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WINTER

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Report on the media analyses

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EXECUTIVE SUMMARY

Media coverage plays an important part in energy transitions as it creates awareness for the change. It is a powerful actor in shaping public perceptions, influencing political decisions and disseminating information. Understanding how the media portrays and influences discussions on energy transformation is crucial for gaining insights into the dynamics of this evolving landscape. The lack of scientific studies regarding the analysis of media in relation to the transition topic, reveals the need for research. The media landscape has never been as diverse as it is now. A wide range of local offers in the form of newspapers, radio, television and, finally yet importantly, online media is available in manifold formats.

The study takes on the challenge of examining the media landscape of the three coal regions, all of which are in different phases of transition: Germany- 60 years of coal transition, Greece- 3 years of Just Transition, Poland- about to enter Just Transition. Therefore, instead of analyzing individual media references on coal transition, the focus should be the identification of the general presence of media coverage.

The media analysis should be based on three core components: statistical evaluation (such as gender and age, number of entries or location), discursive reflection (sentiments or tonality) and retrospective observation (how does the perception change over time?). These quantities cannot be managed without computational tools nowadays. Intensive research was carried out on how to assess the requirements of a media analysis with the result, that there is no tool or agency that is able to fulfill all of the core components automatically. The main reasons for this are data licensing, paywalls and different ways of dealing with retrospective news. Therefore, the criteria for the media analysis were adopted to a freely available tool, the Leipzig Corpora Collection. It contains corpus-based dictionaries for more than 250 languages, in which for every word statistical information, example sentences, and links to related words are provided. The data bases on randomly selected sentences from different news websites.

To supplement the relative small database in the Greek case, headlines from articles published on three prominent news websites in Western Macedonia were scrawled via the Web Scraping methodology, additionally.

An essential part of the work lies in the definition of the search attributes. In order to overcome the linguistic differences across the boundaries of the case regions, competent speakers of the WINTER-project consortium carried out the definition of the search attributes independently for each case study region and classified them into higher categories consistent for all regions. This approach offered the possibility to introduce supplementary terms into the study in addition to general terminology. The categories should cover as many topics as possible that are relevant to social representations and perceptions of the coal phase-out. It turns out that these topics are often different for the case regions. For example, in the German media landscape there are many identity-forming terms that are exclusively linked to the change or the end of hard coal mining in the Ruhr region. They mainly emphasize the cultural identity of the people with the whole region, while in the Greek and Polish case regions specific site names or decrees have a more significant media echo. A particular challenge was the development of the search methodology, as the linguistic differences led to problems with the search function in the portal, so that the scope of the resulting and evaluable results was too small. Thanks to an in-house expert, the consortium was able to overcome this hurdle by manually searching the databases for the Polish and Greek regions.

According to our analysis, topics surrounding the perception of the coal transition on the European level show the highest significance in the German case. The interest in topics related to regional and site development are higher in the Greek region and the Polish analysis reveals most frequent entries for the technical tasks surrounding renewable energy sources.

The analysis exposes three relevant search attributes, which were consistent in all of the three databases: Just Transition, Green Deal and Decarbonization. In Poland, the term “Just Transition” has the highest frequency and highest number of negative entries at the same time, indicating a lack of trust here. In Germany, the reporting is often more factual, but the content is also often characterized by uncertainty, whereas the Greek media support the concept with primarily positive, appealing or factual statements. The “Green Deal” has a neutral to positive tonality, without any significant negative entries across all regions. It is seen as an opportunity for the development of coal regions in transition.

Polish media entries are primarily driven by concerns about the economic and social consequences of a rapid coal phase-out. The negative tonality of the media reports inhibits a positive perception of the transition. In Germany, the coal phase-out affects various decision-making levels: from the European to the national and regional framework but the medial discourse is more shifting to national and international significance emphasizing environmental and especially climate issues. The Greek media support European concepts with primarily positive, appealing or factual statements. The comparison of the case specific media analysis yield further results. The identity-forming and solidarising representations increase with maturity of the transition phase, i.e. in Poland there are hardly any positive terms connected to the identity of the region, whereas in Germany there are plenty of these. The inhabitants and especially the younger generation identify strongly with the local-regional area of the Ruhr region. Beyond this, the increasing scientific debate on new usage options provides more transparency and emphasizes the positive possible potentials of the phase-out. Taking over the positive tonality of terms helps to increase popularity of the topics, i.e. “coal regions” or “Green Deal” are generally perceived with positive sentiments. On the European level, timeframe of the phase-out and managing the economic transition to renewable energy supply belong to the most frequent concerns.

The public does not base its decisions on science-based rational thinking, feelings and emotions play an essential role in assessing the risk of an unknown technology or remediation measure. We advise a high level of local responsiveness on the part of political actors offering the opportunity to improve the social basis for dialogue between politics and citizens. Media analysis accompanying the transition helps to better understand social perceptions and offers the opportunity to meet them at a local level.

This report functions as a preliminary work in which, above all, a suitable method was developed in order to be able to carry out a media analysis at all. By adjusting the criteria, we were only able to sample a very small part of the media landscape, namely randomly compiled online news. As described above the media landscape is much more diverse, but the qualitative and quantitative assessment of significant samples clearly needs further research, which should strongly be recommended here.

PROJECT OVERVIEW

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ACRONYM	WINTER
BENEFICIARIES:	<p>Centre for Research and Technology Hellas – CERTH Thessaloniki, Greece</p> <p>DMT-Gesellschaft für Lehre und Bildung mbH, Bochum, Germany</p> <p>Poltegor Instytut Gornictwa Odkrywkowego-Poltegor Institute of Opencast Mining – Poltegor, Wroclaw, Poland</p>
START DATE:	01/07/2022
END DATE:	30/06/2024
PERIOD COVERED BY THIS REPORT:	01/07/2022 to 30/06/2023
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ON SCHEDULE (YES /NO):	Yes
MAIN PROBLEMS ENCOUNTERED:	None
CORRECTION – ACTIONS:	None
PUBLICATIONS, PATENTS:	None

1 Introduction

The political debate around carbon-intensive coal remains heated. Coal power and mining have played an important, yet alternating role in the history of Germany, Poland and Greece. Media coverage plays an important part in energy transitions all over the world. The present study aims at getting an insight in how coal transitions in the affected European regions are represented and perceived through the media.

The media analysis should identify the differing, circulating understandings of coal transitions, including debates and controversies. The criteria, such as employment opportunities and new usage options, will be defined for each case study region and statistically analyzed. Changes over time will become apparent. Attention will also be given to the way in which people may have perceived coal transitions.

Within the whole project, Work Package 3 (Socioeconomic and management aspects of coal regions in transition) aims to develop a transition management handbook with recommendations for governance and involved actors. The media analysis will provide important input to the design of these recommendations and in the development of the survey of Task 3.4: Social acceptance for best practices solutions for transition process.

Representatives from the consortium members of the WINTER project will carry out the actual analysis manually with the help of computational tools to access representative samples of media data in the languages of the three case study regions. After intensive research into an alternative that was both cost-effective and fulfilled the purpose of this study, the Leipzig Corpora Collection appeared to be a viable data provider.

2 Methodology

The superordinate WINTER methodological approach includes: (i) the environmental and sustainable development dimension, (ii) the socioeconomic dimension and (iii) the integrated management dimension. The present report has the task of capturing aspects of the socioeconomic, dimension. Generally speaking, our media landscape contributes significantly to how our society functions and develops. A key term here is "agenda-cutting". In other words, the decision-making power over the selection of topics that media channels bring to society. Media professionals have the task of - ideally - objectively selecting topics in order to present relevant issues to the consumer. However, decision-making individuals, such as editors and journalists, are subject to subjective expectations - partly based on their own experience, partly on the interpretation of consumer groups. The definition of an agenda and those who can express themselves within the framework of an agenda create interpretive sovereignty (Schiffer, 2021).

Tilman Sutter (2010) goes on to say that in the context of social negotiation processes, it is less about reality itself than much more "about the problem of the general accessibility of concepts of reality". If we look at the methodology in the following, these findings are significant, because with regard to the feasibility of a media analysis in the context of the WINTER project, the focus should be on the general presence of media coverage on the topic of coal phase out and its symptoms. Extensive analyses of the individual media as described, for example, in the basic literature by Sven Grampp (2021) as "internal differentiation of the levels of analysis" are not expedient. This is due to the project scope, data availability and the availability of analytical tools. Yet the methodology should allow comparison between the three case studies, Greece-Western Macedonia, Poland-Konin region and Germany-Ruhr area. The different transition stages of the three regions should ideally be taken into account in the media analysis: Germany- 60 years of coal transition (hard coal), Greece- 3 years of Just Transition (lignite), Poland- about to enter Just Transition (lignite).

For this reason, the identification of media agendas in relation to the coal phase-out will be the primary object of analysis. The general media accessibility, as described above, is elicited to draw conclusions about the presence of potential social negotiation processes related to the topic.

In order to detect a cluster of media coverage on a certain topic, it is useful to look at the characteristic "frequency". This variable is always related to other variables or constants. Thus, the relative frequency is measured against a certain totality. A spatial and/or temporal dimension can for example, limit this totality. It is relevant for a media analysis which frame of investigation was set. Are only local media examined or also national or even international media? Is the framework limited to print media or does it include internet presences such as news portals or even social media. Is it an isolated period or is the focus on time series. A graphical evaluation of the available data can help to identify peaks from the frequency of occurrence in a more accessible way. Methods to be used here are word clouds including the relative relationship strength of entered variables or the visualization of time series in a graph.

Such a preparation enables a discourse analysis, i.e., the comparative examination of multiple media texts on a defined topic (Biemann et al. 2022). A sociology of knowledge approach to discourse examines the connection between knowledge access and social relations. The combination of this approach with media agenda cutting in the context of coal phase-out regions is opportune. In the run-up to implementation, it is assumed that potential differences can be observed in the comparative view between the case regions. These are to be interpreted against the background of national media landscapes and in view of existing expert knowledge regarding significant events in regional, national and possibly international energy policy.

2.1 Analysis tools

The media analysis is based on three core components: **statistical evaluation** (such as gender and age, number of entries or location), **discursive reflection** (sentiments or tonality) and **retrospective observation** (how does the perception change over time?).

The initial step of the analysis is to identify a supposed problem or issue, which, as described above, is the media presence or agenda of coal phase-out-related reporting in affected regions. Based on a common understanding of the problem, a plan must be drawn up on how to obtain sound information on the problem.

In the case of the WINTER Project, due to a lack of networks, a trial and error method was initially applied. To get a first insight, a simple search on local news platforms was carried out with a few

keywords relating to the topic. However, the search was quickly limited by data licensing, paywalls and different ways of dealing with retrospective news.

In the following attempt, a number of clipping provider and media agencies were requested to carry out the media observation: Meltwater GmbH, Deekeling Arndt Advisor, Argus data Insights Deutschland GmbH, Unicepta and Landau media. Except for Meltwater GmbH, all agencies negotiate the request due to a lack of international databases and / or retrospective data insights. The services of meltwater could only be used by taking out an annual subscription, the amount of which would have far exceeded the project budget. After intensive research into an alternative that was both cost-effective and fulfilled the purpose of this analysis, the Leipzig Corpora Collection (Goldhahn et al. 2012) appeared to be a viable data provider.

