ORIGINAL ARTICLE

Phasing-out 'coal tradition' in favour of 'renewable colonialism': how the press contributes to the discursive (de)legitimization of coal and renewables in a coal region in transition

Fulvio Biddau[1,2] · Valentina Rizzoli[3] · Mauro Sarrica[3]

Abstract

This article examines the Sulcis coal region in Italy and illustrates how discursive dynamics can impede energy transition by delegitimizing coal decline and the diffusion of renewable energies. Combining quantitative analyses of textual data and argumentative discourse analysis, we analyze newspaper articles published between 2011 and 2021 in the national, regional, and local press. Our findings reveal that shifts in topic salience and storylines reflect different transition phases (coal legitimacy, regime destabilization, and reconfiguration). Throughout the analyzed period, newspapers have cultivated a discursive environment that weakens efforts to phase out coal and promote low-carbon energy by amplifying particular storylines endorsed by competing discourse coalitions. Media discourse consistently portrays decarbonization and coal phase-out as threatening, anticipating disruption to regional livelihoods and traditions. Over time, renewable energies are marginalized or hindered by storylines promoting regime stability (coal legitimacy), soft transformation (coal-to-gas transition), and, finally, a reconfiguration (utility-scale renewable transition) promoted by incumbents and resisted by locally based discourse coalitions perceiving it as a form of colonialism. This study sheds light on the interplay between discourse dynamics and the complexities and challenges of the destabilization–reconfiguration pathway of coal regions. It contends that approaches combining both build-up and break-down dynamics into the analysis of transitions can offer a more nuanced, politically sensitive understanding and practical insights to instigate and navigate more equitable destabilization–reconfiguration pathways.

Keywords Discourse · Lock-in · Coal phase-out · Energy transition · Coal region · Legitimacy

Introduction

Phase-out processes and the decline of existing socio-technical regimes represent a new frontier of transition research (Loorbach et al. 2017; Köhler et al. 2019; Rinscheid et al.

✉ Fulvio Biddau
  fulvio.biddau@unipd.it

1 Department of Philosophy, Sociology, Education and Applied Psychology, University of Padova, 35122 Padua, Italy

2 Information Systems for Climate Science and Decision-Making Division, Euro-Mediterranean Center on Climate Change Foundation, 40138 Bologna, Italy

3 Department of Communication and Social Research, Sapienza University of Rome, 00198 Rome, Italy

2021). Transition research has traditionally focused on the development and diffusion of sustainable innovations to replace unsustainable technologies and practices, often overlooking the significance of phase-out in creating room and momentum for innovation and accelerating transitions (Rogge and Johnstone 2017; Turnheim and Geels 2012; Trencher et al. 2023). Recent studies are therefore examining the factors contributing to the decline and abandonment of unsustainable socio-technical regimes (Markard et al. 2021) by investigating how economic, socio-political, and environmental pressures can impact the financial asset, political support, and legitimacy of existing regimes (Geels 2019; Rosenbloom 2018; Hermwille 2016).

However, policy and academic debates on phase-out often adopt a narrow sectoral perspective, neglecting the broader implications of resource and technology shifts (Rinscheid et al. 2021; Köhler et al. 2019). This approach risks underestimating how regime destabilization may boost social injustice, exacerbate resistance towards sustainable

innovations, and intensify economic and political struggles and the polarization between winners and losers (Lockwood 2018; Markard 2018).

A focus on broader societal dynamics is especially relevant for understanding transition in coal-dependent regions, which involve vulnerable communities deeply engaged in struggles that extend beyond a sectorial transformation encompassing conflicts between the 'old' and the 'new' (Johnstone and Hielscher 2017). Indeed, in coal-dependent regions, coal-fired power generation and coal mining activities are often deeply intertwined with the community's cultural, socio-political, and socio-economic fabric (Biddau et al. 2022). Consequently, phase-out policies are often met with uncertainty and resistance from regional stakeholders, which pose challenges to the decarbonization agenda (Skoczkowski et al. 2020).

In this regard, integrating a discourse perspective can provide a greater politically sensitive understanding of the dynamics of cultural legitimacy and illegitimacy associated with innovations and dominant technologies (Rosenbloom et al. 2016; Hermwille 2016). However, to the best of our knowledge, most discursive research has focused on phase-out or innovation uptake in isolation instead of integrating them into broader analyses of transition pathways (cf. Isoaho and Markard 2020; Lehotský et al. 2019).

In this vein, this article examines the discursive dynamics of coal phase-out and renewable energy diffusion in Sulcis (Italy), a coal and carbon-intensive region currently interested in the phase-out of coal and the EU Just Transition Mechanism. This study integrates quantitative and qualitative analyses of newspaper articles published between 2011 and 2021 to explore how storylines shaped the cultural and political legitimacy of coal and renewables, shedding light on the dynamics of regime destabilization and innovation diffusion in the region. Newspapers are key as they play a crucial role in shaping public understanding and sense-making on science and technology (Bauer and Gaskell 1999, 2008), influencing political agendas by selecting and prioritizing perspectives and legitimizing certain versions of reality (Moscovici 1976). They also serve as platforms for enacting and reconstructing conflicts and controversies (Carvalho 2008; Castro et al. 2018). Accordingly, the study examines newspaper discourses to analyze coalition building, discourse hegemony, and policymaking seeking to address the following questions: What are the prevailing storylines that shape the energy discourse in the region? How do these specific storylines and discourse coalitions shape the (de) legitimization of coal phase-out and renewables uptake? What role do dominant storylines play in reinforcing path dependency, and how do alternative narratives for phase-out and renewable diffusion challenge this path dependency?

The paper is structured as follows: It begins with a theoretical background highlighting the importance of discourse and discursive legitimacy in environmental politics and energy transition. Next, we present the study context discussing the socio-political and energy landscape of Sulcis. We then outline our methodological approach combining quantitative and qualitative methods to analyze dominant discourses, storylines, and coalitions. Then, we present and discuss the results, focusing on the identified dominant topics and the storylines that either legitimize or delegitimize the energy transition in response to regime destabilization. We conclude by discussing and contextualizing the findings to inform policy and research on coal regions in transition.

Theoretical background

Environmental politics and sense-making: the role of discourse

Energy transitions are inherently political and highly contested processes. Different actors hold different views about desirable directions for transformation and appropriate ways to govern such processes (Kuzemko et al. 2016; Adil and Ko 2016). Thus, competing interests and perspectives engage in a battle over legitimacy for creating or destabilizing legitimacy around existing or emerging policies and technologies and leading the transition processes in the desired direction (Turnheim and Geels 2012).

In this regard, social actors perceiving an affinity of interests and opinions may create coalitions and act in networks to develop and convey discourses promoting a particular way of thinking and acting about environmental challenges. Coalitions strategically construct and convey their narratives in various public and political arenas (e.g., social media, newspapers, and political debates) to influence public opinion and values, as well as shape the political agenda and decision-making and secure public and political support, as well as dedicated resources (Geels 2014; Scrase and Ockwell 2010; Sarrica et al. 2014, 2018; Stirling 2014). Antonio Gramsci's vision of hegemony is essential[1] (Gramsci 1992, 1996) to understand the dynamics of discourse hegemony, conflicts, and power struggles, and also related to energy transition. According to Gramsci, the establishment of hegemonic power involves creating ideological unity and persuading individuals to embrace the values and norms of an exploitative system. This persuasion is achieved through institutions like the media and education, which shape the common sense, belief systems, or ideologies that guide

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[1] Note that Gramsci was born and raised in the case study region, the island of Sardinia. Its theorization largely relies on his experience and should be regarded not merely a general theory of social power and subalternity, but also as an historical and place-based understanding of power relationships.

groups' understanding and interpretation of the world. Therefore, hegemonic power is always subject to contestation, shaped by historical context, and remains an ongoing process, primarily exerted in the cultural sphere (Gramsci 1996). Within the realm of environmental politics, scholars like Hajer (1995) have highlighted the importance of analyzing the discursive struggles for hegemony. In this context, Argumentative Discourse Analysis (ADA) (Hajer 1995) emerged as a tool to understand the socio-political and socio-cultural dynamics involved in achieving discourse hegemony (Dryzek 2005; Späth 2012).

Hegemonic discourses can be defined by considering both discourse structuration and institutionalization (Hajer 1995, 2006). Discourse structuration occurs when discourse becomes dominant in a social unit or policy process, shaping how actors understand and position themselves within that discourse. Discourse institutionalization occurs when a discourse becomes embedded in institutions and organizational practices. To be considered dominant, a discourse must exhibit both structuration and institutionalization.

A central concept in ADA is the storyline, a condensed statement that reduces the complexity of policy issues and provides actors with a symbolic reference for common shared understanding, playing a crucial role in coalition building based on discursive affinity (apparent mutual understanding and interests) (Hajer 2006).

To become dominant, a storyline needs to be attractive, convincing, and legitimate. This can be achieved through different strategies, such as adequate ambiguity, attractive symbols, or metaphors (Hajer 1995), a connection with historical events and imaginaries (Herrero and Lemkow 2015), or with deeply grounded values, assumptions, and overarching representations in society (Moscovici 1988). This requires that actors make sense of and appealingly convey concepts and discourses that are initially vague or ambiguous (e.g., decarbonization, circular economy, or just transition, cf. Rizzoli et al. 2021; Hajer and Versteeg 2005; Heffron 2021) engaging in contestation and negotiation to shape their meanings according to their interest and worldview.

Delegitimizing lock-in and legitimizing transitions: a discursive account

Scholars concur that the dominance of socio-technical regimes must be continuously reproduced through discourses justifying its technologies, institutions, and practices (cf. Seto et al. 2016; Simoens et al. 2022), considering that over time discourses can become sanctioned (Williams 2020) or institutionalized (Hajer 1995).

In this context, storylines play a crucial role as both cognitive anchors, helping actors to construct shared realities, and as strategic means to (de)legitimize certain technologies

and pathways (Markard et al. 2021; Buschman and Oels 2019).

