

Despite the urgency to convert to renewable energy sources to reduce carbon emissions (Lee et al., 2023), public trust in energy suppliers and distrust in renewable energies partly remains low (Calvin et al., 2023; Miller and Lellis, 2015). Thus, this review also investigates the *social acceptance of renewable energy* appearing in the data (**RQ3**). Accordingly, the social acceptance degree depends on the energy sources: The public acceptance of wind power tends to be high in general (van Prooijen, 2019; Visschers and Siegrist, 2014), whereas the wind farms have a limited acceptance rate and gas plants and power lines have a negative one (Azarova et al., 2019; Khai et al., 2024). More than half of the dataset dealt with social acceptance: Exemplarily, research focused on the public awareness and acceptance of renewable energy (Lea et al., 2018; Min, 2023), for example, in social media (Nikolaidou et al., 2024). Also, society's benefit from sustainable energy implementation through social development is addressed (Frimpong et al., 2024). Moreover, research focuses on the factors that can increase social acceptance of certain renewable energies, accordingly, acceptance can be raised

by improved communication and education in society (Sadat-Razavi et al., 2024). Another study shows that society's acceptance depends on government incentives and knowledge, but also on social networks like family, friends and relatives (Tran et al., 2024). These results indicate that social acceptance of renewable energy initiatives is highly context-dependent and cannot be generalized. At the same time, these findings point to the opportunity for further research focusing on society's acceptance of renewable energy initiatives.

4.4 Local factors in energy communication

RQ4 deals with what kind of local connections toward renewable energy are established. Results show that local communities are by far the most present element in local settings (Falk and Hagsten, 2021; Sadat-Razavi et al., 2024). Municipalities are also mentioned in the local context; they can be reached in their energy understanding, for example, through educational efforts such as motivation or advisory campaigns (Bickel, 2017; Schreurs, 2008). Other local connections mentioned are geographical locations with regional energy specifications (Chakir et al., 2020), local climate governance/governmental policies (Linton et al., 2020; overlooked) local knowledge (Ramirez et al., 2022), the similarities and distinctions between urban and countryside (Ramirez et al., 2022), cultural and language-related characteristics typical for a region (Thomas et al., 2018) and local media like newspapers (Alessandri, 2019). Figure 7 shows an explorative framework that illustrates the local energy connections established. This involves both a community-based angle, including citizens and all kinds of organizations, as well as the geographical local connection, which refers to, for example, municipalities, urban and countryside areas. Another understanding of renewable energy communication in local settings, which interconnects communities and geographical location, comprises regulatory local connections such as policymakers and policies. These frames of local connections are united by the common consensus to create a renewable energy future and by the always more or less subtly present element of the culture of localities.

Overall, the findings emphasize the diverse ways in which communication is conceptualized across the data and highlight the central role of society's awareness and locality. At the same time, results show that communication, as an interconnecting element, is key to a further theorization of the renewable energy discourse.