2.2 Leipzig Corpora Collection

The Leipzig Corpora Collection (or its branch Deutscher Wortschatz focused on the German language) collects and processes documents available from the Internet (typically in an annual cycle). The results are corpus-based dictionaries for more than 250 languages, in which for every word statistical information, example sentences, and links to related words are provided. The service ranks among the most comprehensive information systems on German language and provides for many languages the largest freely available text resource. (Goldhahn et al. 2012)

The data is based on publicly available sources that have been collected daily by crawling over the last few years (and continue to be crawled) and have been legally prepared for **text mining**. It is a computer-supported method for semantic analysis - i.e., the analysis of the meaning of a word in context - of texts, which supports the automatic or semi-automatic annotation and classification of texts, especially of very large quantities of texts. These can be used to extract new and relevant information from texts (Biemann et al. 2022).

For ease of use, the scope of the corpora defines the boundaries of the media to be considered in the media analysis. The automatically generated corpora are available for scientific purposes, sorted by language, scope and time period, using the same formats and comparable sources. In principle, texts as linguistic works of all kinds are protected by copyright in Germany (cf. Section 2 (1) no. 1 UrhG 2021). The owner of all exploitation rights of a text is its author. Without their consent, the storage and dissemination of text passages containing more than one sentence is generally prohibited. However, it is expressly permitted to quote a sentence with reference to the source, without the consent of the author and other rights holders is required (Section 51 UrhG 2021). (Biemann et al. 2022)

2.2.1 Database

The corpora of the Leipzig Corpora Collection project contain randomly selected sentences from different corpus languages and can be downloaded in sizes from 10,000 to 1,000,000 sentences from the specified website. The downloads contain quality-filtered, randomly selected sets and are available in standard sizes (10K, 30K, 100K, 300K, 1M), whereby 10K contains 10,000 sets and 1M represents one million sets. The web interface usually accesses an even larger database (Table 1). The analysis was applied via the web interface and based on the entire data for the German case. The Polish and Greek analysis is based on the downloadable corpora for reasons, which are discussed in Chapter 2.5 (Development of the search method). In each case, either news texts or the results of general web crawling are utilized as the source. Since this material is subject to copyright law (as discussed above), the texts are always broken down into individual sentences and these are sorted randomly, so that it is not possible to recover the original text. After this processing step, the original documents are deleted and cannot be provided anymore (Biemann et al. 2022). The public Wortschatz Portal initially hosted 10 News corpora for German, Greek, and Polish from 2019 through 2022. To enlarge the database to the maximum of available data, 16 more News corpora for these languages have been collected and processed by the host of the portal (InfAI-Institute for Applied Informatics) from 2013 through 2022 (Table 1). The 16 previously unavailable corpora (i.e. these 16 large collections of sentences drawn from RSS-harvested news texts, comprising 171.5 million sentences in total) were loaded into the Wortschatz Portal and made publicly available, so that they can be queried manually using the web interface by anyone.

Table 1: Number of sentences available in the data corpora of the Leipzig Corpora collection. Corpus size is given in "million sentences".

Corpora	German	Greek	Polish	Total size
2008	1			
2010	1			
2012	30			
2013	32,6	0,6	2,7	35,9
2014	34,5			34,5
2015	32,4			32,4
2016	20,4	0,8	3,3	24,5
2017	22,9	0,9	3,1	26,9
2018	11,3	0,6	1,6	
2019	21,3	1,2	2,3	24,8
2020	35,0	2,2	2,1	39,3
2021	33,3			33,3
2022	31,8	1,9	3,0	36,7
Total size	275,5	10,1	20	305,6

2.2.2 Co-occurrences

Co-occurrences of a word are those words that occur noticeably often together with it. This may be the case as immediate left neighbor, as immediate right neighbor, or in the same sentence. At the Leipzig Corpora Collection the log-likelihood ratio is used as a significance measure and word pairs of little significance are removed to measure the relevance of a co-occurrence (Biemann et al. 2022). We assume that frequent co-occurrence of two words in close textual proximity occurrence is a strong indication for a semantic context. In the web interface, the co-occurrences are visualized by a wordgraph: For the most important co-occurring words of an attribute, it is checked whether significant co-occurring relationships exist between all possible word pairs. If so, an edge is drawn between their nodes in the graph and also between them and the input word. The significance of a co-occurrence is represented by the line width of the corresponding edge.

2.2.3 Statistical data

The results overview of the Leipzig Corpora Collection provides a range of statistical information for each term (Wortschatz Leipzig 2023):

Frequency: Number of occurrences of the word in the corpus. This is an absolute number and therefore linearly dependent on the corpus size.

Rank: Position of the word in the corpus word list sorted by frequency in descending order. In most English corpora, "the" is the most frequent word and has therefore rank one. The second most frequent word (often "and" or "to") has rank two, etc. The rank of a word does not grow with corpus size, but it may differ significantly between corpora (especially for low frequent words).

Frequency class: Words of similar frequency are grouped into classes with the goal that the frequency class of a word does rarely change between different corpora. The frequency of the most frequent word of a corpus is divided by the frequency of the word in question and the logarithm to the basis 2 of the result is rounded up to the next whole number. The most frequent word in a corpus always has frequency class 0; a word in frequency class 1 is around half as often found in the corpus as the most frequent word. In general, a word of frequency class $n+1$ has half the frequency of a word in frequency class n .

2.3 Web scraping database

In the case of the regional datasets, research was carried out as part of the WINTER project, applying the Web Scraping methodology to gather headlines from all articles published on three prominent news websites in Western Macedonia from 2016 to date. In Western Macedonia, which includes four prefectures: Florina, Kozani, Kastoria, and Grevena, the majority of the power plants (4) are located around the greater area of Eordaia in Ptolemaida, Kozani. Western Macedonia has around 20 regional news websites with a corresponding presence on social media.

The selection of the three websites was based on their proximity to the majority of the power plants and their associated lignite mines, so the media of Kastoria, Florina, and Grevena excluded from the survey. The fact that on some portals, there were republished articles influenced the selection process because duplicate headline entries had to be avoided. In addition, another factor leading to the omission of the other sites of Kozani prefecture was that no articles older than 2020 were uploaded on these sites, so the survey could not be extended. Table 2 presents a list of the most popular news sites in Western Macedonia.

Table 2: List of Western Macedonia's news portals.

Kozani/Ptolemaida	1. url: https://kozan.gr/ 2. url: https://e-ptolemeos.gr/ 3. url: http://eordaia.org/ 4. url: https://eordaialive.com/ 5. url: https://www.ptolemaidanews.gr/ 6. url: https://kozani.tv/
Florina:	7. url: https://neaflorina.gr/ 8. url: https://www.florinapress.gr/ 9. url: https://amyntaionews.gr/
Grevena:	10. url: https://greveniotis.gr/ 11. url: https://grevenapress.gr/ 12. url: https://grevenamedia.gr/
Kastoria:	13. url: https://kastoria.news/ 14. url: https://www.svouranews.gr/ 15. url: https://fouit.gr/ 16. url: https://sentra.com.gr/ 17. url: https://kastoria365.gr/

Python 3 programming language was used for the web scraping, and the BeautifulSoup library helped in parsing the headings with a custom algorithm adapted for each portal and implemented within the project. The algorithm iteratively crawled each page of the sites parsing the headlines of each article without exception. It crawled based on the source code of each site and the specific attributes of the HTML programming language and then stored each extracted title in a plain text document. The final text documents contain the titles of all the articles for the given periods, each in every new line of the file. They were then divided into individual text documents and categorized by year of publication.

The news sites selected were e-ptolemeos.gr, kozan.gr and eordaia.org. Table 3 shows the periods of the articles collected and the total number of headlines for each site. The period of articles collected from e-ptolemeos.gr was between 19/09/2016 and 15/08/2023, the period for kozan.gr was between 03/12/2016 and 15/08/2023, while for eordaia.org it was between 30/11/2016 and 01/09/2023. From e-ptolemeos.gr, 99374 titles were collected, from kozan.gr, 84110 titles were collected and 42603 article titles were collected from eordaia.org. The oldest available article uploaded on the public web determined the beginning of the periods for each scraping.

Table 3: The total article headlines, which were gathered through, web scraping.

Site	Headlines	Date	
		Start	Finish
e-ptolemeos.gr	99374	19/09/16	15/08/23
kozan.gr	84110	03/12/16	15/08/23
eordaia.org	42603	30/11/16	01/09/23

2.4 Definition of search attributes

For the handling of the media analysis, search attributes are determined by means of expert knowledge, which should fulfil the following criteria. What attributes does the object of coal transition in the media agenda comprise? How salient are those attributes? How does the frequency of attributes vary over time? For this purpose, suitable upper categories (A to F) were first found that simplify and subdivide a statistical evaluation (left column of Table 4):

- A) **Solidarity/ Identity:** Terms and words that have an identity-forming and solidarising character. Be it identity with the region, the mining industry or the industrial past in general.
- B) **Site Development:** All terms that describe the development of a (former) mining site.
- C) **Regional Development:** All terms that describe the development of a (former) mining region.
- D) **Technical Tasks:** (Technical) terms describing the technical tasks used around the coal phase-out, site decommissioning or implementation of renewable energy sources.
- E) **Landscape Zone:** Terms that are primarily used to describe the landscape area.
- F) **Perception EU:** Words and concepts that classify the perception of the coal phase-out at the European level.

Due to national differences in montane terminology, each case region has the possibility to introduce supplementary terms into the study in addition to general terminology. Competent speakers of the WINTER-project consortium carry out the definition of the search attributes independently for each case study region.

Table 4: Search attributes and categories of the three languages for analysis with the Leipzig Corpora Collection.