Simoens et al. (2022) argue that three discursive dynamics concur in reproducing the entrapment and dominance of fossil fuels, namely carbon lock-in[2]:

(1) *unchallenged values and assumptions of a meta-discourse* (e.g., "globalization" or "sustainable development", cf. Foucault 1972) that aligned with the institutionalized discourse act as dominant constructs excluding alternative voices and avoiding confrontation with alternative ideas.

(2) *incumbents with a strong discursive agency that reproduce the institutionalized discourse and resist transformative impulses* (cf. discursive regime resistance in Geels 2014) using socially valued and legitimated representations (e.g., Mouro and Castro 2012).

(3) *narrative co-optation*, occurring when a marginal narrative aligns too closely with the dominant discourse to persuade incumbents to lose its transformative power, e.g., Smith and Raven (2012) defined marginal and radical alternatives as *fit-and-conform* and *stretch-and-transform* narratives.

Accordingly, scholars assume that two pathways can break discursive lock-in: (a) a disruptive event can alter the meta-discourse assumptions, creating an opportunity for alternative discourses to gain legitimacy and dominance (e.g., the Fukushima incident on nuclear power legitimacy, Buschmann and Oels 2019; Hermwille 2016); (b) deliberate interventions that challenge and expose the foundations of the dominant meta-discourse, creating space for alternative narratives to emerge and attract incumbents, thus destabilizing the institutionalized discourse. Thus, transitions occur when actors' commitment to discourses supporting the regime weakens, allowing the emergence of new discourses and changes in discourse coalitions, e.g., incumbents shifting from discourses reinforcing carbon lock-in to embracing new discourses advocating for renewable energies (Buschmann and Oels 2019).

Context of study

Sulcis is a subregion with a population of around 140,000 in the southwest of Sardinia Island, an Italian administrative region with special autonomy renowned as a seaside tourist destination. Sardinia is politically characterized by a longstanding movement advocating for greater autonomy,

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[2] Unruh (2000) coined the concept of carbon lock-in to explain how industrial economies are trapped in fossil fuel-based energy systems, due to a co-evolution of technologies and institutions.

Fig. 1 From right to left: localization of Sulcis territory in Sardinia, the Sulcis coal basin, the Portoscuso area and Portovesme industrial cluster

independence, and self-governance in response to historical marginalization, colonization, neglect of the island's interests by the national government, and economic and political powers.[3] The regionalist movement in Sardinia has achieved discrete electoral success (Pala 2015; Sorge 2015), but its fragmentation and division into minor groups and parties have prevented it from firmly positioning itself on the left–right political spectrum, limiting its ability to compete with regional branches of nationwide parties, leading to alliances with larger parties (Hepburn 2009). Therefore, the regional political landscape closely aligns with the national party system, with regional elections over the past 2 decades reflecting the alternating victories between right-wing and left-wing coalitions observed in Italian politics.[4]

The region has a long mining history, with a focus on coal, lead, and zinc extraction. The extractive industry played a significant role in shaping the region's territorial structure, economy, and identity, especially in Sulcis during the nineteenth century. In 1937, the urban center of Carbonia (coal city) was founded as the Italian energy capital. Sulcis' population increased from 78,000 to 137,000 residents until 1951, when the mining industry began to decline due to international market competition (Sabattini and Moro 1975).

From the early post-war period to the present day, a number of government initiatives [e.g., Cassa per il Mezzogiorno, Piano di Rinascita, Piano Sulcis, Just Transition Fund (JTF)] played a role in the reconversion of the mining sector but further amplified the region's dependence on external actors (Osti 2018; Sanna 2015) (see Appendix for a detailed review[5]).

In 1972, the Portovesme industrial cluster was established to support the local economy and employment, becoming the nation's most significant nonferrous metals site (Sanna 2015). Additionally, a 590 MW coal-fired power plant was built in 1973 to support local coal mining and meet the energy needs of these industries (Fig. 1).

In the 1990s, the extractive and manufacturing–metallurgical sectors employed 32.5% of the workforce in Sulcis (Saba 2003). However, sustaining coal mining became challenging due to its economic viability, and industrial activity faced obstacles due to the lack of competitively priced

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[3] Partito Sardo d'Azione, PSd'Az is one of the oldest regionalist parties in Europe and was founded in 1922.

[4] Note that in the period under study right-wing (2009–2014; 2019-today) and left-wing (2014–2019) coalitions alternated in governing the region.

[5] For more detailed information, please refer to the Appendix, which provides a comprehensive historical overview focusing on: (a) policy, financial, and R&D support for the coalfield (1965-today); (b) initiatives for energy diversification and affordability, such as the gas pipeline project (early 2000s) and wind farms sited close to the industrial cluster (2011); (c) investments and plans addressing the socio-economic and environmental crisis, including the Sulcis Plan (2012) and Just Transition Fund (2022); (d) the competing pathways for renewable energy transition in the region, including the green electrification project with utility-scale renewables, and the distributed generation with renewable energy communities.

electricity.[6] The 2008 global crisis exacerbated the situation, resulting in industrial decline, increased migration, and unemployment. The region also faces environmental degradation caused by mining, waste, and industrial activities, including air pollution and contamination of soil and water (Russo et al. 2021).

Efforts were made to address the socio-economic crisis and environmental degradation, including the Piano Sulcis 2012 financed by the regional and national government. However, the visible impact of these initiatives has been limited as several indicators suggest that previous perturbations and windows of opportunity have been followed by inadequate adjustment and reconfiguration (cf. European Commission 2020).

From 2012 to 2018, the manufacturing sector saw a 28% decrease in employment, with unemployment reaching 20.6%, doubling the national average of 10.3% (Istat 2019). Pensions accounted for 31.74% of regional GDP. Out of a workforce of 47,000 individuals, 37,000 were employed, with 9000 in the industry sector, 26,000 in services, and 2000 in agriculture (Regione Autonoma della Sardegna 2019a, b).

Regarding energy supply,[7] multiple initiatives overlapped for keeping alive coal while reducing environmental impacts through carbon capture and storage (CCS). State aid between 1998 and 2010 amounted to a total of 405 million euros. The European Commission consistently opposed such support that violated state aid rules. In 2014, an infringement investigation prompted the Region to present an alternative closure plan for the coal mine, aligning with the end of coal mining subsidies in the EU by 2018 (Cau 2015). The 2017 National Energy Strategy declared the coal-fired generation phase-out by 2025.

One the one hand, this perspective led to various expressions of opposition due to Sardinia's significant reliance on coal for electricity (around 33%, Regione Autonoma della Sardegna 2023), a lack of natural gas infrastructure, and concerns and uncertainties regarding energy security and socio-economic stability.[8]

On the other hand, Sardinia is experiencing a surge in interest from private investors in renewable energy projects. This surge is due to the region's technical capacity for generating renewable electricity, ranking second among Italian regions (GSE 2020).

Notably, the leading Italian energy company Enel has decided to decommission the Sulcis coal-fired power plant and has proposed a green electrification initiative, as part of the Multi-Stakeholders Energy Compact of the UN in 2021 aiming to replace coal with renewable energy sources and positioning the island as Italy's energy hub and green laboratory for transition.

Additionally, the Sulcis region is benefiting from the JTF, an EU initiative that supports regions heavily dependent on carbon-intensive industries, assisting them in managing the socio-economic effects of decarbonization.

In this context, several key players are shaping the dynamics of the region's energy transition. The industry lobby of aluminium and coal remains interdependent and supported by trade unions (CGIL, CISL, and UIL) and the workforce concerned about occupational levels in the region (Osti 2018). Major players like ENEL, and transmission operator TERNA, are promoting utility-scale renewables, also supported by regional branches of prominent environmental NGOs, including Greenpeace, WWF, or Legambiente. In contrast, regardless of their affiliation, Regional Governments have consistently advocated for island methanisation. Representatives from minor NGOs, civil society movements, local authorities, and regionalist parties oppose both the utility-scale transition and methanization projects (Biddau and Sarrica 2023; Caiati et al. 2022).

Method

As pointed out by Markard et al. (2021), the accessibility and duration of online newspapers make their discourse an interesting venue to examine the long-term processes of (de) legitimization going beyond formal policymaking. Therefore, we analyze discursive dynamics surrounding energy in the Sulcis region analyzing articles published from January 1st, 2011, to February 28th, 2021. The procedure for data collection and analysis is outlined in Fig. 2.

The dataset[9] includes articles from the national press agency Ansa, regional newspapers La Nuova Sardegna (right-wing liberal) and L'Unione Sarda (left-progressive), and local newspaper La Provincia del Sulcis-Iglesiente. This selection provides a balanced representation of perspectives at the national, regional, and local levels (Sarrica et al. 2018). Using online databases of newspapers, we collected all articles including the keywords 'energy' and 'Sulcis' (search query: "Sulcis" AND "energ*"). After a manual screening process to ensure relevance (i.e., articles

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[6] Sulcis coal is a sub-bituminous coal with a low calorific value, high sulfur content, and needs an extensive treatment process making it less valuable when compared to other coal varieties.

[7] To gain an understanding of the administrative structure and responsibilities of the State, Region, Provinces, and Municipalities in energy governance, please refer to Sarrica et al. (2018).