5 Discussion

This semi-structured literature review demonstrates that energy communication is an interdisciplinary field situated at the intersection between communication studies, environmental studies, and other social sciences such as business/economics, which aligns with previous literature (Cozen et al., 2018; Endres et al., 2016). Across these academic disciplines, the communicative dimension is often subtle, embedded between the lines and interpreted depending on the disciplinary lens. This "in-between the fields" character is not just descriptive but has also implications for further developing theory in and around communication
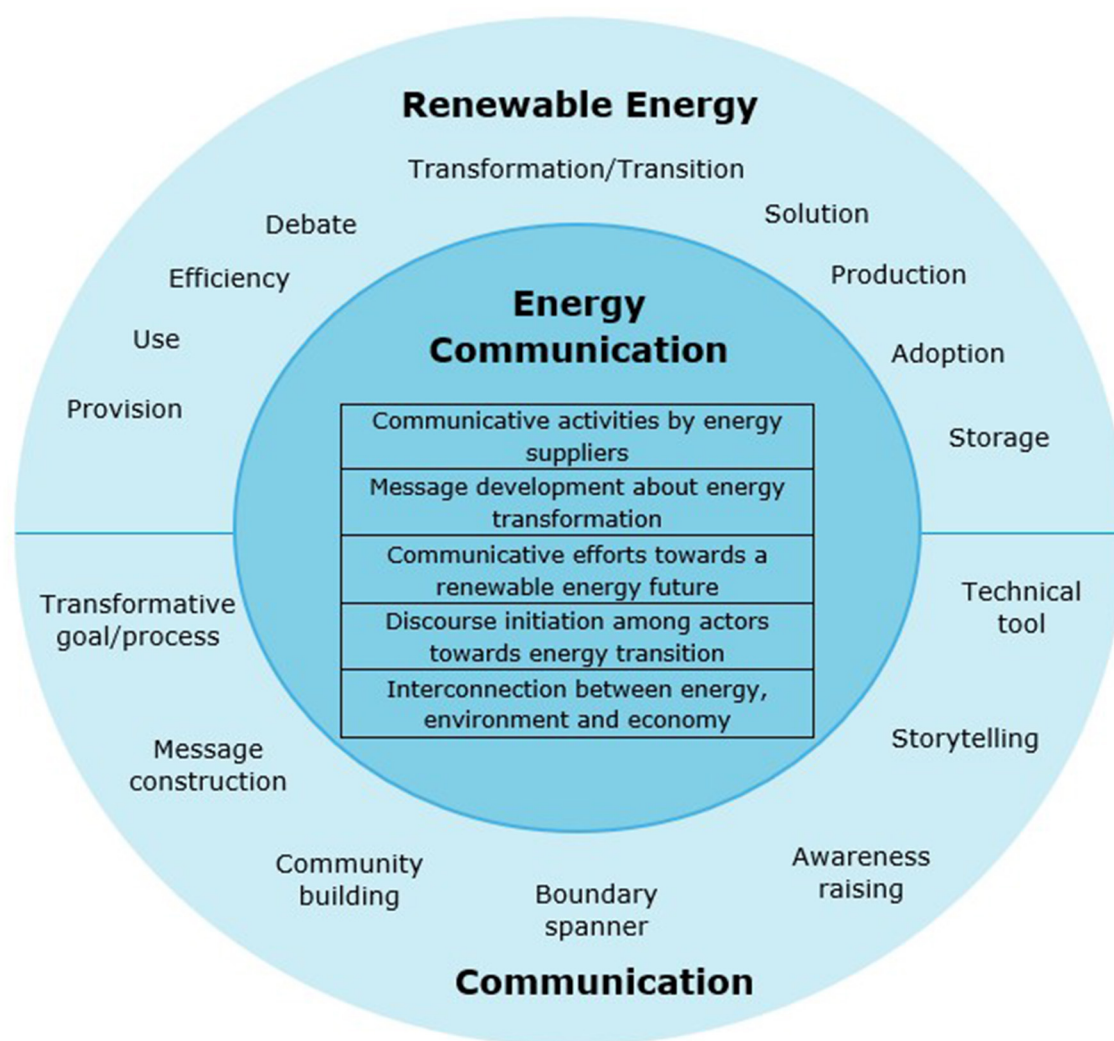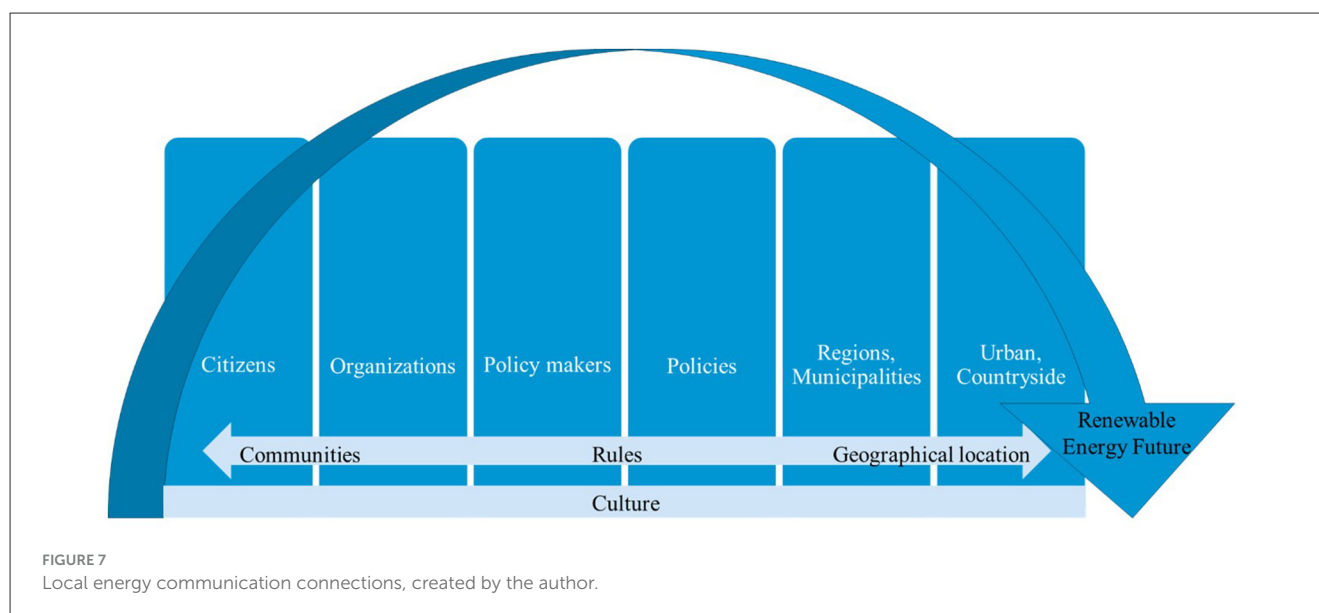
FIGURE 6
Dimensions of Energy Communication identified in the literature, created by the author.