	English	German	Polish	Greek
A) Solidarity/ Identity	Industrial culture	„Industriekultur“		
	Thank you miners!	„Danke Kumpel“		
	Now it is over!	„Schicht im Schacht“		
	Cultural Landscape	Kulturlandschaft		
	Cultural heritage	Kulturerbe		
	World Heritage	Welterbe		
	Mining tradition	Bergbautradition		
	Glückauf!	Glückauf!		
	St. Barbara	Hl. Barbara	Barbórka	Αγία Βαρβάρα
	socially acceptable	Sozialverträglich		Κοινωνική αποδοχή
	Mavropigi			Μαυροπηγή
	Akrini			Ακρινή
	Steam Power Plant			Ατμοηλεκτρικός σταθμός
	Megalopoli			Μεγαλόπολη
	Ptolemaida			Πτολεμαΐδα
	Western Macedonia			Δυτική Μακεδονία
	Plant			Εργοστάσιο
	S.P.P.			ΑΗΣ
	J.D.T.P.			ΣΔΑΜ
	Mining industry		Branża górnicza	
Social contract		Umowa społeczna		
Territorial Just Transition Plans		Plan sprawiedliwej transformacji		
B) Site Development	Revitalization	Revitalisierung		
	Recultivation	Rekultivierung		
	Post-mining	Nachbergbau	Pogórnice	
	Mining waste	Bergbauablasten		
	Re-use	Nachnutzung		Επαναχρησιμοποίηση
	Colliery wasteland	Zechenbrache		
	Remediation	Sanierung		

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	waste	-		Απόβλητα
	Regeneration			ανάπλαση
	Post-lignite			Μεταλιγνιτική
	De-lignification			Απολιγνιτοποίηση
	Post-lignite era			Μεταλιγνιτική εποχή
	Soil remediation			Αποκατάσταση εδαφών
	Deposits/dumps			Αποθέσεις
	Reclamation		Rekultywacja	
C) Regional Development	Structural Strengthening Act	Strukturstärkungsgesetz		
	Transition			Μετάβαση
	Coal phase-out law	Kohleausstiegsgesetz		
	Coal-fired power generation	Kohleverstromung		
	Ruhr Regional Association	Regionalverband Ruhr		
	Lignite		Węgiel brunatny	Λιγνίτης
	Hard coal	Steinkohle	Węgiel kamienny	
	Open pit mine	Tagebau	Kopalnia odkrywkowa	
	Transformation	Transformation		
	Structural change	Strukturwandel		
	Coal regions	Kohleregionen		
	Carbon			Άνθρακας
	Mine			ορυχείο
	Coal		Wgiel	Κάρβουνο
D) Technical Tasks	Perpetual obligations	Ewigkeitsaufgaben		
	Land recycling	Flächenrecycling		
	Mine water	Grubenwasser		
	Drainage	Wasserhaltung		Απορροή
	Geomonitoring	Geomonitoring		
	PCB	PCB		
	Sinkhole	Tagesbruch		
	geotechnical			Γεωτεχνική
E) La	Productive landscape	Produktive Landschaft		

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	Slag heap landscape	Haldenlandschaft		
	Landscape park	Landschaftspark		
	Renaturation	Renaturierung		
	Post-mining landscape	Bergbaufolgelandschaft		
	Post-mining area	Bergbauflächen		
	Solar Park			Αποκατάσταση εδαφών
	Regeneration			ανάπλαση
	Territorial Plans			Εδαφικά σχέδια
	Dump		Hałda	
	Spoil tip		Zwałowisko	
	Mining excavation		Wyrobisko	
F) Perception EU	Transition	Transition		
	Just Transition	Gerechter Übergang	Sprawiedliwa Transformacja	Δίκαιη Μετάβαση
	Just Transition Fund		Fundusz Sprawiedliwej Transformacji	
	Green Transition			Πράσινη Μετάβαση
	Energy Transition		Transformacja energetyczna	Ενεργειακή Μετάβαση
	Decarbonization	Dekarbonisierung	Dekarbonizacja	Απανθρακοποίηση
	Green Deal	Green Deal	Zielony Ład	Πράσινη Συμφωνία
	Green Fund			Πράσινο Ταμείο
	European Green Deal			Ευρωπαϊκή Πράσινη Συμφωνία
	Climate change	Klimawandel	Zmiana klimatu	Κλιματική Αλλαγή
	Climate Crisis			Κλιματική Κρίση
	SDG's	Nachhaltigkeitsziele		Στόχοι Βιώσιμης Ανάπτυξης
	Coal phase-out	Kohleausstieg		
	Coal transition	Kohleausstieg	Transformacja wglowa	
	Just Development Transition			Δίκαιη Αναπτυξιακή Μετάβαση
	Just Development Transition Plan			Σχέδιο Δίκαιης Αναπτυξιακής Μετάβασης
	National Climate Act			Εθνικός Κλιματικός Νόμος
European directive			Ευρωπαϊκή οδηγία	
Energy crisis		Kryzys energetyczny	Φωτοβολταϊκό πάρκο	



WINTER: Report on the media analysis

	Global warming		Globalne ocieplenie	
	Greenhouse gases		Gazy cieplarnian	
	Moving away from coal		Odejście od węgla	

2.5 Development of the search method

The Leipzig Corpora Collection works as a corpus-based dictionary. Thus, it is initially not designed to be applied for media observation studies across the different languages. The **database** differs a lot among the languages and among the different annual corpora (Table 1).

The Web Interface works like an encyclopedia. To get to the results overview, it is not possible to use search operators to limit or extend the search. Moreover, the search is limited to (usually) one word, except for frequently used coherent terms (such as Green Deal). Especially in Polish and Greek, many expressions are composed of several words.

The analysis of language and its translation is very complex and subject to linguistic sciences. Assessing the **linguistic differences** between the various languages would go far beyond the aim of the present study. In the following, we will only go into a few aspects that have led to problems or limitations in using the search function of the web interface: Inflection belongs to the most obvious limitations in a one-word search method. Inflection describes the derivation of grammatical full forms from a stem. A simple method of making no distinction between the different word forms of a word when evaluating texts is to reduce the word forms to their base form or stem. In base form reduction, also called lemmatization, a word form is reduced to a form distinguished in the lexicon. By stem form reduction (stemming), different word forms are reduced to the same stem. The task of stem form reduction is different among the different languages. In English, which has only very few inflections (namely s, ed and ing), it can be realized quite easily. In German, on the other hand, the large number of different inflections and frequently occurring allomorphs create problems. Allomorphs are different variations of a morpheme (in the spoken or written language). For example, in German, the verb stem *sprech* (speak) appears in the variants *sprich*, *sprach*, *spräch* and *sproch*. This is just one example of how linguistics influences the search method.

Within the web interface, the set of indexed multiword units is inconsistent and varies especially between different languages and genres. Every query is treated case sensitive. (Biemann et al. 2022)

Evaluable results from the web interface usually only come from searches with one word. Since the analysis with the web interface for the Polish and Greek analysis did not provide satisfying results due to the limited search functions, the downloadable corpora were assessed individually. The datasets were scraped for the years 2013, 2016, 2017, 2018, 2019, 2020, 2021, and 2022. As a result, only a subset of the datasets accessible for free download through the Leipzig online tool was utilized (Table 5).

Table 5: Number of sentences examined in the data corpora of the Leipzig Corpora collection.

Corpus	Germany	Poland	Greece
News 2008	1.000.000		-
News 2010	1.000.000		-
News 2011	29.865.333		
News 2012	30.000.000		-
News 2013	33.159.102	1.000.000	300.000
News 2014	34.529.102		
News 2015	32.441.065		
News 2016	20.389.172	1.000.000	300.000
News 2017	22.880.223	1.000.000	300.000
News 2018	11.324.815	1.000.000	300.000
News 2019	21.276.683	1.000.000	1.000.000
News 2020	35.021.957	1.000.000	1.000.000
News 2021	33.323.616	1.000.000	1.000.000
News 2022	31.774.802	1.000.000	1.000.000

The datasets were processed using the Linux operating system and terminal tools. A bash scripting

program was developed to automate the search process for the main keywords chosen by the members of the consortium (single or multi). The application used basic bash shell commands to search all accessible article titles for the keywords without regard for upper or lower case. It also built an alternative search with root keywords to avoid the case inflection problem. The sentences were extracted in separate plain text document files that aggregate all relevant titles for each keyword/root keyword for each year, allowing to easily analyzing the titles in a second stage. The retrieved results were the frequency of appearance of a keyword/root keyword and of the most frequent word, the rank of a keyword/root keyword and of the most frequent word, and finally the frequency class of a keyword/root keyword and of the most frequent word. The foregoing data assessment enabled searching for multi-keywords / multi-root keywords.

The next step is to examine the data provided in terms of their relevance to the problem, because words are not always used in the **context of the topic**. A negative example of this are religious sources that might use research-relevant technical terms for allegories. Thus, the resulting hits also include sentences that do not match the content of the subject area to be analyzed. The content-related reference must be assessed individually.

Texts do not only contain information about objects and facts, but they can also be understood as an appeal or as an expression of opinions and sensitivities of an author to the readers. The subject of **sentiment analysis** is generally the identification and analysis of sentiment expressions, which express a subjective feeling or an evaluation of objects, events or opinions (sentiment targets). (Biemann et al. 2022)

For the German language, the Leipzig Corpora Collection offers a free and downloadable database of positive and negative words. The SentimentWortschatz gives the positive and negative polarity for contained words, as well as their part of speech and (if applicable) inflectional variants. As this table is only available for the German language it has not been applied in this study. In order to nevertheless gain an impression of the mood with regard to our topics, the results have been randomly examined for their tonality individually by the members of the WINTER-consortium.

Except for 4.2.2, the local/regional analysis of Western Macedonia, all of the discussed results in Chapter 4 to 6 refer to the data of the Leipzig Corpora Collection which is best described in Goldhahn et al. (2012). Sentences quoted from the databases of the Leipzig Corpora Collection in the discussion of keywords are marked with inverted commas. The source is not explicitly listed again here to facilitate readability.

2.6 Consolidation scheme

The consolidation of the respective results per country or language is one of the major hurdles of media analysis. For, as described above, not only does the context differ with regard to the extraction of raw materials (lignite/ hard coal), but the linguistic differences also make a one-to-one comparison difficult to carry out. Accordingly, the partners of the consortium have analyzed special words of their own for the media analysis (Table 4), the comparison of which is omitted in the consolidation. The evaluation method must be plausible with regard to the data basis and the problem. (Lücke-Benz, 2022) Due to the above-mentioned reasons concerning the unbalanced data basis between the different languages, a direct comparison seems difficult at first. However, the Corpora Collection offers a statistical measure that is largely independent of the respective size of the corpus and focuses more on the frequency of the word within all words: The **frequency class**. In the consolidation scheme, the mean frequency class for all defined words and terms of one category are added up per year and language and presented in tabular form (Table 6). The mean is calculated by adding the frequency classes of all words from each year and dividing the sum by the number of values.

The same approach was used to evaluate the **tonality** of the different categories. After adding up all the positive, negative and neutral entries, these were divided by the total number to identify the average attitudes in each category. The results are visualized in bar and curve diagrams in Chapter 6.

Table 6: Consolidation scheme applied in the study.

Frequency Category	2016	2017	2018	...	2022	n	Mean per language	Summed Mean
A_GER	X_1	X_2	X_3	...	X_{n-1}	X_n	$\sum_{i=1}^n \frac{X_i}{n} (A_GER)$	$\sum g(A)$ $= X_i + Y_i + Z_i$
A_GR	Y_1	Y_2	Y_3	...	Y_{n-1}	Y_n	$\sum_{i=1}^n \frac{Y_i}{n} (A_GR)$	
A_PL	Z_1	Z_2	Z_3	...	Z_{n-1}	Z_n	$\sum_{i=1}^n \frac{Z_i}{n} (A_PL)$	
B_GER	X_1	X_2	X_3	...	X_{n-1}	X_n	$\sum_{i=1}^n \frac{X_i}{n} (B_GER)$	$\sum g(B)$ $= X_i + Y_i + Z_i$
B_GR	Y_1	Y_2	Y_3	...	Y_{n-1}	Y_n	$\sum_{i=1}^n \frac{Y_i}{n} (B_GR)$	
B_PL	Z_1	Z_2	Z_3	...	Z_{n-1}	Z_n	$\sum_{i=1}^n \frac{Z_i}{n} (B_PL)$	
...

3 Literature review

The literature review identifies media analyses, which deal with the topic of coal transition in Europe. The available studies are presented for each case region and the results are briefly summarized. In a further chapter, media analyses conducted in other regions of Europe are also presented.