[8] According to the National Territorial Plan for the Just Transition (2022), the phase-out of coal has already led to the loss of 1400 jobs at the mine, and it is estimated that additional 400 to 1200 jobs will be lost from the thermal power plant. Additionally, there is a significant risk to jobs in the metallurgical industries, including Eurallumina (363 jobs), Sider Alloys, former Alcoa (380 jobs), and Portovesme s.r.l. (1,350 jobs).
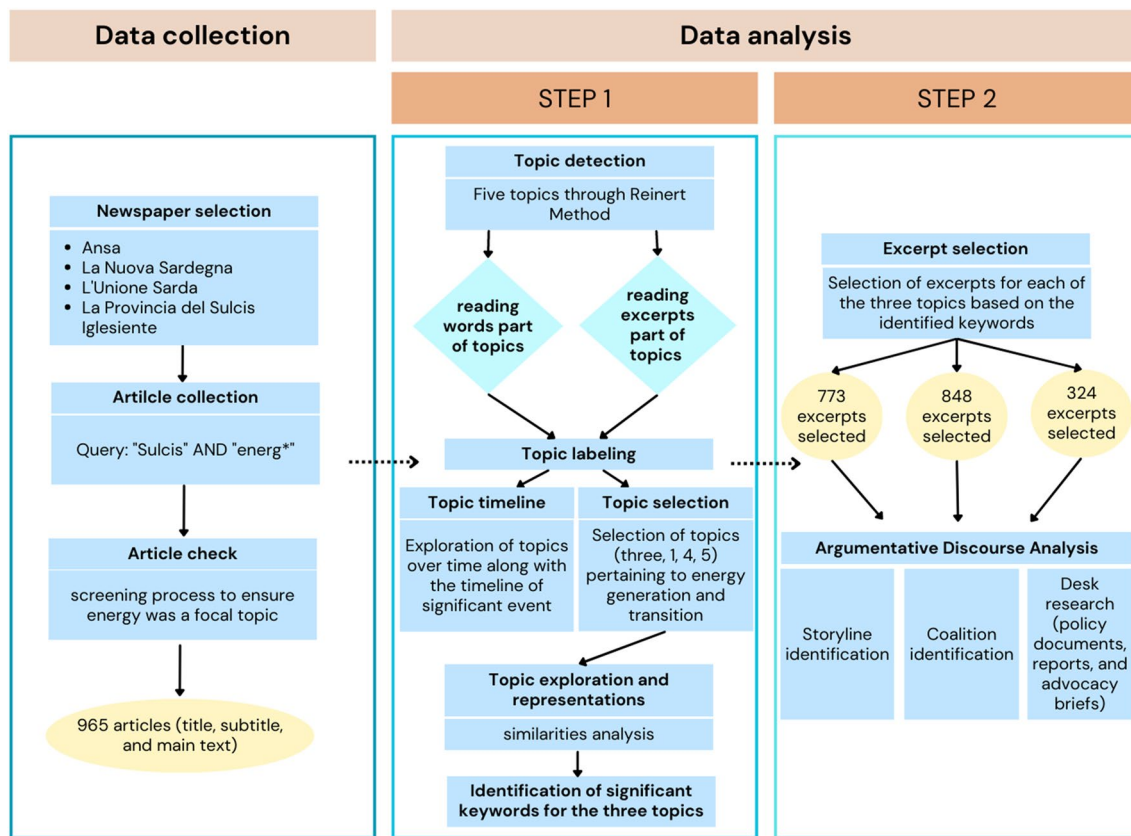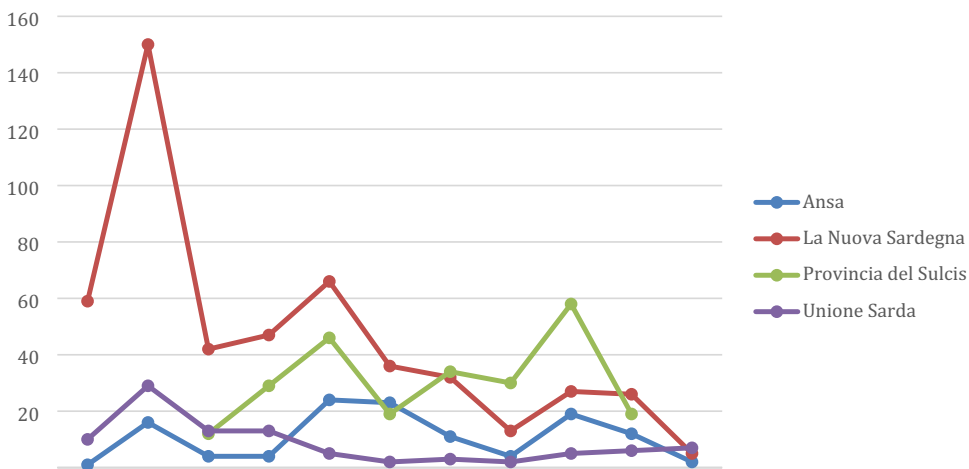
[9] https://hdl.handle.net/11573/1657125.

Fig. 2 Workflow of data collection and analysis

Fig. 3 Distribution of articles over years (2011–2021) and among newspapers (Ansa, La Nuova Sardegna, Unione Sarda, La provincia del Sulcis-Iglesiente)

focus on energy as a focal topic of the narrative rather than just mentioning it), the final dataset comprised 965 articles (including title, subtitle, and main text) distributed in a non-homogenous way across time and newspapers (Fig. 3).

The corpus was analyzed in two steps. The first step adopts quantitative analysis of textual data to provide an overview of the topics covered by the newspapers and their semantic structure. This step is instrumental to the second step, enabling the identification of topics specifically addressing energy supply and transition, and selects only relevant and significant excerpts. The second step involves a targeted qualitative analysis of these selected excerpts, shifting the focus from the topic structures to an in-depth analysis

of the contents including discursive patterns to identify the storylines conveyed by newspapers and their functions.

In the first step, we used the Reinert method (Reinert 1993) implemented in the Iramuteq software (Ratinaud 2009) for topic detection. The corpus analyzed consisted of 308,288-word occurrences (i.e., the set of all present words) and 19,838 distinct forms. Hapaxes (words appearing only once) accounted for 42.3% of the forms, and the forms/occurrences ratio was 6.4%.[10] Multiword identification (Pavone 2018) was performed using the TalTac2 software (Bolasco et al. 2000) to treat meaningful word sequences as single forms (e.g., renewable energy). The Reinert method is a lexicometric approach for content analysis that identifies topics as lexical worlds, i.e., the visible traces (lexical) of the latent dimensions that underlie the discourse (Reinert 1993).

To identify these underlying dimensions, each text (comprised of a title, subtitle, and main body of the articles) is segmented into smaller units corresponding to periods (i.e., text segments). An iterative hierarchical descending cluster analysis is conducted to uncover words that frequently co-occur within periods. The assumption is that these words contribute to define a common semantic meaning, thus collectively forming a topic. The contribution of words for defining each cluster is computed using a Chi-square index, which shows the associative strength between words and classes (i.e., whether they are significantly over- or under-represented in the class by words contingency table). The output also suggests a few text segments in which most significant words associated with each cluster are co-occurring. These excerpts can be considered as the most representative of each topic.

It is important to stress that although the data analysis is quantitative, the interpretation and the data itself are qualitative. Researchers interpret the results and assign labels to the topics through careful examination of the significant words included in each cluster and by reading their usage in the text.

Each topic is then visually represented through similarity analysis which displays the network of the most significant words associated with each topic based on a co-occurrence index. Using R software, we displayed the distribution of topics over the years, emphasizing the relationship between concurrent events and the prominence of specific topics in the case study.

The second step involves a qualitative analysis based on ADA (Hajer 1995) of excerpts from the topics identified in the previous analysis. A qualitative approach is indeed necessary to identify the storylines conveyed by newspapers, their functions, and the supporting actors (cf. Braun and Clarke 2006; Batel and Castro 2018). Considering our research focus, we narrowed our analysis focusing on three topics specifically addressing energy supply and transition, excluding those related primarily to the industrial crisis.[11] The second step was thus conducted on a sub-corpus composed of excerpts from 653 articles belonging to the topics strictly related to the energy issue and selected based on the content of topics.

To select the relevant excerpts for analysis, we identified the most significant words of each topic (i.e., the central elements of networks graphically produced in similarity analysis) and related to energy transition (e.g., coal, industrial, territory, cost, renewable sources, gas pipeline, wind farm, and photovoltaic) identifying and analyzing a total of 1945 excerpts related to such words.

Subsequently, we analyzed the selected excerpts to capture discursive patterns and underlying meanings (i.e., the storylines), their mutual relation and significance, and the function they serve in (de)legitimizing transition pathways (e.g., resisting socio-technical change; reproducing or contesting hegemonic discourses; sustaining a particular pathway; justifying technologies and policies; making evident contrasts between territories, etc.). During the analysis of these excerpts, we tracked direct quotes to identify the actors conveying the storylines and examined their intertextuality to map the discourse coalitions.

Following Hajer (2006), this analysis was complemented by a desk research and document analysis including policy documents, reports, and advocacy briefs from various stakeholder groups. This review provided a more detailed insight into the positioning of actors involved and served to confront our interpretations about coalitions and to look at the initiatives taken in the political and institutional arena by relevant actors. In Table 1, we provide an overview of the dominant actors in the debate.

Accordingly, when presenting excerpts in the result section, we specify the newspaper, year, type of article (news report, editorial, or feature articles), and the actors making the claim or whose voice is reported.

Results

Step 1: detection and exploration of topics

The Descending Hierarchical Classification identified five topics (Fig. 4) (80% of the classified text segments, 7269 out of 9092), and divided into two main groups: industrial decline (topics 3 and 2) and energy transition (topics

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[10] Since they are, respectively, less than 50% and 20%, the corpus can be considered suitable to perform analyses based on word count (Lebart et al. 1998).

[11] Articles that frame energy chiefly in terms of costs and continuity of energy supply as the main reason behind industrial crisis. See the "Results" section.