studies: It challenges communication studies to move beyond narrow foci such as media or strategy, and to develop concepts that incorporate boundary-spanning roles and the subtle ways communication is used across different domains. Concepts such as communicative interconnections could provide useful foundations for theorizing how diverse actors are linked in energy transitions (Dóci, 2021; Middleton, 2018; Paniagua-Rojano and Durán-Mañes, 2023; Xiaoping and Yanqiu, 2024).

Despite the societal urgency of the energy transition, energy communication has gained little attention in core communication journals. A search of the 15 highest-ranked journals revealed only one relevant article, with most contributions from the final dataset instead appearing in interdisciplinary journals (e.g., Zehner, 2014) and/or journals from neighboring disciplines like Marketing (e.g., Kratschmann and Dütschke, 2021). This absence of energy communication in leading communication journals represents a disciplinary gap and raises the question of where the discourse is taking place instead: On the one hand, the

energy discourse from a particular communication lens might be in un-peer-reviewed literature, which wasn't considered in this study. On the other hand, it may be that the interdisciplinary nature of the topic leads authors to publish more frequently in thematically oriented journals such as *Energies*, *Sustainability*, or *Energy Research* and *Social Science*, to ensure thematic anchoring, rather than prioritizing a disciplinary communication studies perspective in the authors' journal selection. This assumption is supported by the observation that many elements related to communication studies, such as communicators and channels, are explicitly addressed in the analyzed papers. Nevertheless, precisely because energy communication is not being published in core communication journals, there is a risk that communication studies are left out in the global debate on renewable energies—unless energy communication is more firmly integrated into the field's research agenda. This threat, at the same time, is an opportunity, as energy communication offers the chance to expand the discipline's research agenda and strengthen its societal relevance. Instead of

FIGURE 7
Local energy communication connections, created by the author.