3.1 Greece

As far as the authors are concerned, there is no literature on how the Greek media cover the issue of delignification and the transition to cleaner energy sources. Thus, there are no tangible results on how mass media coverage affected the public perception for energy transition in Greece. This is the first attempt to understand public perception through media analysis. Nevertheless, according to a questionnaire research study (Karasmanaki et al, 2020) that was conducted in 2020 with the aim to explore the attitudes of residents towards new lignite units in the region, a substantial part of residents was positive to new lignite projects and occupation was the variable with the greatest influence on this desire with individuals not having a permanent job expressing greater support. The main conclusion that was drawn was that employment prospects in the mining industry are a decisive factor in shaping positive attitudes towards the resources sector. Most importantly, participants with a negative attitude were those who felt that life quality in the region deteriorated in the past years due to environmental issues.

3.2 Germany

In their study “Who cares about coal?” Müller-Hansen et al. (2021) analyzed parliamentary debates on coal in the German Bundestag between 1949 and 2019 by applying dynamic topic modeling, a machine learning technique that reveals the thematic structure of large documents over time. They identify four major thematic areas related to coal: economic policy, energy policy, environmental policy as well as international and regional policy. They note that economic issues have dominated the debate for most of the time, but have become less important in recent years. Environmental and energy issues, especially climate protection and the energy transition, have been more strongly associated with coal. This suggests that the view of coal has changed from being an engine of national prosperity to a problem for climate protection.

In addition to the three classic goals of energy policy (limiting cost, securing access and reducing the environmental burden) Schmidt et al. (2019) identify a fourth policy goal: strengthening the national energy technology industry. The initially strongly polarised discourses on the future of energy supply in Germany have converged over time. The solution of environmental problems, the modernisation of the industrial system, the creation of jobs and an improved position on the world markets for renewable technologies became the central argumentation pattern of the energy turnaround (Leipprand and Flachslund 2018).

Walter and Hanke (2020) performed a social network analysis of tweets related to “renewable energies” on twitter. After their analysis, the most frequent co-occurring word is “Energiewende” (energy transition), which references the change from non-renewable energies to renewable sources. Regarding the type of renewables “wind” (and wind power) seems to dominate the overall discussion in relation to solar energy (Figure 3-1, left). Furthermore, the authors identified opinion leaders in the field of renewable energies with the LeaderRank algorithms. The results are visualized in the right part of Figure 3-1. The individuals @vquaschning (Volker Quaschning, a professor for renewable energy systems at the university of applied sciences for technology and economics in Berlin) and @luisamneubauer (Luisa Neubauer, a member of the Fridays for Future movement) both posted relevant tweets that received positive feedback and they both play a fundamental role in the network which is evaluated by LeaderRank.

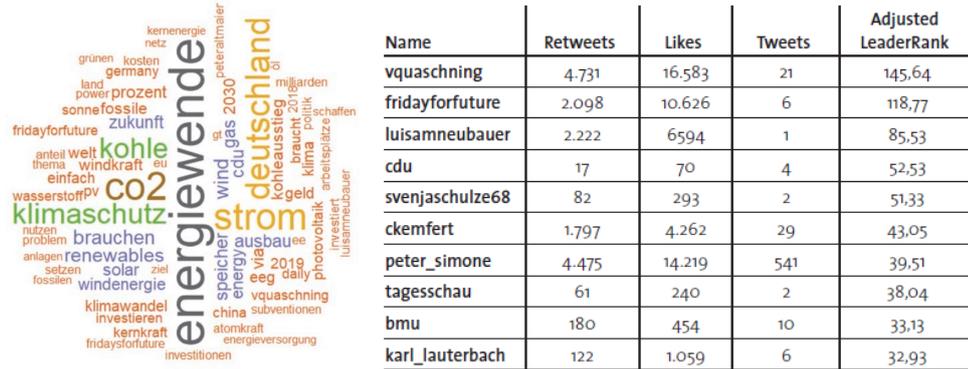


Figure 3-1: Findings of the social network analysis from Walter and Hanke (2020). Left: Wordcloud of German tweets linked to renewable energies. Right: Opinion leaders identified with the Adjusted LeaderRank.

Wolkersdorfer et al. (2022) investigated the people’s prevailing opinion and emotions regarding mine water, mine water treatment, mine flooding as well as the level of acceptance of the remediation measures and the mining company in abandoned West German hard coal mining regions. The study is based on a representative telephone and online survey with around 1,500 participants for the respective regions. Participants indicated that they wanted more information about mine flooding. Of the actors dealing with mine water, the mining company is thought to be best situated to solve potential problems, whilst politicians were least expected to solve them. The authors further deny any substantial differences between the local and the German personal interests. Someone interested in local issues relating to the environment, renewable energy and mining, shows a similar interest on the national scale. On the other hand, the personal interest in renewable energies and environmental issues is throughout higher than in mining or mine water. The authors conclude that differences between the populations’ attitudes are mainly due to the emotions in the three German mining regions (Ruhr area, Saar region and Ibbenbüren), the mining history and experience they have with the mining company. People who were positively involved with the mining company tend to see the proposed mine flooding scenario more positive than others. More easily understandable information in local and social media and on company and authority web pages should be used to increase the trust of the population in mining companies tackling the opportunities and risks associated with mine flooding (Wolkersdorfer et al. 2022).

3.3 Poland

Poland's energy transition is a topic of both national and international significance. As the world struggle with the urgent need to reduce carbon emissions and shift away from fossil fuels, Poland's unique context provides valuable insights into the challenges, opportunities, and complexities involved in such a transition. The country's historical reliance on coal, coupled with the cultural and economic factors associated with this industry, has made its transition a subject of intense public and political debate.

In the present day, the topic of energy transformation and the process of transitioning away from coal in Poland has garnered significant attention from researchers. This subject has evolved into a focal point for numerous studies that delve into the multifaceted aspects of this critical transformation. The area of research exploring the energy landscape of Poland extends across a wide spectrum, encompassing diverse socio-economic dimensions. Researchers, policymakers, and experts are engaged in an array of inquiries, aiming to understand, analyze, and provide solutions for the complex challenges and opportunities inherent in this profound transition. The transition away from coal in Poland is not merely a matter of environmental concern; it involves a comprehensive socio-economic transformation that affects various aspects of society and the economy. Researchers are investigating the socio-economic implications of this transition from multiple angles, seeking to unravel its complex dynamics.

One significant area of focus is the economic dimension, where studies examine the economic consequences of reducing coal dependency and transitioning to alternative energy sources. These investigations assess the impact on industries, employment, and economic growth, aiming to provide a holistic view of the financial implications (Sokołowski et al., 2022; Kaczmarek, 2022).

Simultaneously, the societal dimension is also being closely examined, with researchers investigating how the transition affects citizens, especially those residing in coal-dependent regions. Questions related to job displacement, social cohesion, and community well-being are central to this discourse (Śniegocki et al., 2022, Dobniak et al., 2022). Moreover, the energy transformation in Poland has significant political and policy-related implications (Brauers, Oei, 2020; Kuchler M., Bridge G., 2018). Experts are closely examining the role of politics and policymaking in shaping the direction and pace of this transition. They assess the effectiveness of government policies, regulatory frameworks, and international agreements in facilitating the shift towards sustainable energy sources.

The media, as a powerful actor in shaping public perceptions, also holds a prominent place in this landscape. Researchers are keen on understanding how the media portrays and influences discussions related to energy transformation in Poland. They analyze how various media outlets frame the discourse, the narratives that emerge, and the impact on public awareness and opinion. In an era marked by global efforts to combat climate change and transition towards sustainable energy sources, the role of media in shaping public opinion and policy discourse cannot be understated. Poland, with its significant history of coal dependence and ongoing energy transformation, presents a fascinating case study in this regard.

In the overall picture of media analysis in the context of energy transformation in Poland, some common conclusions can be observed. The coal industry is perceived as an integral part of Poland's energy system, economy, and society. In Poland, the media often portray coal through the "Coal continuity" narrative, suggesting its inevitability and indispensability for the country's energy system and economy. They frequently emphasize the perspectives of entities maintaining the status quo while offering limited exploration of alternative energy sources or transition options. It is important to note that energy transformation takes place mainly at the state level and, in most cases, primarily applies to the Silesian Voivodeship, although there are also other regions in Poland where coal is mined.

Media research plays a crucial role in identifying distinct stakeholder groups involved in the discourse surrounding Poland's energy transformation, shedding light on their diverse approaches to this multifaceted issue. In a study conducted by Krzywda et al. (2021), five key stakeholder groups were identified: mining municipalities, government, other politicians and commentators, environmental organizations, and miners' union representatives. These groups engaged in an extensive 7-month debate on social contract encompassing various topics, including the social contract, coal phase-out, the future of miners in the Silesian Voivodeship, the role of the EU, and the state of mining in Poland. The media analysis conducted within this study revealed a notable trend of regional authorities being marginalized in the discourse about the transformation, with the primary focus of discussions centering on interactions between the government and the mining community. In this discourse, the government placed particular emphasis on the issue of employment while portraying the EU as an enforcer of regulations, imposing stringent conditions. Curiously, this group infrequently considered alternative energy sources in the context of energy security.

Conversely, the discourse among commentators and other politicians (outside of the government) exhibited considerable diversity. Some regarded the EU as a custodian of the law with ambitious climate goals, advocating for Poland's alignment with these objectives. Arguments were made in favor of mine closures due to the high energy costs linked to emission fees. This group also expressed criticism of the social contract, perceiving it as inconsistent with the EU's overarching plan. Among commentators and other politicians, a spectrum of concerns emerged, encompassing topics such as energy poverty, unemployment, the potential adoption of gas as an alternative to coal, and the receipt of EU funds.

Environmental organizations stood out as the sole group explicitly highlighting the climate crisis as a compelling reason to accelerate coal phase-out. They advocated for an earlier exit from coal as well. Trade unions, on the other hand, often evoked the challenging history of coal mining, and their discourse on climate change issues tended to be negative, as well as regarding the future of Silesia. In recent years, trade unions have been staunch advocates for miners' concerns, and their voices have consistently been the most prominent in public debates.

The diverse range of perspectives from these social actors, coupled with the formidable influence of the coal regime's discourse, presents a multifaceted challenge to Poland's ongoing efforts in transitioning to cleaner energy sources. This intricate web of viewpoints and the entrenched narratives surrounding coal not only complicates the decision-making process but also underscores the need

for a nuanced and comprehensive approach to address the socio-economic, environmental, and political dimensions of this transition. Consequently, achieving a swift and smooth shift towards sustainable energy alternatives demands a careful balancing act, taking into account the varied concerns and interests of all stakeholders involved.

In addition, international perspectives play a vital role in shaping the discourse on Poland's energy transformation. Comparative studies that examine how Poland's transition aligns with global trends and international commitments are another area of exploration. Osička et al. (2020) studies highlight that media coverage in Poland, Germany, and the Czech Republic centers around key issues such as climate protection, energy transition, the local environmental impact of coal mining, and the economic significance of the national coal industry, including its role as a major employer. While German media places a primary emphasis on climate and transition, Polish media delve deeply into the economic challenges faced by the coal industry and their potential repercussions on the nation's economy, social fabric, and energy security. In contrast, Czech media prioritize discussions on regional employment and the local environmental consequences stemming from coal mining. These studies also highlight distinctions in how alternative energy sources are viewed. In Germany, renewable energy is broadly acknowledged by the elites as a feasible replacement for traditional energy sources, while the Czech Republic demonstrates a strong preference for nuclear energy. Conversely, in the Polish context, neither of these alternatives seems practical, posing challenges for policymakers to adopt an alternative approach to coal. These distinct emphases underscore the nuanced nature of energy transition discourse in the region. Furthermore, despite similarities in the structural conditions of the coal industry across these countries, differences in media coverage are shaped by various factors, including media agenda formulation processes and variances in energy governance. The authors note that the media primarily serve as platforms for conveying the perspectives of decision-makers and energy policy stakeholders, with the main disparity arising from the approaches of the major political forces within each country regarding the coal issue.