Table 1 Overview of the most dominant actors in the regional debate per category

Actor category	Actor
Political parties and government	Municipalities (e.g., Carbonia, Portoscuso, Sant'Anna Arresi)
	Left-wing parties (e.g., Partito Democratico, SEL; 2014–2019 governing coalition)
	Right-wing parties (e.g., Lega, Fratelli d'Italia, Forza Italia; 2009–2014 and 2019–today governing coalition)
	Regionalist parties (e.g., Partito Sardo d'Azione)
Businesses	Confindustria (Trade union)
	Alcoa (now Syder Alloys, metal industry)
	Portovesme S.r.l. (Glencore, metal industry)
	Eurallumina (metal industry)
	Carbosulcis (coal mining company)
	Sotacarbo (R&D firm specialized in CCS & clean coal)
Energy utilities	Enel (power company)
	Terna (transmission system operator)
Unions	Cgil Sarda
	Cisl Sardegna
	Uil Sardegna
NGOs & Civil Society	WWF Sardegna
	Legambiente Sardegna
	Greenpeace
	Italia Nostra Sardegna
	Gruppo d'Intervento Giuridico
	Sardegna Pulita
	Local movements (e.g., Coordinamento Comitati Sardi)

1, 4, and 5). Indeed, examining the relationship between the five discourses on the factorial plan, they can be interpreted along two primary dimensions. The X-axis opposes discourses about energy generation/transition and deindustrialization. The Y-axis opposes discourses about politics and policy (plans, strategies, governance struggles, etc.) and discourses concerning projects, territories, and actors (local and material outcomes).

Topics 3 and 2 (28.5% and 18.5% of classified text segments) pertain to industrial decline, as depicted in the graph. They are labelled as "industrial crisis" and "crisis management and resolution", respectively. Topic 3 contains representative words related to key industries (e.g., *Alcoa*, *Eurallumina*, *Glencore*), locations (*Portovesme*), or actors affected by the industrial shutdown, acquisitions, or interruptions of productive activity (e.g., *labourer, worker*), highlighting workers and unions' fights (e.g., *protest*, *dispute*, *sit in*).

Topic 2 refers to actors involved in crisis management (e.g., the *unions*: *Cisl*, *Cgil*, *Uil*; regional and national policymakers: *Cherchi*, *Pigliaru Todde*, *ministry*, *secretary*) and related institutional activities (e.g., *meeting*).

The second group of themes emerging from the analysis is related to energy generation and transition, including topics 1, 4 and 5.

Topic 1 (25.13% of classified text segments) concerns "plans and strategies for sustainability transition", and comprises words referring to political goals (e.g., *development*, *sustainability*, *efficiency*), action domains (e.g., *environmental*, *energetic*, *research*, *touristic*), and premises for sustainability transition (e.g., *resource*, *territory*).

Topic 4 (19.42% of classified text segments) refers to the semantic universe of "materiality of energy generation". The most representative words describe material premises (e.g., *coal*, *cost*, *mine*, *fuel*) or outcomes (e.g., CO_2, *emission*, *consumption*, *pollution*) of energy generation and quantifying elements (e.g., *ton, year*).

Finally, topic 5 (8.42% of classified text segments) concerns the "territoriality and infrastructures of new forms of energy generation and socio-technical change". Representative words are primarily related to geographical locations related to energy infrastructure across the island (e.g., *Oristano, Porto Torres, Portoscuso*) or energy supply regions (*Algeria*), and prominent projects in the media (e.g., *gas pipeline, Galsi, regasification, wind farm, off-shore*).

This topic primarily centers around gas infrastructure projects, particularly the tension between transitioning from coal to gas using gas pipelines and utilizing gas deposits with floating storage and regasification units. This focus
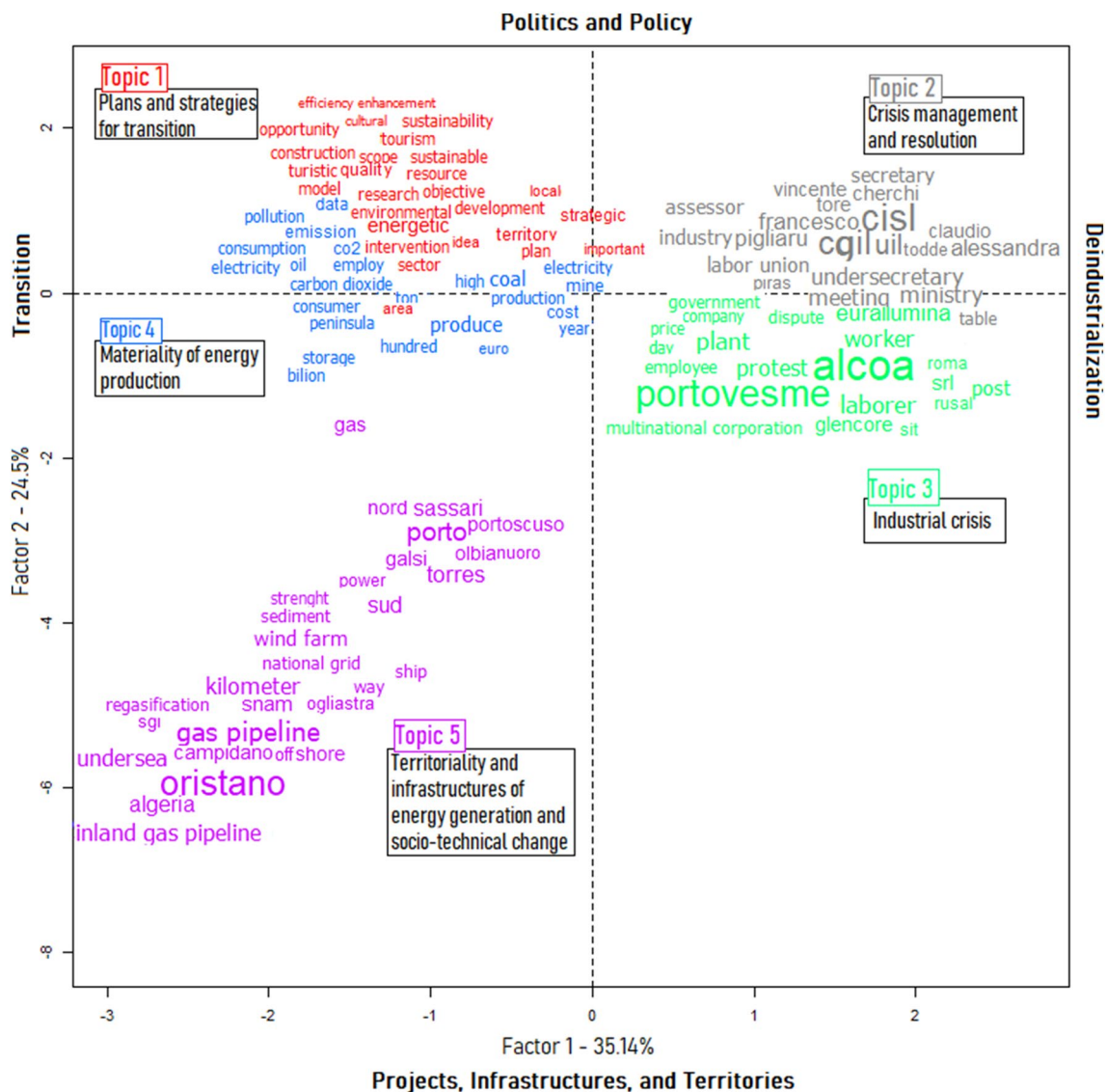
Fig. 4 Most characteristic words for each topic identified by the Reinert method projected on the Cartesian plan. Each topic is represented by a different color. Translation by the authors

highlights the extensive coverage of the coal-to-gas transition, while renewable energy occupies a more marginalized and niche position within the dominant discourse on socio-technical change.

As shown in Fig. 5, topic 4, primarily associated with coal, is prominent during significant events, such as the national referendum on nuclear power (2011), the decision to close the coal mine (2014), and the policy shift towards phasing out coal in favour of gas transition (2018) as outlined in the National Energy Strategy (2017) and the Integrated National Climate and Energy Plan (2019). Concomitant to these policy decisions, topic 5 gains prominence from 2017 to 2021, representing the destabilization–reconfiguration period following the coal decline.

Step 2: identifying (de)legitimizing storylines on coal phase-out and renewable energy transition

To identify the storylines associated with energy-related topics (1, 4, and 5), we conducted a detailed analysis of text segments extracted (excerpts) using the most significant words of semantic networks derived from similarity analysis (Figs. 6, 7, and 8), as summarized in Table 2.
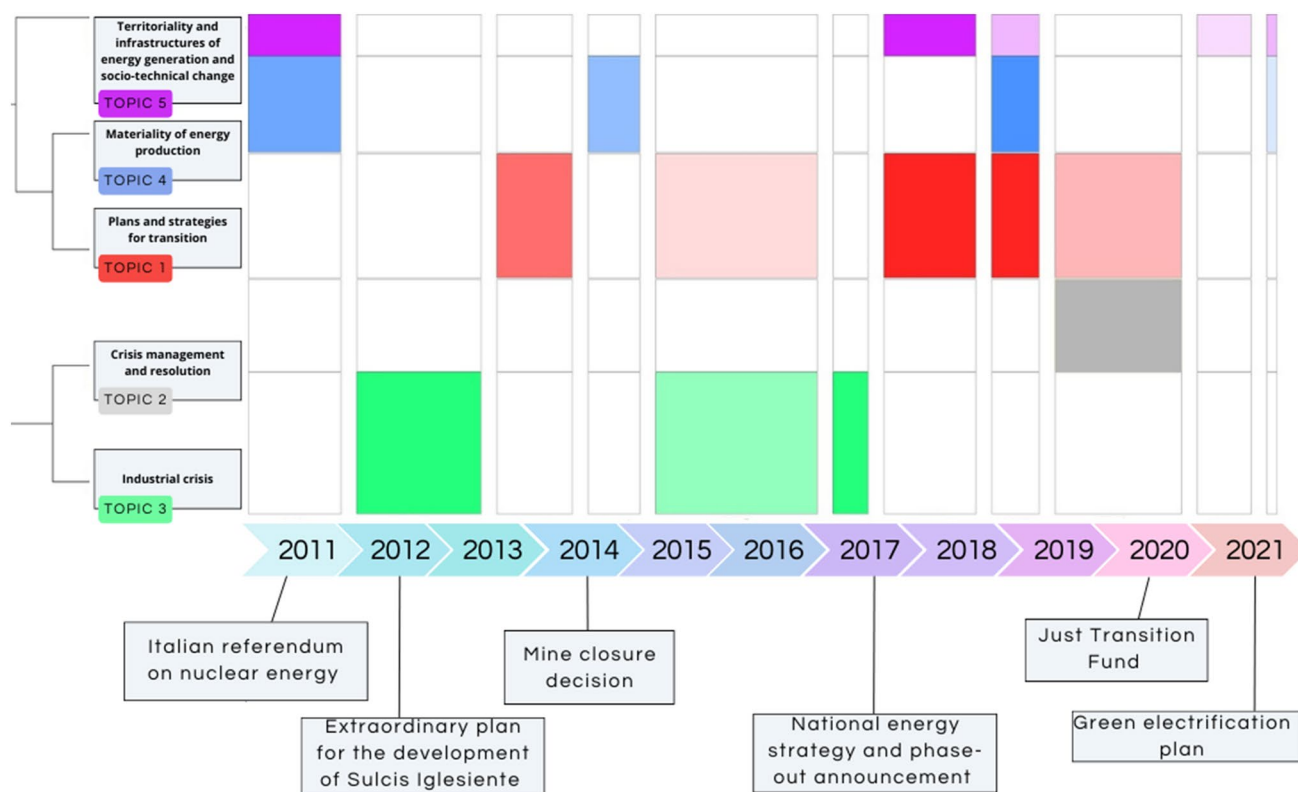
Fig. 5 Association among topics and years (Chi-square index) and events timeline. Each bar represents a year (2011–2021). The width of the bars is proportional to the number of text segments in a given year. The intensity of the color is proportional to the strength of the association between class and year