narrowing the field, communication's in-between role could extend the scope of communication theory.
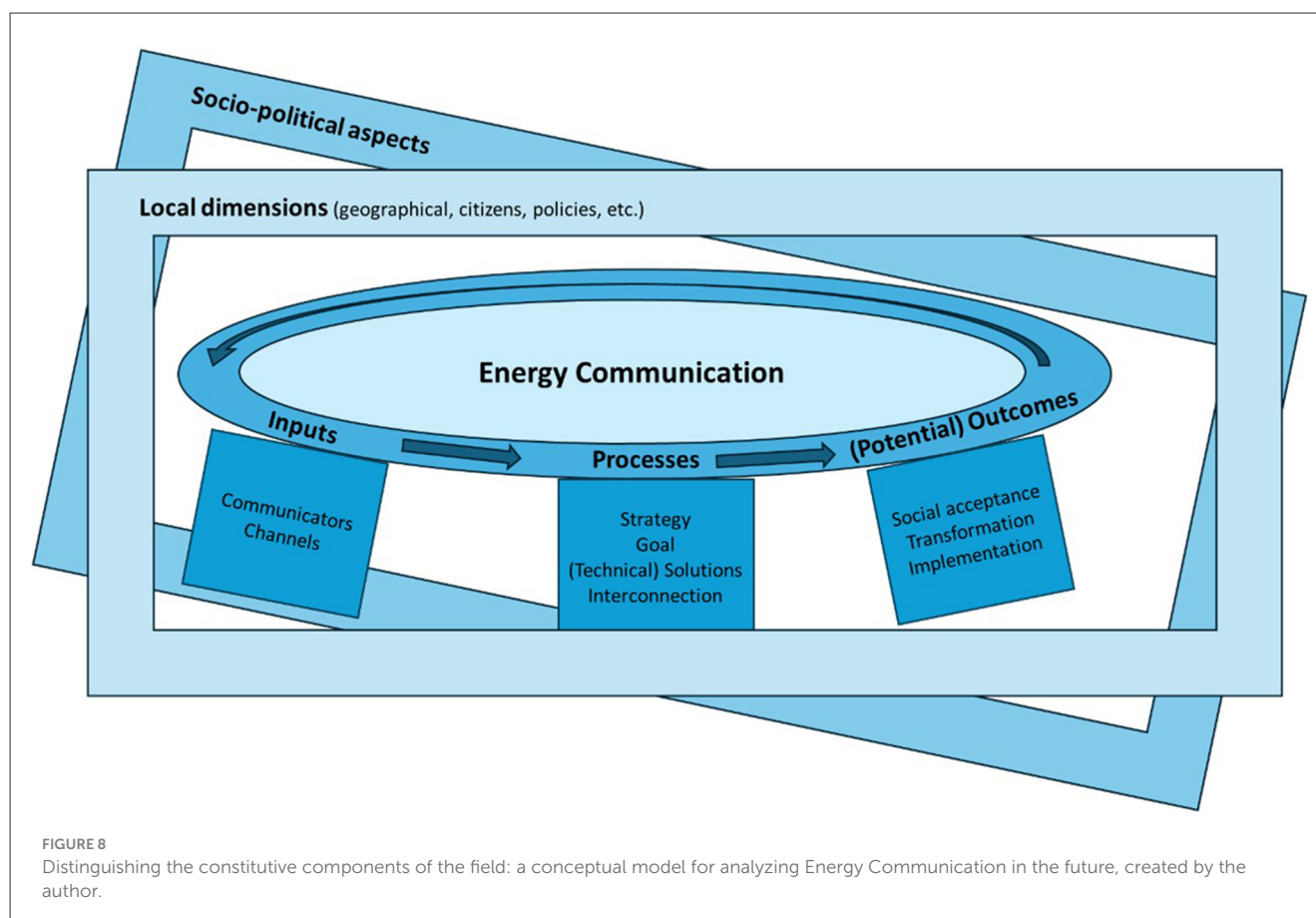
Furthermore, the review also reveals that energy communication is conceptualized in multiple, sometimes contradictory ways. The manifestations made with communication show it as solution, goal or technology, by the use of communication models like framing (van Dijk et al., 2024; Weder et al., 2019; Weko and Schuch, 2024) and Luhmann's system theory (Hall et al., 2017), as well as through channels. This indicates that an emerging—though not yet explicit—renewable energy communication discourse is present in literature. This once again underlines energy communication as an *in-between the fields* topic, suggesting that while authors and research projects may have various incentives, they share a common goal of examining renewable energy initiatives, transition and projects, with communication often playing a significant role in that.

The study finds communication in renewable energy contexts to have a transitioning, solution-oriented, and adoptive character (e.g., Argyriou et al., 2022; Nikolaidou et al., 2024; Tran et al., 2024b), while it is also applied in transformative processes, as an interconnecting-element, as storytelling and as message construction (Dóci, 2021; Middleton, 2018; Paniagua-Rojano and Durán-Mañes, 2023; Xiaoping and Yanqiu, 2024). These roles are not fixed but have a dynamic character, depending on the context. Building on this is the term energy communication, understood as communicative activities by the energy suppliers, as communicative efforts of the renewable energy future, and as initiating the discourse between involved actors, also in a strategic manner (Middleton, 2018; Nikolaidou et al., 2024; Patrianti et al., 2021; Weder et al., 2019). These manifestations match the core definition of energy communication as an everyday social practice and communication phenomenon (Endres et al., 2016). For communication studies, this shows the need to theorize communication in renewable energy contexts as a flexible and interactive concept rather than a fixed one. Also, the limited use of theory in the analyzed dataset, which is mainly framing and systems

theory (Hall et al., 2017; Weder et al., 2019), highlights the field's early, exploratory stage and the opportunity for further theorizing energy communication in future research.