Socio-political analysis plays a pivotal role in understanding crucial moments within Poland's coal mining industry. This role is exemplified by the examination of significant events, such as the social contract debate in the Silesian Voivodeship (Krzywda et al., 2021) and the mining industry crisis triggered by the COVID-19 pandemic (Żuk et al., 2021). Additionally, media analyses have been conducted in the context of Poland's efforts to establish its first nuclear power plant. These developments have been further influenced by the energy crisis, amplified by the conflict in Ukraine and soaring energy and fuel prices. Consequently, nuclear energy has resurfaced as a reliable energy source, aligning with Poland's imperative to shift away from coal. Recent research findings (Żuk, 2023) underscore the media's substantial role in promoting nuclear energy and shaping public discourse on this subject. Notably, the majority of media reports, regardless of their political leanings, tend to lack critical perspectives on nuclear energy, with critical voices primarily appearing in historical reports related to the Chernobyl disaster.

As we conclude this section on media analysis literature, it becomes evident that understanding the role of media in shaping perceptions and influencing energy discourse is paramount in the context of Poland's ongoing energy transformation. The diverse insights gained from previous studies pave the way for a deeper exploration of media's impact on the nation's energy landscape. In the following Chapter 6, we will delve into the findings of the media analysis conducted as a part of the WINTER project, providing a comprehensive understanding of how media narratives are contributing to the complex tapestry of Poland's energy transition story.

3.4 Entire Europe and other European regions

Osička et al. (2020) explore the coverage of the future of coal in major newspapers and political magazines in Germany, Poland and Czech Republic. They conclude from their analysis that the media tend to follow the prevailing energy policy paradigm of the countries: In Germany, the media facilitate the phase-out, in Poland it acts as an inhibitor, while in the Czech Republic the political uncertainty surrounding lignite mining in the north-west of the country is dominating the way of reporting.

Lopez and Blanchette (2020) analyzed the public perceptions of a New Pit Lake in As Pontes, Spain. The interviews revealed that although a high level of acceptance can be identified, this was influenced by previous experiences with the mining company. Company employees and local politicians were more likely to be positive about the benefits of the lake, while people who were not directly



involved (long-term residents, remote villagers, schoolteachers) were more likely to have a negative attitude towards it. Technical success is thus not the only factor influencing community acceptance of pit lakes and company decommissioning plans. Unresolved social issues can also influence the way certain people perceive the new landscape, regardless of the ecological and aesthetic impacts. Unruh (2000) argues that industrial economies are trapped in fossil fuel-based technological systems. This condition, called "carbon lock-in," arises from a combination of systematic forces that maintain existing infrastructures despite their known environmental externalities and the apparent existence of cost-neutral or even more cost-effective remedies. The term "carbon lock-in" refers to the self-perpetuating inertia that emanates from large fossil fuel-based energy systems. It hinders public and private efforts to adopt alternative energy technologies.

Buschmann and Oels (2019) emphasize the role of discourse in this context and note that discourses are both part of lock-in mechanisms and important factors in explaining change. They conclude that discursive lock-in and discursive inflection points are useful analytical tools that help explain how the transition to renewable energy is evolving. Future research should explore the interaction between discursive lock-ins and other types of lock-ins.

Obschonka et al. (2018) examined the relationships between the historical share of employment in the major coal-based industries and contemporary regional differences in personality and well-being in England and Wales. They find that the historical local dominance of large coal-based industries predicts today's markers of psychological adversity (lower scores for conscientiousness, higher scores for neuroticism, lower activity, and lower life satisfaction and life expectancy) showing how today's regional patterns of personality and well-being (which shape the future trajectories of these regions) may have their roots in major societal changes underway decades or centuries earlier.

4 Greece

4.1 Evaluation of media landscape

At a local and regional level, many media sources in Western Macedonia play an important role in covering local news and events. Local newspapers, radio stations, and regional television networks are common examples of these venues. These media frequently cover a wide range of issues, such as local politics, economic developments, cultural events, and community news. Regional television channels in Western Macedonia offer news coverage, talk shows, and programs that reflect the interests and concerns of the local population. They may also cover regional sports events and cultural activities. With the rise of digital media, many local news online platforms have been created to reach a broader audience. These websites provide up-to-date news and may include multimedia content. Local media outlets in Western Macedonia, like many regional media organizations, may face financial challenges due to limited advertising revenue and competition from national media in a way that maintaining high-quality journalism can be a struggle for some.

At a national level, Greece has a broad and competitive media landscape, with television, radio, newspapers, and online news providers. There are numerous prominent national newspapers with a large circulation, including Kathimerini, Eleftheros Typos, Ta Nea, Realnews and To Vima. These publications cover a wide range of topics, including national and international news, politics, economics, and culture. Greece has a variety of magazines covering topics such as news, lifestyle, politics and special interest. News broadcasts, talk shows, and entertainment content are provided by national television networks such as ERT (Hellenic Broadcasting Corporation) and commercial channels. National radio stations broadcast a variety of news, music, and talk shows. There are also several private television channels. Some of the major private TV networks include ANT1, Mega Channel, Alpha TV, Open TV, STAR channel and Skai TV. These channels offer a wide range of programming, including news, entertainment, and sports.

There is also a variety of radio stations either private or public covering music news and talk shows. Digital news platforms and online news portals are becoming increasingly popular, as they provide instant access to news and commentary. Many national news organizations have a large web presence. The Greek media landscape is confronted with issues of media ownership, political impact, and financial sustainability. These difficulties can occasionally have an impact on the quality and independence of journalism.

Overall, the media environment in Western Macedonia, Greece, reflects broader regional and national media developments. Local and regional media channels play a vital role in informing locals about local events and issues. They may, however, suffer resource and sustainability concerns. At the national level, Greece has a thriving media environment with a varied range of outlets covering national and international news. However, concerns have been expressed about media ownership and independence, and these issues may have an impact on the media's ability to offer balanced and unbiased reporting.

4.2 Discussion of main search attributes

4.2.1 National level

A Solidarity/ Identity

The words “**plant**” and “**Western Macedonia**” (Figure 4-1) share the first positions in content related words amongst the words of Category A **Solidarity/ Identity**. It is worth noting that more occurrences of word “plant” were in 2019. Similar to “plant,” the term “Western Macedonia” had more occurrences in 2021, implying that it was frequently mentioned in that year within the context of Category A Solidarity/Identity.

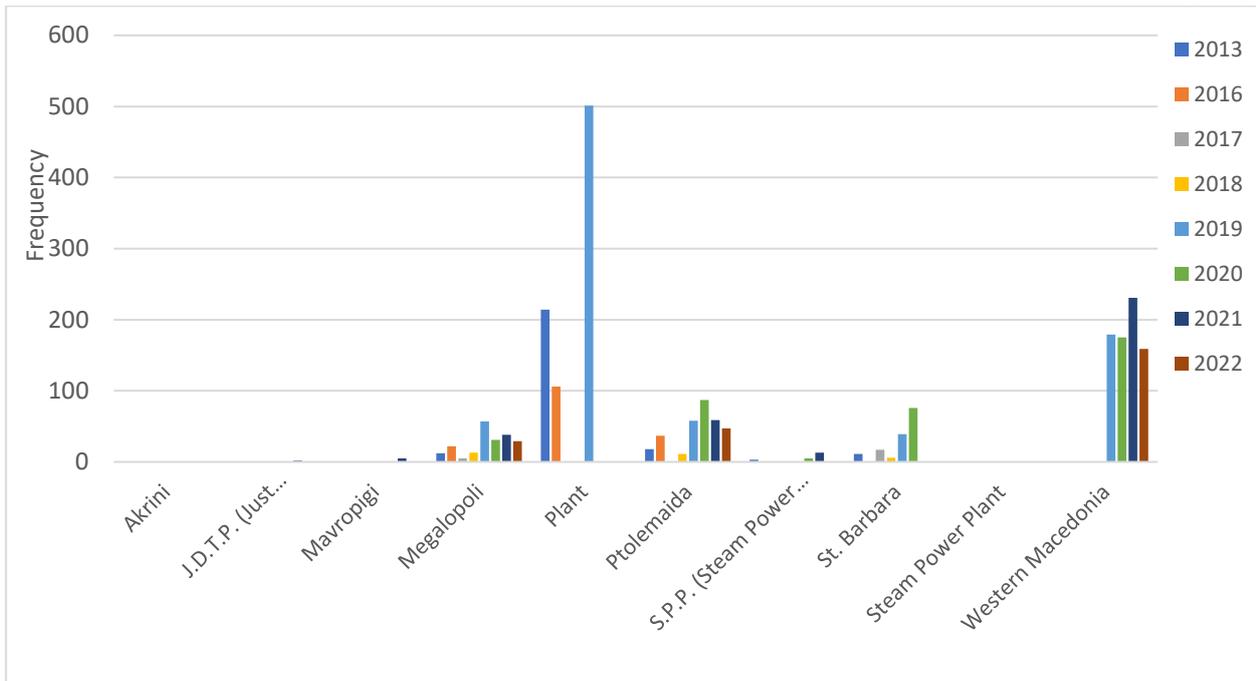


Figure 4-1: Solidarity/identity content related words vs number of entries and year.

“Plant” (Εργοστάσιο) is a term that is used for any kind of production process, like nuclear, chemical or steam. The most frequent co-occurring word in 2013 was “nuclear” linked with the tsunami of Fukushima. In 2019, the word production appears as the most frequent co-occurrence. Fire is the second word in co-occurrences. It is used within the context of accidents that may happen in plants. “Volkswagen” and “G.C.C.” follow in appearances. In 2019 (Figure 4-2) there were news related to the topic of transition giving a positive tonality of reporting such as “PPC’s large steam power plant in Ptolemaida starts operating.”

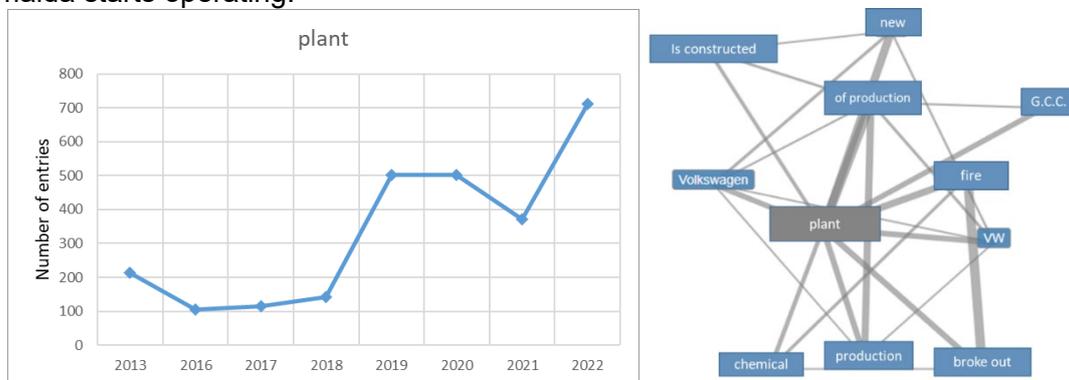


Figure 4-2: (left) Number of occurrences of the word “εργοστάσιο” (plant) with time. (right) Word graph for the term “plant” used in the Greek media in 2019.