Topic 1: plans and strategies for transition

The core keyword of this topic is "piano|plan" (Fig. 6), which is connected to the main strategies for transformations in different areas: energy (area I), environmental (area II), and industrial (area III). These strategies are connected to political objectives including innovation and development of new sectors (area IV), economic/infrastructural and territorial development (areas V and VI), economic and natural resource use and conservation (area VII), sustainable energy and efficiency (area VIII), and public policy and administration (area IX).

From the excerpts selected from this topic ($n = 773$), we identified five storylines:

(1) **Energy transition and phase-out as disturbance and distress.**

This storyline portrays energy transition in Sardinia and Sulcis as difficult and distressing due to the lacking gas supply infrastructure. This infrastructure deficit poses a significant obstacle to the phase-out of coal, which is deemed crucial for maintaining socio-economic stability and the livelihoods of the Sulcis community.

"It is necessary to guarantee the maintenance of the current energy system, protect over two thousand jobs, defend the regional production system and allow a non-traumatic *transition* between the old energy model and the new one" [2015, Ansa, News Report, President Regional Council]

"The lack of gas and its distribution network represents a situation of infrastructural diversity for Sardinia that does not allow a gradual *transition* phasing out coal" [2019, La Nuova Sardegna, News Report, Unions[12]]

A large coalition of actors supports and conveys this storyline, including regional governments across time, industrial stakeholders, unions, and workers, also supporting other storylines directly related to industrial survival.

(2) **Energy strategies must preserve the industry.**

As revealed during topic detection, energy issues and strategies are closely intertwined with industrial con-

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[12] The unions CGIL, CISL, and UIL frequently issue joint statements. Therefore, in such cases, we refer to "unions" collectively throughout the results.

Table 2 Summary of the second step of the analysis

Topic	Topic mining keywords (number of analyzed excerpts containing the keyword in the topic)	Storylines	Discourse coalitions
1. Plans and strategies for transition (773 excerpts)	Energy (169) Industrial (80) Resource* (94) Development (167) Territor* (197) Transition (37) Valorization/enhancement (29)	Energy transition and phase-out as disturbance and distress	Unions; regional governments; carbon-intensive industries
		Energy strategies must preserve the industry	Unions; regional governments; carbon-intensive industries
		(Clean) coal is strategic for energy security and socio-economic stability	Unions; regional governments; carbon-intensive industries; coal extraction and R&D firm
		Coal and industry are part of local culture, identity, and vocation	Unions; regional governments; carbon-intensive industries; coal extraction and R&D firm
		Large-scale renewables only when contributing to environmental restoration and recovery of brownfields	Local politicians; local movements; regional and local environmental NGOs; regionalist parties
4. Materiality of energy production (848 excerpts)	Coal (186) Cost* (148) Electricity (167) Wind (24) Renewable source* (29) Solar power plant (14) Power plant (127) Photovoltaic (21) Firm (86) [Energy] production (146)	Coal is low risk and can bridge past and future	Coal extraction and R&D firms; carbon-intensive industries; unions; regional governments
		Phase-out and transition to renewables are economically unsustainable due to the absence of natural gas	Unions; regional governments; carbon-intensive industries
		Power generation embodies a colonial relationship	Unions; regional governments; local politicians; local movements; regional and local environmental NGOs
		Renewables are a territorial cost (without benefits)	Local politicians; local movements; regional and local environmental NGOs; regionalist parties
5. Territoriality and infrastructures of energy generation and socio-technical change (324 excerpts)	Deposit* (28) Wind (35) Photovoltaic (15) Gas pipeline (70) Plant (53) Wind turbine* (14) Wind farm (27) Port* (82)	Coal-to-gas transition is needed to reduce costs for households and businesses	Regional governments; unions; carbon-intensive industries
		Energy system change needs a large-scale transition and technology substitution	Power companies; regional governments; carbon-intensive industries; unions; national environmental NGOs
		Energy system change needs distributed generation and self-consumption to stimulate collective agency and ownership	Local politicians; local movements; regional and local environmental NGOs; regional council opposition parties

Keywords for text mining, the number of segments containing them for each topic, the related storylines, and discourse coalitions supporting them
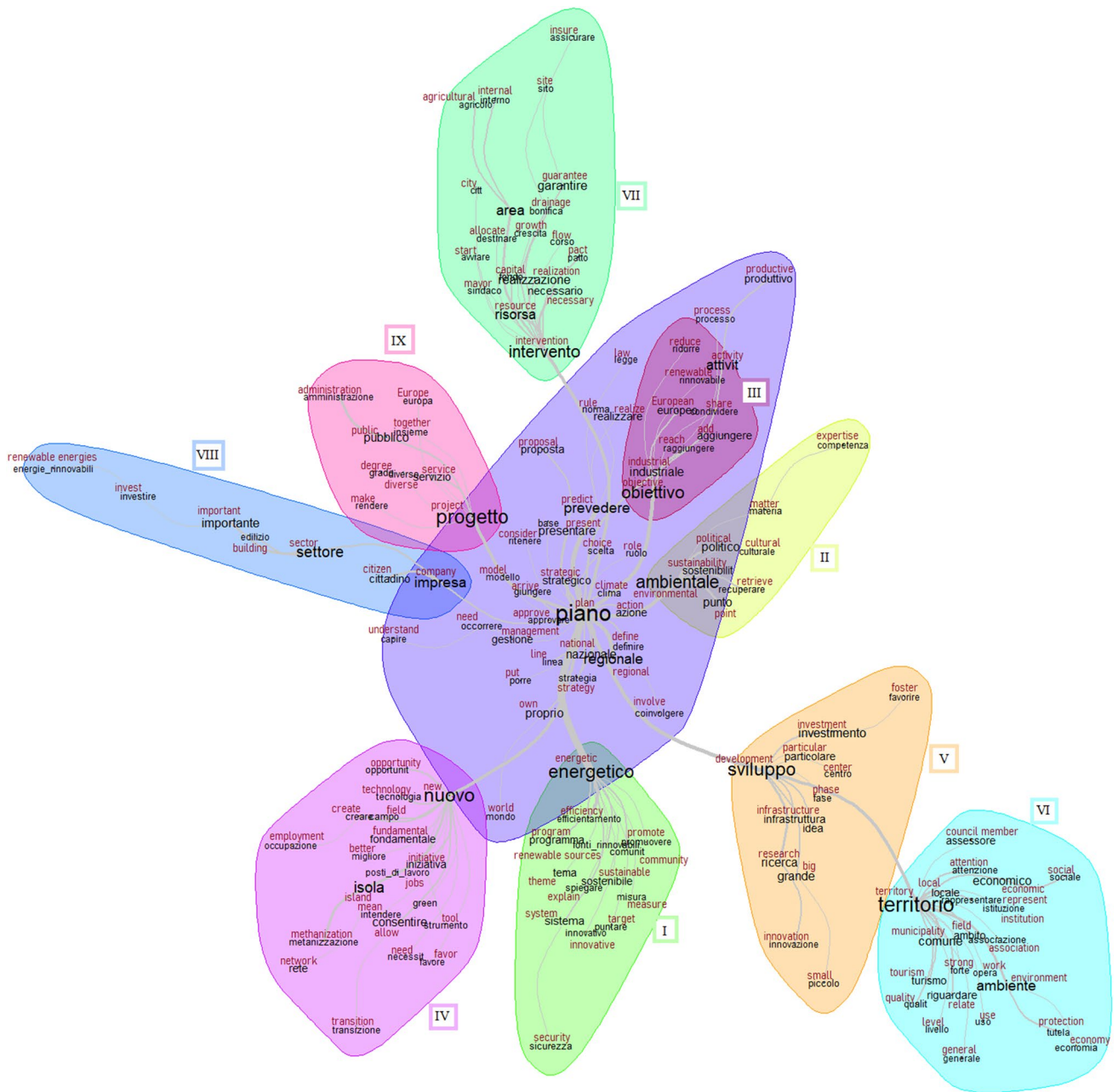
Fig. 6 Network of the most significant keywords in Topic 1. The areas highlight a subset of frequently associated keywords. The words' font size is proportional to their frequency. The thickness of the branches is proportional to the co-occurrence of the keywords. English translation by the authors

siderations. Industrial needs have a strong influence on energy planning, with a particular emphasis on securing affordable energy supply.

> "The *transition* from coal must be gradual in order not to jeopardize the industrial future of Sardinia" [2019, La Nuova Sardegna, News Report, Unions]

(3) *(Clean) coal is strategic for energy security and socio-economic stability.*

   In line with the previous studies (e.g., Isoaho and Markard 2020), coal extraction and coal-fired power generation are justified over time by a storyline that presents coal and climate mitigation as compatible with CCS technologies, and portraying coal as a "clean source" suitable

to address the intermittency of renewables and the transmission grid deficiencies (overcapacity).