Locality as another defining dimension emerging from the data does not only refer to geographical locations, like municipalities, places, regions or cities (Chakir et al., 2020; Israr et al., 2023; Kim et al., 2024), but also to governance structures, policies, local communities of citizens, corporations, NGOs and cultural contexts (Alessandri, 2019; Linton et al., 2020; Rodin and Moser, 2022). This large scale of locality in an energy context gives a partial idea of the immense socio-political challenge for involved actors to communicate the transition to renewable energies (Weder et al., 2019), highlighting the need to further explore underrepresented dimensions of locality—including cultural, community dynamics, and governance aspects—in future renewable energy communication research. This future academic attention will further enrich the understanding of the interplay between communication and the energy transition in local settings.

Based on the revised literature, a conceptual model was created to unify elements involved in energy communication within a cycle (Figure 8). This model broadly categorizes the many factors that play a role in energy communication, with the local and sociopolitical dimensions forming the foundation. Although these two frameworks overlap, they must be distinguished, as illustrated by the model. The local dimensions are, among others, geographical, but also include communities, governance, and cultural factors; these differ from the broader sociopolitical context, which is very prominent in energy debates about the climate crisis and environmental disruptions. In contrast, the local dimension, as shown in this literature review, remains underexplored and requires further development in the context of renewable energy communication. Therefore, the local dimension is highlighted in the foreground in this graphic to emphasize the potential for future research. The framework further incorporates components of the energy communication cycle: The input section illustrates how

FIGURE 8
Distinguishing the constitutive components of the field: a conceptual model for analyzing Energy Communication in the future, created by the author.

different communicators and channels engage with and transmit energy-related topics. Throughout the process, energy issues are discussed and debated—depending on the context—as strategies, goals, solutions, technical objects, or inter-connections. Ultimately, these processes can lead to various societal outcomes, such as social acceptance, energy transformation, or the implementation of renewable energy initiatives. These outcomes return to the inputs, establishing a new starting point.

6 The future of energy communication

This study uncovers the interdisciplinarity of energy communication and demonstrates that it spans across multiple disciplines. However, despite its high relevance, the field remains underrepresented in communication journals and thus leaves communicative perspectives on energy underexplored. The data show that energy communication has become a recognized topic in research, but it is understood and conceptualized in fundamentally varying ways depending on the theoretical and disciplinary lens applied. Nevertheless, there seems to be something like common sense around communicative efforts that need to be taken toward renewable energy: Strategic communication, as well as information and community/participatory-based communication, are especially present in the analyzed literature and thus seem to be of particular relevance. Moreover, the study shows that energy

communication is closely attached to local settings, which not only implies geographical proximity but also community-driven and cultural embeddedness.

The study demonstrates that energy communication as a research field is still in its developing stages, especially compared to the technical advancements of the energy transition and is not yet fully embedded in communication studies. The field is often discussed in abstract or universal terms; however, this is not enough for a full understanding. Instead, place-based cases with its cultural, governance, and community dimensions could break down the abstract. Future research might therefore benefit from incorporating the local dimension of the proposed framework that captures how energy debates take place and are negotiated in specific local contexts (Figure 8). Thereby, organizational- and meso-level approaches seem to be more accessible in local settings than in multinational, complex, or highly abstract contexts and thus might offer "hands-on" insights into the participatory character of energy communication.

Regarding limitations, first, the database search relied on specific keywords, which means that some relevant articles may have been overlooked. The terms were selected to balance breadth and focus: Mandatory terms were combined with variable terms, and the use of asterisks was meant to ensure word variations were included. This approach generated a diverse interdisciplinary dataset, nevertheless, the author acknowledges that some relevant studies may not have been captured. Hence, future research should expand the keyword selection process to cover further relevant

articles. Second, the study was limited to one database, Scopus. This database was chosen because it covers a wide range of literature, has an interdisciplinary scope, yet at the same time, there remains a major overlap with Web of Science (Powell and Peterson, 2017). Due to these reasons, Scopus was the most reasonable choice for this review. Still, relying on a single database inevitably narrows the scope, and future work will benefit from drawing on additional databases (e.g., Web of Science) for wider coverage. Third, the keyword-based article search excluded search types like the snowballing method. Although this is a biased approach where the author chooses the literature, the initial search uncovered relevant literature—such as in book chapters—through the snowball system. However, this could not be considered in the final dataset due to the study's focus on peer-reviewed articles. In future research, the snowball method, including "gray" literature, might be worth including for a more comprehensive understanding.