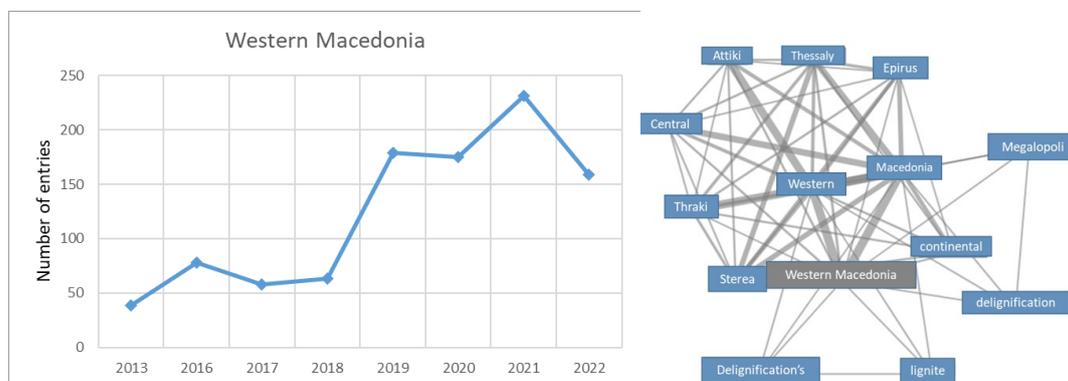


Figure 4-3: (left) Number of occurrences of the word “Δυτική Μακεδονία” (Western Macedonia) with time. (right) Word graph for the term “Western Macedonia” used in the Greek media in 2021.

“**Western Macedonia**” (Δυτική Μακεδονία) is a word strongly related with the content of coal transition since is the region where transition occurs. 2021 was the year with the largest number of entries as it is depicted in Figure 4-3. In 2021, most frequent co-occurring words related with the administrative regions of Greece and the words lignite and delignification within the content of transition. (Figure 4-3). Figure 4-1 shows that 2019-2022 seems to be the content related period. Results that are content related appeared positive such as “The absolute priority of the government is to make the transition to the post-lignite era in a fair way for Western Macedonia and Megalopolis, claiming all the necessary resources from Brussels” (2019) or “At the recent meeting of the Council of Ministers we discussed the Just Transition Plan in Western Macedonia” (2020). In 2021, there are sentences that question the delignification in Western Macedonia affecting the common feeling. “Delignification is a critical issue that concerns thousands residents in two large regions, Western Macedonia and Megalopolis, and is linked to their economic and social stability”. Feeling changes in 2022 where there are sentences with optimistic sentiment. “It is worth noting that the mega photovoltaic project of ELPE in Western Macedonia was completed within the schedule and despite the difficulties caused by the pandemic”

B Site Development

The words “**waste**” and “**De-lignification**” (Figure 4-4) share the first positions in content related words amongst the words of Category B *site development* with more occurrences in 2020 and 2021 respectively.

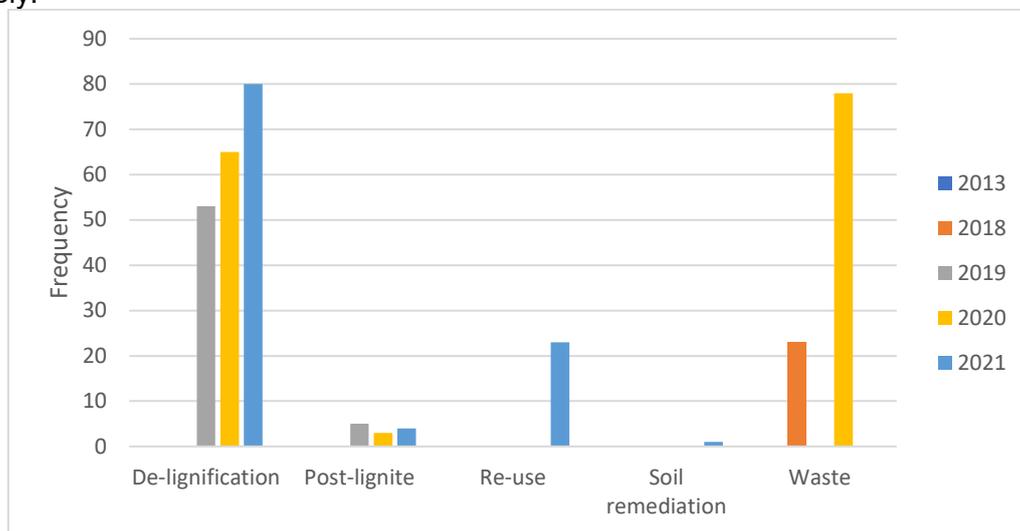


Figure 4-4: site development content related words vs number of entries and year.

Waste (Απόβλητα) as a term may refer to a variety of industries and activities, such as nuclear waste, urban waste, electronic waste, and mining waste, the most relevant to coal mining industry. The present analysis did not yield results on coal mining waste or coal transition in particular, however there are a few references to industrial/mineral waste in 2018 and 2020 (Figure 4-5), with a neutral to positive tonality.



Figure 4-5: Number of occurrences of the word “Waste” during 2013-2022.

De-lignification (Απολιγνιτοποίηση) is a term specifically referring to the phasing-out of lignite mining and power production in Greece. The term first appears in 2018 (Figure 4-6), when the Greek Government officially announced the transition from lignite and the gradual closing of the mines and the power stations in Greece. The highest number of entries appears around 2021, after the Government issued the Master Plan for the transition process, the Just Transition Development Plan, at the end of 2020. Tonality is largely positive: “The organizations support the decisions on de-lignification through the expansion of renewable energy sources.” “Greece now takes a leading role in both the de-lignification and the green economy.” The leading role of Greece in the De-lignification process and consequently, coal transition, is widely mentioned, as well as the necessary changes for its successful implementation. De-lignification co-occurs with terms such as “energy”, “Renewable Energy Sources” and “environment” (Figure 4-6).

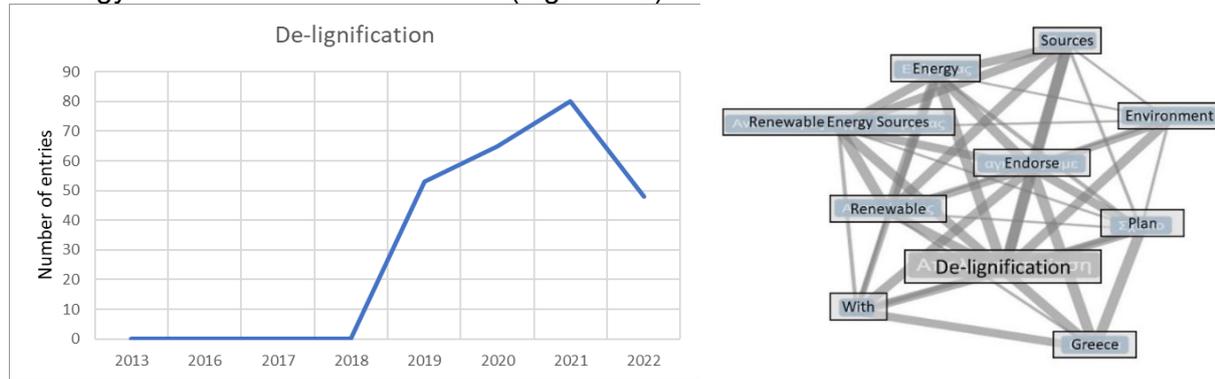


Figure 4-6: (left) Number of occurrences of the word “De-lignification” during 2013-2022. (right) Word graph for the term “De-lignification” used in the Greek media in 2021.

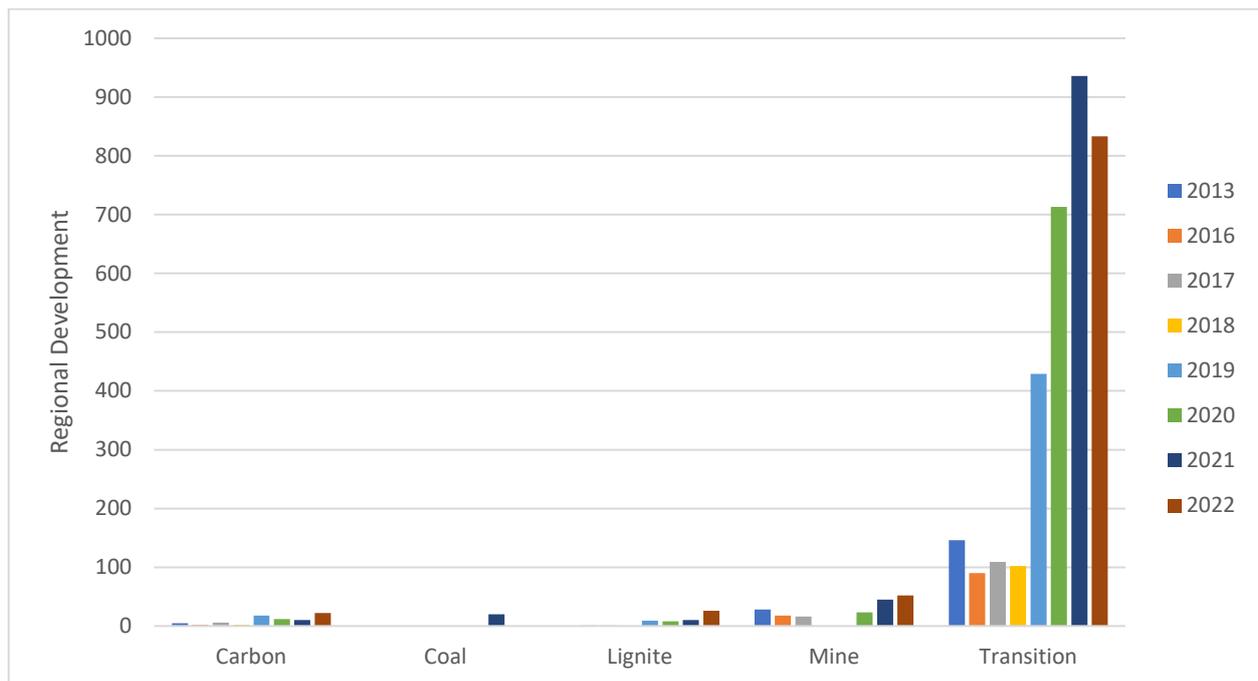


Figure 4-7: Regional Development content related words vs number of entries and year.

C Regional Development

In Category C (Regional Development), there are the following keywords: a) Transition, b) Lignite, c) Coal, d) Carbon and e) Mine. All of them are representatives of the transition phase in Western Macedonia but to showcase the results of the search conducted, Lignite and Mine were chosen. The reason for this choice is that Lignite, Coal, and Carbon are similar words in meaning in the Greek language, and the word Transition has a broader meaning.