"with the CCS also fossil fuels can continue to be used on a large scale [..] researchers are finalizing a complete, impartial, and independent Report on the Italian energy situation with particular attention to the role that coal can play in the future *energy* mix if treated with appropriate technologies" [2014, La Provincia del Sulcis Iglesiente, News Report, President IEA Clean Coal Centre]

"The growth of renewables, therefore clean but intermittent *energy* has an impact on the operation of the electricity grid. In this scenario, coal plays a leading role because it represents the most suitable resource to guarantee the necessary *energy* coverage when the production of renewables decreases or ceases [2017, La Provincia del Sulcis Iglesiente, News Report, Journalist]

This legitimizing storyline is reinforced by the regional companies involved in coal mining and R&D activities focused on carbon capture, storage, and utilization.

(4) *Coal and industry are part of local culture, identity, and vocation.*

Despite the decision in 2014 to cease mining activity and close the coal mine by 2018, discourses surrounding coal consistently exhibit efforts to re-legitimize and preserve it. These efforts involve discourses highlighting industrial needs, the stability of the power system, and presenting coal and metal industries as essential elements of Sulcis' industrial heritage, identity, and economic stability.

"The essentiality regime[13] [of the coal-fired powerplant] would make it possible to safeguard employment levels, protect the heritage of technical-*industrial* culture and tradition, and guarantee the safety and stability of the electricity system. It was thanks to the [coal-fired] power plants that, in February 2015, the black-out was avoided in Sardinia" [2015, La Nuova Sardegna, News Report, Regional Industry Trade Association]

The reactions flooded in the aftermath of the interview in which the entrepreneur proposed for the Sulcis to focus on tourism and abandon the *indus-*

trial model. All reactions to the same sign, from miners to trade unionists, from parliamentarians to public administrators: considerations sent back to the sender. Suggestions are perceived as a foreign body to the territory. [..] in short: tourism and industries "can coexist" [2013, L'Unione Sarda, News Report, Journalist]

This storyline seems culturally hegemonic as it encompasses a situation where coal and carbon-intensive sectors are recognized by a heterogeneous plethora of actors as the core of the community's sense of self and livelihood (cf. Bell and York 2010).

(5) *Large-scale renewables only when contributing to environmental restoration and recovery of brownfields.*

Another storyline within this topic addresses the environmental degradation and territorial dispossession resulting from deindustrialization and energy transition, which, respectively, jeopardize the territorial resources and leave little economic benefit locally. Accordingly, the storyline proposes that large-scale renewable energy projects are sited in brownfields, such as mining sites and abandoned industrial areas. This approach offers an opportunity to develop a low-carbon economy that simultaneously recovers contaminated sites and safeguards other valuable assets crucial for alternative sectors like tourism and agri-food.

"All the local administrators stressed the distortion of *territorial* planning, and the indiscriminate consumption of the territory... "the Regional Council can do a lot, pending the new energy plan and urban planning law. It is possible to intervene, identifying suitable sites to host the power-plants (unused industrial areas, reclaimed landfills, disused quarries" [2014, La Provincia del Sulcis Iglesiente, News Report, Local Mayor]

"the choice to install large energy infrastructures in agricultural areas, and not for example in abandoned industrial areas, is in stark contrast with the principles of sustainable development that we believe strategic for the future of Sardinia" [2016, La Provincia del Sulcis Iglesiente, News Report, Regionalist party councillor]

The storyline seems widely supported but mostly conveyed by local politicians/mayors, regionalist parties, regional environmental NGOs, and communities opposing the business-as-usual transition with utility-scale renewables.

[13] Legal term indicating the essentiality of powerplants for the safety of the power system.

Topic 4: materiality of energy production

The core of topic 4 is the word *coal* (*carbone*), as shown in Fig. 7. The surrounding semantic areas can be categorized as: "Energy provision" (area I); "Energy market" (II and III areas); "Coal regime adaptation and survival" (IV and V areas, encompassing "clean coal and CCS", and "coal-fired powerplant") "Economic impacts" (VI and VII areas, energy costs and actors affected).

Analyzing the excerpts from this topic ($n = 848$), we identified four storylines legitimizing investments in coal or the coal-to-gas transition while delegitimizing the ongoing renewable energy diffusion.

(1) *Coal is low risk and can bridge past and future.*

This storyline promotes the legitimacy of coal by incorporating discursive elements from other storylines. It emphasizes territorial disadvantages and high
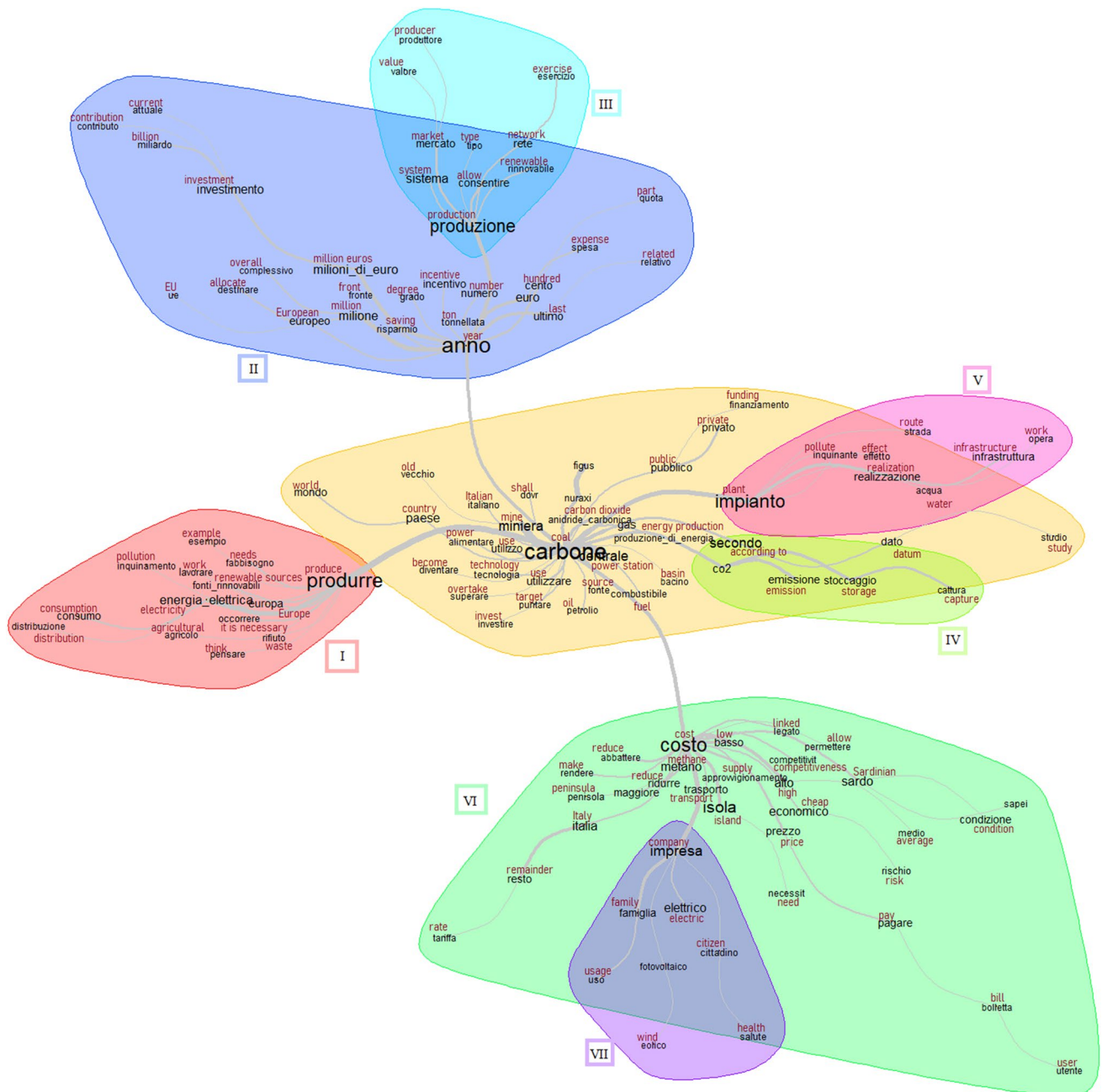
Fig. 7 Network of the most significant keywords in Topic 4. The areas highlight a subset of frequently associated keywords. The words' font size is proportional to their frequency. The thickness of the branches is proportional to the co-occurrence of the keywords. English translation by the authors

energy costs for industry and households compared to the rest of the country and the potential of reducing coal's environmental impact through CCS. It portrays coal as a convenient and strategic energy source, with unions, regional politicians, and stakeholders from the extractive and metalworking industries advocating for its recognition as a primary source of energy security and a potentially clean and safe local asset.

"We all are now aware that nuclear energy has its limits, while it is recognized by technicians and experts that the kWh produced with *coal* has a lower price than other energy sources" [2011, La Nuova Sardegna, News Report, News Report, President national union]

"Today the *coal* of Sulcis must be the Sardinian answer to nuclear power, our uranium in the sub-soil..It is not dangerous with modern technologies; it does not pollute as you can eliminate co2. It will never be used to produce atomic bombs or cause alarms for radioactive pollution [2011, L'Unione Sarda, Editorial, Journalist]

What sets this particular narrative apart from others is the representation of coal as a low-risk solution that can drive innovation and local development, leveraging the region's mining and industrial heritage for justifying new investments in the declining sector.