This review makes two central academic contributions. First, it demonstrates that research on energy communication remains fragmented, unsystematic, and only loosely situated within the broader field of communication studies. The study contributes by systematically collecting, mapping, and classifying the peer-reviewed scholarship that does exist, establishing a foundation for future studies to further theorize and anchor energy communication as a core topic within communication studies— at a stage of the field still being in early development. Concretely, the conceptual model on Energy Communication (Figure 8) might serve as a starting point for future research with empirical focus. Second, the review advances academic discourse by showing that, while much scholarship addresses energy communication from a macro perspective and energy communication in everyday life often takes place at a micro level, organizational-level case studies might provide particularly concrete insights. Although these cases may not always be representative, they have an "illustrative" value for understanding how the participatory character of energy communication appears in practice—potentially more clearly than in multinational, complex, or highly abstract contexts. Future research should therefore further investigate organizational-level cases, as they offer critical entry points for theorizing and advancing energy communication within communication studies.

Looking beyond academia, this study contributes to the public discourse by breaking down scholarship from various subfields and offering insights into renewable energy communication. The review highlights the importance of place-based approaches that consider cultural and community dimensions, and it points to the potential of more critical, culturally sensitive frameworks for analyzing renewable energy projects and their (strategic) communication, which might be, apart from academia, interesting for policymakers, strategic communicators and other practitioners.

The final takeaways from this literature review are: First, energy communication emerges as an *in-between-the-field* topic: It is not anchored in communication studies and can also not be fully allocated to environmental, sustainability, or strategic communication. Instead, it offers theoretical opportunities for communication studies to explicitly engage with the energy transition. Second, local contexts like communities, governance structures and cultural aspects play a major role in building energy communication practices, highlighting it as a place-based phenomenon that negotiates between policy frameworks and

everyday social realities. Third, communication in the context of renewable energy is understood as an interactive role that spans strategy, goals, solutions and interconnections, requiring the need to theorize communication not as a fixed system but as holding a dynamic role. Overall, energy communication is not a niche phenomenon within communication studies, but an interconnecting, interdisciplinary, yet locally embedded field whose further exploration is essential for the energy transition to succeed. Still, energy communication will remain fragmented until it is integrated more firmly into the core of communication studies.

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Appendix

TABLE A1 Final category scheme based on the research questions and the data.

Final category scheme			
1. Formal categories (RQ1)	2. Communication categories (RQ1a & 1b)	3. Energy-specific categories (RQ1a & 1b)	4. Location based energy-specific categories (RQ 1c)
Journal	Does communication play a role in the paper? (no/yes)	Is there a definition of energy communication available? (yes/no)	Is a local connection of energy (resources) mentioned? (no/yes)
Type of paper: empirical/theoretical/conceptional	What is the role of communication in the paper (e.g., transmission oriented view, value distribution, etc.)	What is the dominating energy area/field discussed in the article? (e.g.: Designation/just mentioning, production, use, transformation, others)	If yes, how often/frequently is this connection mentioned?
If empirical: method overall (qualitative; quantitative; mix)	Which communication "products" are used in the paper? (e.g., media, PR, campaigns, others)	Is there a hint on social acceptance of energy resources? (yes/no)	Which kind of local connection is mentioned? (e.g., social, cultural, specific geographical location, region)
If empirical: method specific	Who is communicating in the paper? (e.g., individual, organizational, mass media, other institutions, others)	Which renewable energy resource is mentioned? (e.g., wind, hydrogen, hydropower, solar, etc.)	Not energy-related local connections
If empirical: sample size (number)	Communication research area (e.g.: strat.comm., CSR, business, environmental comm., journalism, others)	If there is a hint on the social acceptance, how is the social acceptance of energy resources described?	
Research discipline (e.g., communication, business, technical, psychology, etc.)	Definition of communication available? (yes/no)	If there is a definition on energy communication available, what is the definition?	
Language (English, German, others)	If communication definition is available, what is the definition?		
Geographical context (continent & country)	Elements covering energy communication		
Theories used	Communication through… (e.g., social media, framing, etc.)		
Research questions	Communication as… (e.g., improvement, gate keeper, strategy, etc.)		
Theories used/definitions			
Keywords			
Key findings			
Key theories and references used			
Implications for future research			
Limitations of the study			
Key quotes			
Arguments in favor of the study			

Lighter colored subcategories (upper part): answers are clearly defined, 1–3 words; darker colored codes (lower part): answers more open and individual.