“**Lignite**” (Λιγνίτης) shows an increasing trend starting from 2018 through 2022 (Figure 4-8) as it was the fuel for the Greek power plants. This word appears to be mainly connected with the words “P.P.C”, “unsustainable”, “gas”, “polluting” and “expensive” (Figure 4-8). Before 2018, there were a

few appearances of the word in news article titles and mainly it was referred to as the backbone of Greece's energy production. After 2018 lignite is being compared to natural gas checking its viability with example headlines such as "Lignite is our natural resource and replacing it with imported natural gas is neither a cleaner solution nor cheaper, and it also keeps the country dependent on importers.", "Lignite as a fuel is dead, either in 2023 or 2035." and "Lignite is no longer economically viable due to rising pollutant prices." The results appear to be negative regarding the sentiment for this word and they are content-related to the subject.

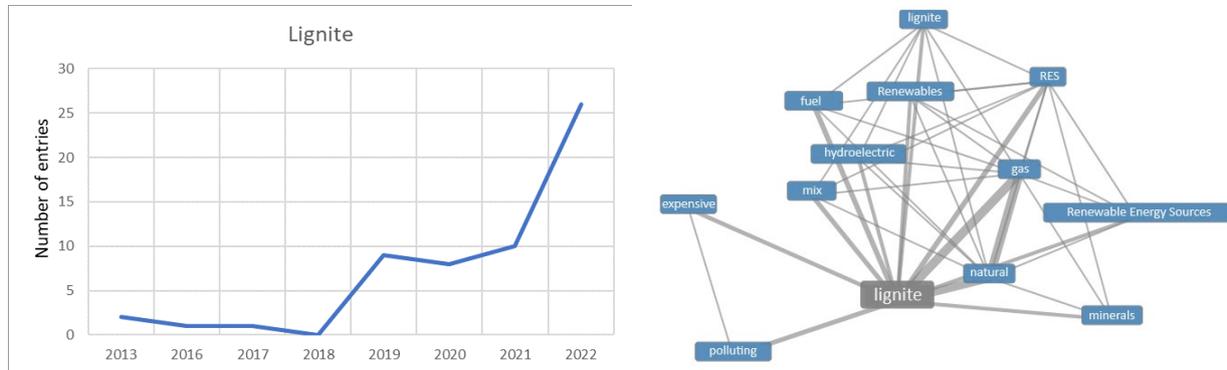


Figure 4-8: (left) Number of occurrences of the word "Λιγνίτης" (Lignite). (right) Word graph with nearest word co-occurrences of the word "Λιγνίτης" (Lignite).

The word "mine" (Ορυχείο) shows the same increasing trend starting from 2018 through 2022 with a low in 2020 possibly due to Covid monopolizing the news articles (Figure 4-9). This word appears to be mainly connected with the words "P.P.C" (Public Power Company), "Amyntaio" (a village in W. Macedonia with a coal mine), "workers", "energy" and "RES" (Figure 4-9). Before 2018, there were a few appearances of the word in news article titles and it was referred to mainly due to accidents. After 2018 lignite appeared in the headlines due to a huge landslide that occurred at the Amyntaio coal mine with the following example article titled "Great damage has been caused by the detachment of huge masses of soil that occurred at 11:00 Saturday morning at the Amynteo mine." and "These problems, just as we pointed out, have unfortunately already appeared at the Amynteo Mine, which is the first mine to stop operating." but also, due to seize of operation and transition. The results appear to be negative regarding the sentiment for this word and they are content-related to the subject of decarbonization.

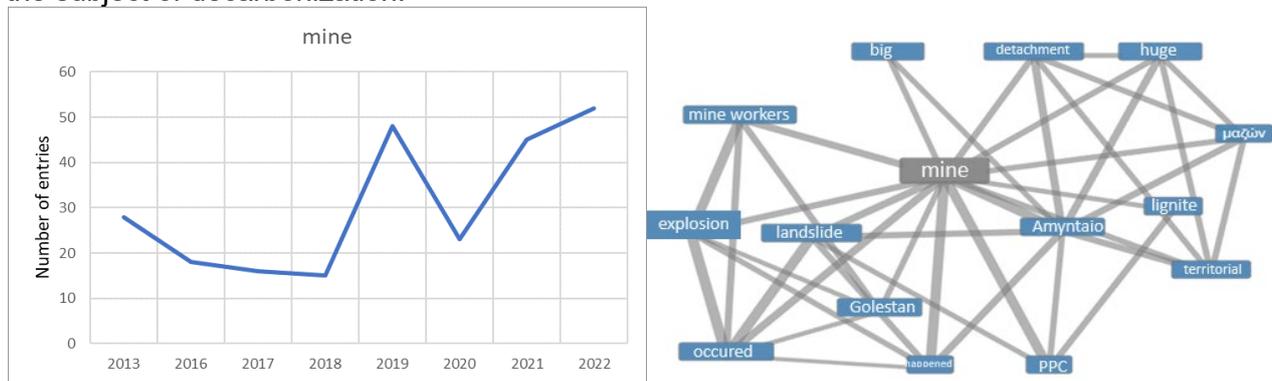


Figure 4-9: (left) Number of occurrences of the word "Ορυχείο" (Mine). Word graph with nearest word co-occurrences of the word "Ορυχείο" (Mine).

The term "Transition" (Μετάβαση) has been employed in various contexts. In the year 2018, the discourse around "Transition" notably shifted towards discussions related to energy and sustainable transitions, particularly focusing on the transformation of regions. Subsequently, in 2022, "green" emerged as the predominant co-occurring term followed by the terms "energy" and "digital" providing a clear social acceptance of "Just Transition" in national Greek media. (Figure 4-10)

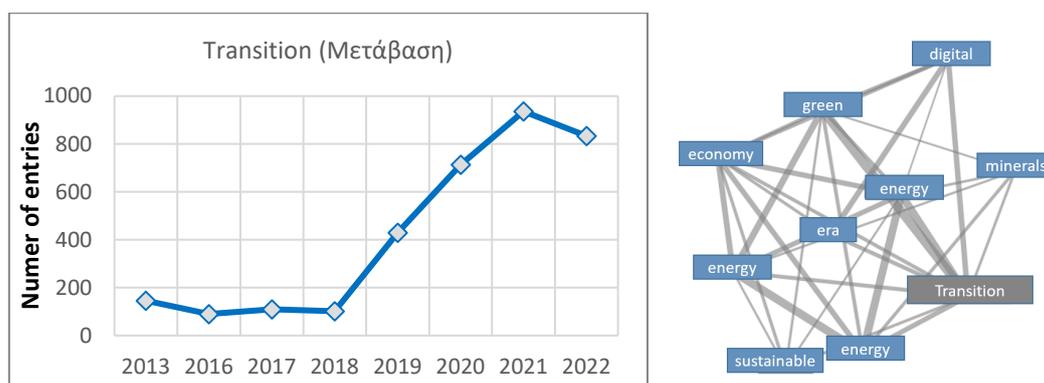


Figure 4-10: (left) Number of occurrences of the word "Transition" (Μετάβαση). (right) Word graph with nearest word co-occurrences of the word "Transition" (Μετάβαση) in 2022.

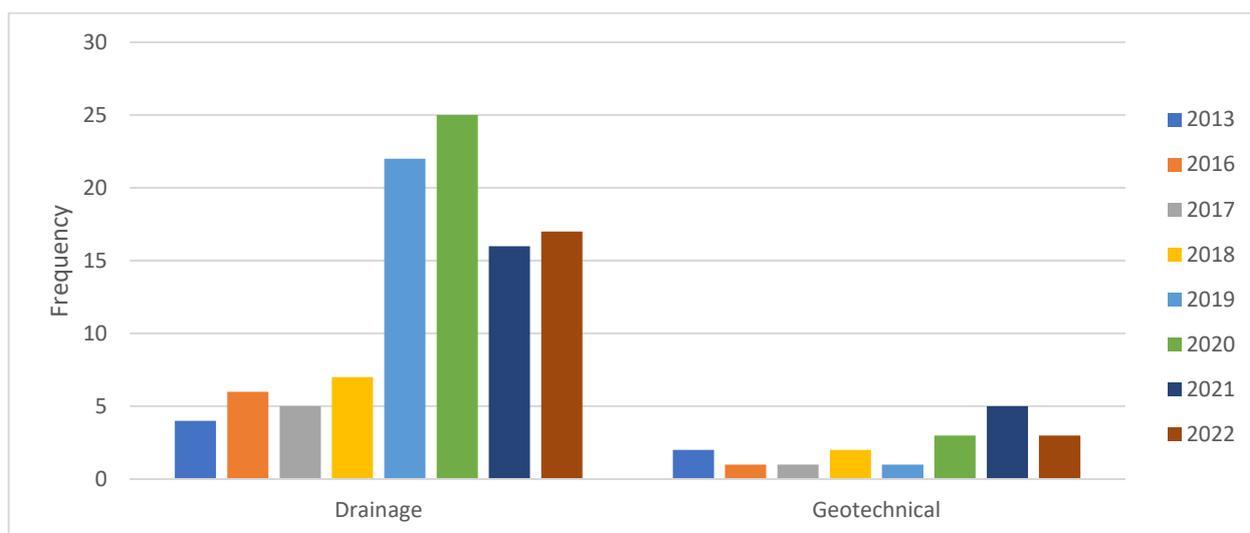


Figure 4-11: Technical Tasks related words vs. number of entries and year.

D Technical Tasks

The words **“drainage”** and **“geotechnical”** (Figure 4-11) represent the Category D **technical tasks** with more occurrences in 2020 and 2021 respectively.

“Drainage” (Απορροή) shows an increasing trend but is not actually related to the coal transition. Specifically, the word seems to start appearing more frequently since 2019, with its peak in 2020 (Figure 4-12). This word appears to be mainly connected with topics related to words “water” and “rainwater”. Therefore, the only indirect reference seems to be in 2016, which is related to the drainage management of sewage and industrial waste, but without a clear connection to the word "industrial" in the coal industry. The results appear to be positive but are not characterized as content-related.

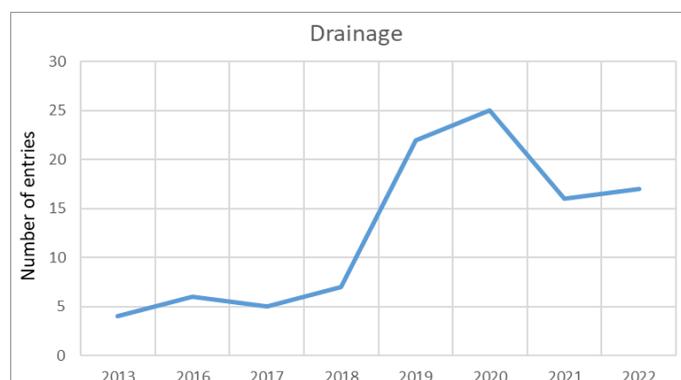


Figure 4-12: Number of occurrences of the word “Απορροή” (Drainage).