"The funding of this kind of [R&D] initiative is more than justified. It is not just about reviving an old coal mine, but developing in the Sulcis an Italian technology hub of pan-European interest in clean *coal*" [2012, Unione Sarda, News Report, Mining company]

"We must use all the mining expertise remaining in our region after the coal extraction phase to forge technological partnerships with countries such as China and the United States that are focusing on coal in terms of clean energy for the future" [2015, Ansa, News Report, Left party councillor]

(2) ***Phase-out and transition to renewables are economically unsustainable due to the absence of natural gas.***
Over the years, policies and investments supporting coal first and the coal-to-gas transition later are legitimated by a storyline that stresses the island's infrastructural diversity. Following the final decision to phase out coal-fired power generation by 2025, a coal-to-gas transition is presented as necessary for a low-carbon transition and the deployment of renewables.

"as there are still no alternative energy sources such as methane Sardinia pays a total cost between businesses and families that is excessive compared to the *costs* of the rest of the peninsula" [2014, La Provincia del Sulcis Iglesiente, News Report, Left party councillor]

"We need methane to face the energy transition and reach the 2050 target with energy produced from renewable sources " [2019, Ansa, News Report, Right party councillor]

(3) ***Power generation embodies a colonial relationship.***
Discourses on energy provision frequently depict a "colonial relationship" between the State and the Region symbolically exemplified by the submarine powerline that exports a substantial amount of locally generated energy to the mainland.

This storyline is shared among regional discourse coalitions and depicts regional power generation as benefiting the country at the expense of regional interests, reflecting a form of energy colonialism that prioritizes national energy security (cf. also Batel and Devine-Wright 2017).

"Regarding Sardinia and manufacturing activities, if we want them to have a future, we must be able to rely on thermal energy that guarantees continuity of supply and protects us from possible connection problems with the peninsula. Now Sardinia *produces* more *energy* than it consumes." [2014, Unione Sarda, News Report, Journalist]

"We consume less but produce more than we need. The energy produced cannot be stored and is exported to the peninsula, for the benefit of who? Certainly not ours. Sardinians do not buy electricity at a "Sardinian price". *Electricity* produced in excess and mainly from coal could be very cheap, but by law, we must buy it at a single national price [2013, Nuova Sardegna, News Report, Regionalist party Councilor]

As the excerpts show, this storyline stresses the paradox of having a high energy production from local sources, a high percentage of energy export, and little benefit from this production in terms of energy costs or stability of power supply (e.g., storage and grid).

(4) ***Renewables are a territorial cost (without benefits).***

A fourth storyline focuses on hidden costs of renewables, especially opposing the interests of local communities to those of incumbent actors.

"We express our full solidarity and closeness to the fight that the Communities are waging with farmers and environmentalists, against the installation of solar energy systems in their territories, without any economic impact on local populations and to the detriment of existing and future agro-pastoral productions. A contemptuous and colonialist vision of the history and culture of the Sardinians."[2015, Provincia Sulcis, News Report, Local mayor]

"Offshore wind cannot be the solution. While in this period of neglect of coal, the solution could be transient with gas. Alternative energies make sense if, in addition to providing energy, they do not increase the costs of energy itself, on the territory, or on the community. Energy development from *renewable sources* is welcome, but it must be born in the area, with a whole series of infrastructures that should start from the construction of the plants up to installation and maintenance. In this project we see everything coming down from above and snatching the resources that can entail." [2020, Provincia Sulcis, News Report, Local mayor]

This storyline brings attention to the intensive exploitation or impairment of local resources and the unequal distribution of burdens and benefits due to inadequate regulations and policies. It portrays renewables as a "territorial cost" and is primarily promoted by local movements, administrators, regional environmental NGOs, and opposition parties in the regional council. Consequently, energy transition is depicted as an external force that does not result in the local creation of economic opportunities or benefits.

Topic 5: territoriality and infrastructures of energy generation and socio-technical change

The central area of the word network (I) focuses on the term "project," accompanied by related terms like gas, deposit, GALSI, and municipality (Fig. 8). These elements are connected to the right and left areas involving terms related to gas supply (IV), distribution network (II), and the affected territories/cities (III). Other areas relate to utility-scale power plants (V) and pioneering renewable energy activities (VI).

This topic primarily focuses on places and infrastructures related to energy production and socio-technical change, with a particular emphasis on the coal-to-gas transition. Within this topic, we identified three storylines ($n = 324$ excerpts analyzed).

(1) ***Coal-to-gas transition is needed to reduce costs for households and businesses.***

This storyline emphasizes the importance of diversifying energy supply and reducing costs for industries and households. This narrative is primarily propagated by the regional government, trade unions, and industrial stakeholders, portraying the coal-to-gas transition as imperative and pressing, despite the ongoing uncertainty surrounding the type of infrastructure.

"The *gas pipeline* with Algeria will not be built but the Region does not give up on methanisation which would lower the cost of the bill" [2014, La Nuova Sardegna, News Report, Journalist]

"There are two options on the table: the construction of a Sardinian-Tuscan *gas pipeline* which would be the most convenient for all industrial and household end users or a regasifier that is certainly more expensive in all respects" [2014, La Provincia del Sulcis Iglesiente, News Report, Left party industry councillor]

(2) ***Energy system change needs a large-scale transition and technology substitution.***

This storyline portrays decarbonization as achievable primarily through fossil and renewable large-scale facilities, highlighting the importance of socio-technical change and utilizing terms like power plants, wind, megawatt, and power.

"A decarbonization scenario cannot be implemented without a new electricity interconnection with the rest of Italy and regasification plants." According to the Region, the coal abandonment scenario, outlined by the Environment Ministry, without an adequate alternative to thermoelectric energy supply ensured by coal or other fossil sources other than methane, creates risk conditions capable of determining significant economic impacts for the Sardinians and Sardinia." [2019, La Provincia del Sulcis Iglesiente, News Report, Regional Council statement]

Energy production is predominantly discussed in relation to large-scale facilities such as regasification plants, wind farms, and solar farms, presenting the
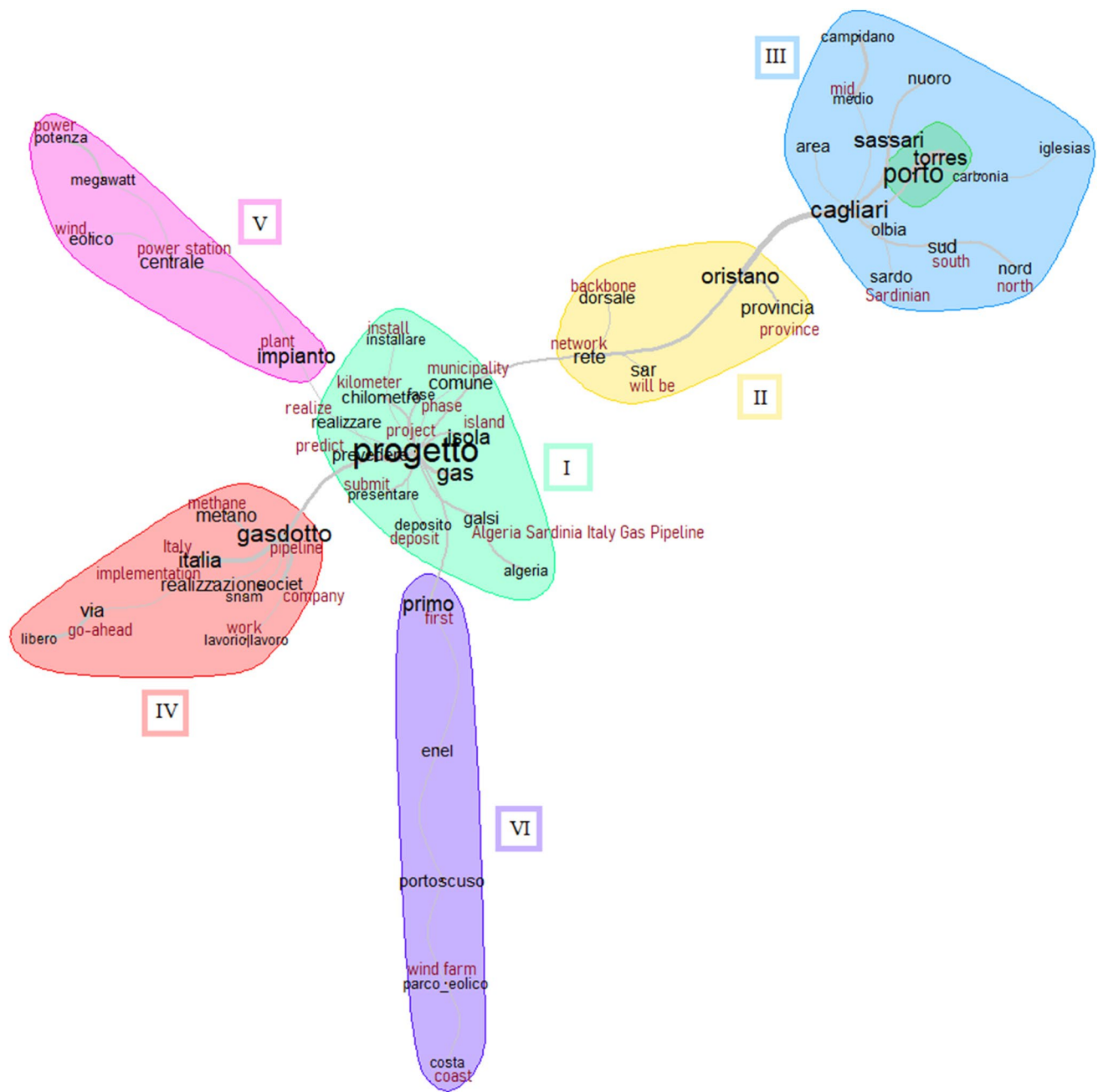
Fig. 8 Network of the most significant keywords in Topic 5. The areas highlight a subset of frequently associated keywords. The words' font size is proportional to their frequency. The thickness of the branches is proportional to the co-occurrence of the keywords. English translation by the authors

energy transition as a technological substitution that maintains the centralized model of production and distribution. These projects are seen as viable alternatives to replace coal-fired power generation and mitigate negative economic impacts. This is exemplified by discourses on wind farms reflecting the development of on-shore and off-shore wind projects, starting from the pioneer projects in 2011 to the latest development proposals and controversies about an off-shore wind farm in 2020.

the ENEL green power engineering and construction manager immediately pointed out that "this is the first phase of a project that represents an important intervention in the sector of electricity production with renewable sources. We are

building the largest *wind farm* in Italy, in an area adjacent to an industrial cluster" [2011, La Nuova Sardegna, News Report, Power company]

"An electricity production *plant* consisting of 42 wind turbines, each with a total power of 504 megawatts, off the coast of Cala Domestica, according to the association represents a very innovative project that "overcomes the problems of visibility of wind power by placing the towers away from the coast in deep waters"" [2020, La Nuova Sardegna, News Report, Environmental NGO]

However, this storyline contains diverse and conflicting perspectives. Influential actors like the Regional Government and regional industrial stakeholders emphasize the importance of gas infrastructure development. Other influential actors including national power utilities and to some extent some environmental NGOs challenge the institutionalized discourse by advocating for a fully renewable energy transition model driven by profit-based decisions and focusing on large-scale energy facilities, reproducing a centralized energy system.

(3) ***Energy system change needs distributed generation and self-consumption to stimulate collective agency and ownership.***

Nevertheless, opposition to utility-scale facilities is a common trend observed among citizens, local politicians, and certain environmental NGOs, often with the support of specific political parties.

"we believe that our support should be directed to a correct incentive policy for renewable energy, that is to support distributed generation and self-consumption, while a strong and determined counteraction should be exercised against the proliferation of industrial plants for power production" [2018, La Provincia del Sulcis Iglesiente, News Report, two environmental NGOs]

This storyline exposes the dominant discourse on socio-technical change highlighting the contrast between two pathways, i.e., community-based energy systems versus large-scale renewables owned by private investors. It calls for energy policies that empower citizens and communities to play an active role and have ownership in the low-carbon transition (cf. Bullegas et al. 2020).

Discussion and conclusions

In this article, we analyzed the discursive dynamics surrounding the phase-out of coal and the diffusion of renewable energies. We examined newspaper articles from 2011 to 2021 combining topic detection and ADA to identify key topics, storylines, and discourse coalitions. The synergy of quantitative and qualitative text analysis allowed us to effectively summarize a large amount of data and provide structured insights. It helped us to uncover patterns and narrow down the focus, enabling a more fine-grained qualitative exploration while reducing selection bias. This approach enabled us to track shifts in argument salience (Sarrica et al. 2020) and (de)legitimization processes over time, capturing changes in storylines and discourse coalitions (Markard et al. 2021) and considering simultaneously the phase-out of fossil fuels and renewable energy uptake (Turnheim and Geels 2012).

Our findings revealed three distinct periods characterized by shifts in topics and storylines mirroring key political events and turning points: i.e., the referendum on nuclear energy and industrial crisis (2011–2012), the mine closure decision (2014), and the national energy strategy, and phase-out announcement (2017) (see also Fig. 5). The first period (2011–2014) is characterized by topics and storylines focusing on coal legitimization and survival. The second one (2014–2017) concerns the increasing coal destabilization with attempts to re-legitimize it. The third period (2017–2021) marked a period of reconfiguration and increased tension between competing pathways.

Results show that in all three periods, energy discourse tends to be dominated by the topic of the industrial and employment crisis, emphasizing energy security and affordability as key for regional livelihood and economic prospects. Newspapers cultivated a discursive environment that portrays decarbonization and coal phase-out as threatening and potentially shocking due to the lack of infrastructure for diversification with natural gas. This prompted strategies and discourses aimed at securing affordable energy supply for industrial survival.

This explains the presence of storylines culturally and politically legitimizing coal extraction, use, and investments over time. A powerful coalition of actors associated with coal—including unions, regional politicians, and stakeholders from extractive and metal industries—countered policy and advocacy efforts by mobilizing storylines that sought to: (a) position coal with CCS as a viable source and asset for the security and stability of energy and socio-economic systems; (b) re-legitimize it by mobilizing extractive and metal industries as the cornerstones of the regional sense of self (see Bell and York 2010; Mayer 2018). Not surprisingly, incumbents resisted change by reproducing institutionalized and culturally hegemonic discourses to legitimize and

reinforce locked-in patterns of production (Simoens et al. 2022).

As documented by policy documents, coal destabilization did not happen due to actors' alignment and internal momentum (cf. Markard et al. 2021) but as a consequence of landscape pressures.[14] Accordingly, actors were forced to align their discursive strategies. During the coal regime destabilization period, the storylines supporting coal leapt into others promoting a coal-to-gas transition, which intensified after the national decision to phase out coal-fired power plants. Storylines highlighting the impact of energy costs on households, businesses, employment, and regional wealth have intensified, resulting in a strong demand for infrastructural investments to facilitate a coal-to-gas transition. On the other hand, they overshadowed the discussion on renewable energies, which has received less attention in the discourse on socio-technical transition.

Contrary to previous research (e.g., Isoaho and Markard 2020; Rosenbloom 2018), health and climate-related arguments had low salience and did not significantly impact the delegitimization of coal (cf. also Lehotský, et al. 2019). Surprisingly, arguments highlighting negative externalities from metal, mining, or energy industry affected the storylines surrounding renewables, stressing negative externalities and cumulative impacts of large-scale facilities on the territorial natural resources, and portraying them as acceptable when used for recovering contaminated or abandoned sites.

Overall, our analysis suggests that storylines mobilized by different groups played a crucial role in policy and technology dynamics. Renewables remain almost marginalized in the newspaper discourse, facing difficulties in scaling up due to discursive dynamics that promoted regime stability (coal legitimacy) or transformation (coal-to-gas transition) while undermining the coal regime destabilization. Furthermore, the adoption of renewable energy in the region faces obstacles due to the transition model advocated by established stakeholders and based on utility-scale renewables. This model encounters substantial resistance from local movements and authorities. Their storylines stress that renewable energy deployment reproduces a centralized model and perpetuates neo-colonial power dynamics, imposing territorial costs without demonstrating clear local benefits. These findings support Osti's (2018) claims that renewable energy development in Sardinia is not widely seen as a means to achieve social redemption and political and economic independence.

In this sense, the press contributed to a discursive and policy environment in which phasing out fossil fuels and promoting low-carbon energy have been constantly weakened by amplifying particular storylines.

However, certain critical storylines suggest a potentially legitimized (policy) way forward for low-carbon transition. These include siting large-scale infrastructures in built environments and brownfields, and promoting distributed generation and self-consumption schemes involving energy communities producing and consuming their own energy. This, in turn, can help contrast local actors' narratives and perceptions of being passive agents and enable them to become political agents and levers of energy transition (Köhler et al. 2019).

It is worth noting that our data collection concluded before 2022, a year marked by significant disruptions in the global energy landscape. Recent developments, including the energy crisis, have prompted the national government to accelerate decarbonization and endorse narratives that position Sardinia as a 'green laboratory' or 'energy hub,' making it attractive to incumbent actors.[15] Power companies with a strong discursive agency are destabilizing any attempt to re-legitimize coal and intensifying the discursive struggle between 'utility-scale renewable electrification' and 'coal-to-gas transition' pathways. While recent events seem to be opening a window of opportunity for disrupting a locked-in development and accelerating low-carbon pathways (cf. Appendix), there is a potential risk of co-opting or disregarding the critical narratives mentioned earlier, which could worsen conflicts and lose momentum for harnessing the just transition mechanism and achieving an equitable reconfiguration (Newell et al. 2022).

This research provides valuable insights into the discursive dynamics that can characterize coal-dependent regions in transition, shedding light on the complexities of disentangling cultural legitimacy and socio-economic and political interdependencies linked to coal. It aligns with the growing body of research emphasizing the socially constructed nature of the fossil fuel hegemony, marked by shared narratives across countries and continents that highlight coal's historical significance for community well-being and identity while framing decarbonization and renewable energy transitions as threats (see, e.g., Wright et al. 2022; Markard et al. 2023).

As Markard et al. (2023) noted, the success and pace of coal phase-out and the establishment of low-carbon alternatives are undeniably linked to regime stability, influenced by various techno-economic and socio-political factors that can be detected in discursive struggles. In our case, factors such as job dependence on coal, energy supply reliance, and the readiness of competing (renewable) or complementary (gas) power supply alternatives, significantly contributed to the slow-onset of coal destabilization, thereby limiting the opportunities for renewables to gain space and momentum.

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[14] Under EU pressure to phase out coal mining and coal-fired power generation, there have been significant developments. For instance, in 2013, the European Commission rejected the Italian proposal for €8.4 million State aids to the Sardinia Region aimed at supporting the development of a new coal-fired power plant, as per Decree n. 145/2013.

[15] https://www.enelgreenpower.com/countries/europe/Italy/sardinia-green-energy-model.

Comparative case studies across different coal regions and their narratives can provide valuable insights into how coal hegemony and stability are entrenched with such factors or alternatively how can be disrupted (cf. Hermwille et al. 2023). In this regard, our methodological approach can serve as a valuable tool for a comprehensive analysis of energy discourse, facilitating the identification of key topics and competing narratives (see also Rizzoli et al. 2023). It demonstrates one way to integrate computational tools with qualitative methods to gain a deeper understanding of the discursive dimension of socio-technical transitions and to offer insights into associated challenges (see also Müller-Hansen et al. 2021). However, we stress that to get a proper understanding of the state of transition, its direction and speed, along with actionable knowledge, the analysis of discursive dynamics should go beyond single elements or facets and integrate both build-up and break-down dynamics. Our approach aligns with recent scholarship (Hebinck et al. 2022), emphasizing the need to consider the development and stabilization of innovations alongside the destabilization and decline of existing practices and structures to fully understand and support low-carbon transitions in-the-making.

This approach can illuminate the interplay of processes over time, contribute to understanding how discourse (de) legitimizes transition pathways and perpetuates locked-in trajectories, and support reflexive governance approaches and the identification of appropriate policy mixes to instigate and navigate destabilization-reconfiguration pathways.

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