Geotechnical (Γεωτεχνική) is a word that is not related with coal transition and has low trend rates

in Greece. Specifically, the word has increased entries in 2021 (Figure 4-13), with the nearest connected words are being "study" (μελέτη) and „static" (στατική) in 2019 and 2021, respectively. The sentences appear to be positive but are not related with the transition.

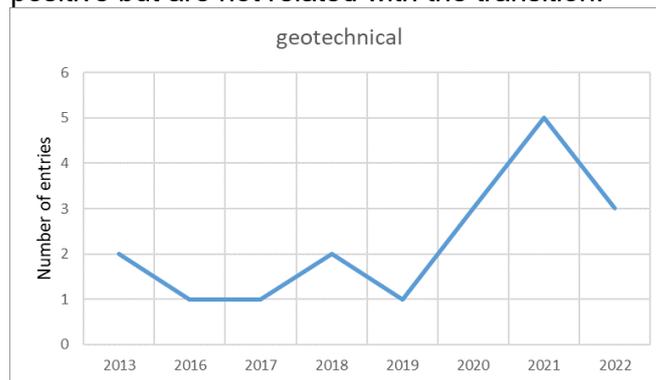


Figure 4-13: Number of occurrences of the word "Γεωτεχνική" (Geotechnical).

E Landscape Zone

In accordance with Category E (Landscape Zone) (Figure 4-14), the term "solar park" appears in media results. It is worth mentioning that this phrase is related to the topic of coal transition in the context of energy and environmental policy, especially in territories and communities that historically relied on energy production from coal. The word first appeared in 2013 (Figure 4-15) with four entries in one million sentences. In 2018, the term started to experience a continuous rise within the context of energy transition, with a positive perception. This behavior can be attributed to the announcement of large-scale solar park developments in Western Macedonia and the potential opportunity of the creation of job opportunities. After 2020, the term shows a small but steady rise, possibly due to the media reporting regarding the new Photovoltaic Park with a capacity of 35.985 MWp within the boundaries of the Municipality of Kozani.

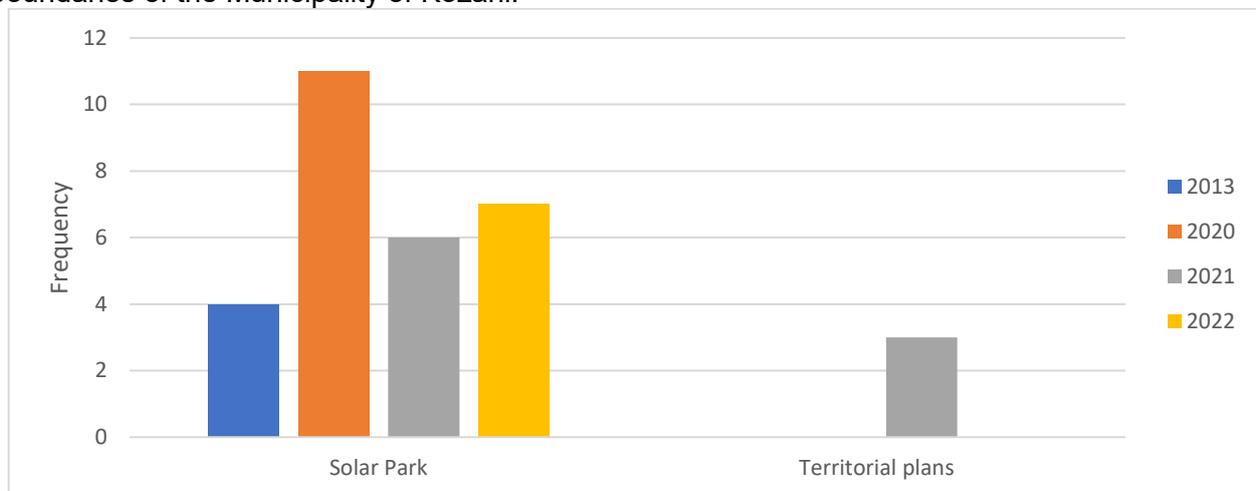


Figure 4-14: Landscape zone content related words vs number of entries and year.

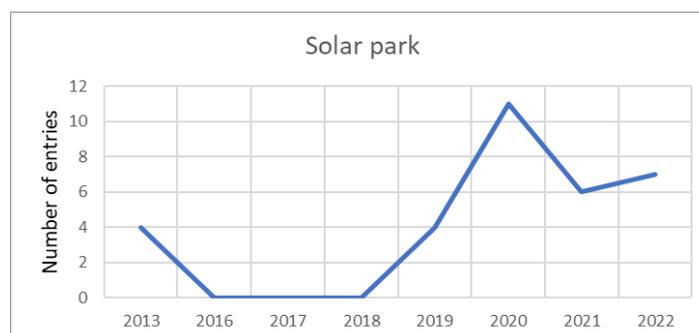


Figure 4-15: Number of occurrences of the word "solar park" during 2013-2022.

Territorial plans as a term is frequently used for any kind of design and construction processes related to spatial planning in a specific geographical boundary. In accordance with Figure 4-16 this phrase had no occurrences from 2013 to 2021 in context of coal transition. It is worth to be noted that in 2021 territorial plans presented a peak of occurrences due to the fact of the announcement in media for a just development transition in Western Macedonia with positive feedback.

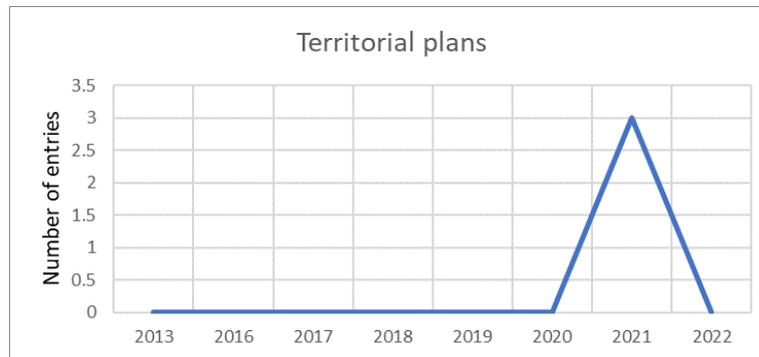


Figure 4-16: Number of occurrences of the word “Territorial plans” during 2013-2022.

F Perception EU

All the words of **Category F: Perception EU** in Figure 4-17 are content related with more occurrences in 2019, 2021, 2021, 2022, 2019, 2021, 2021, 2020, 2022, 2021, 2021 and 2022 respectively. All the terms presented in the graph of Figure 4-17 have an increasing trend from 2013 to 2022 reflecting that in Greece the energy transition era has begun.

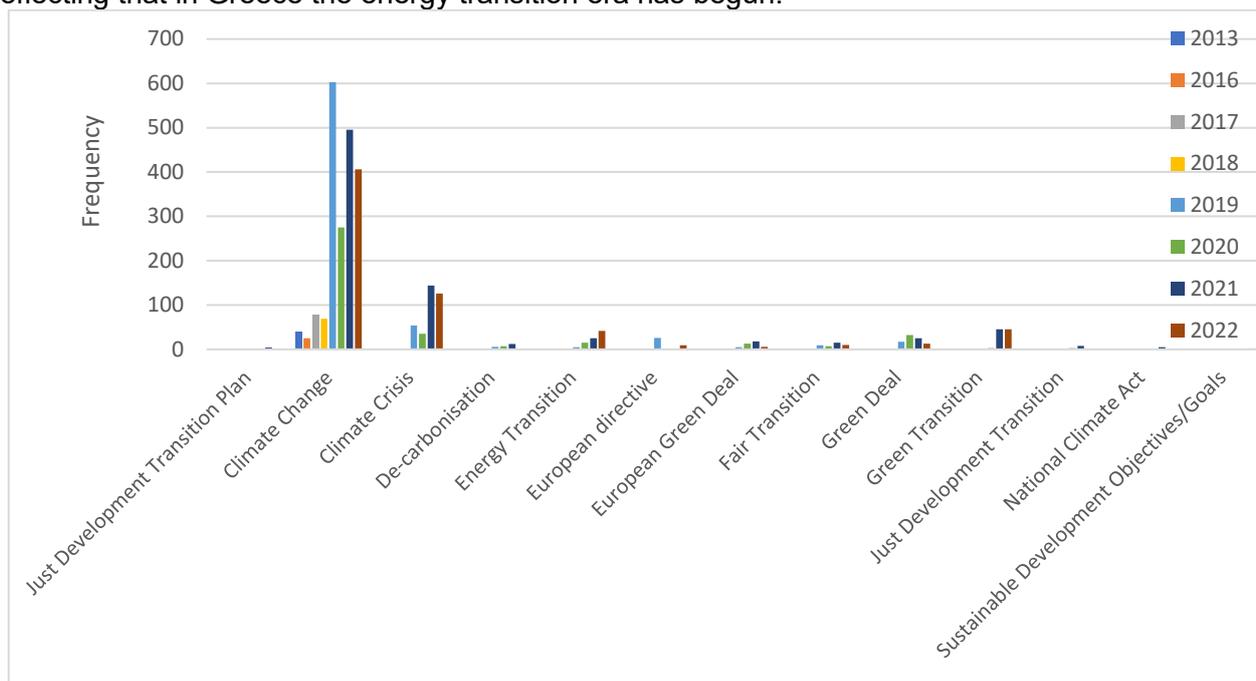


Figure 4-17: Perception EU Transition content related words vs number of entries and year.

The terms **“National Climate Act”**, **“Climate Change”**, **“Climate Crisis”** and **“European Directive”** are directly linked with the fact that in 2022 the Greek legislation has adopted the European Climate Law to reduce greenhouse-gas emissions by at least 55% (compared to 1990 levels) by 2030.

The first occurrence of the **“National Climate Act”** appears in 2020 and it is increasing until 2022 with a maximum of five occurrences. This is in accordance with the first discussions in Greek media regarding the European Climate Law. Based on the findings, the perception of the public is positive as National Climate Law aims at reducing gas emissions, strengthening "green" energy and establishing a long-term energy planning.

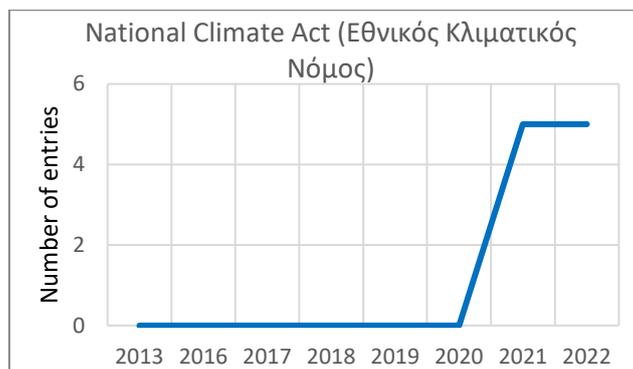


Figure 4-18: Number of entries of the word “Εθνικός Κλιματικός Νόμος” (National Climate Act) with time.

The term “**Climate change**” has also an increasing trend from 2013 to 2022 with the highest entries (600) to appear in 2019. The positive trend is also observed for the term “**Climate crisis**” which has the maximum occurrences (140) in 2021. Both terms have a negative sense reflecting the view of the Greek society on the challenging issue of climate change. This is also depicted in the word-graph of Figure 4-19 in which “Climate change” co-occurs with words such as “worst”, “scenario” and “humanity”.

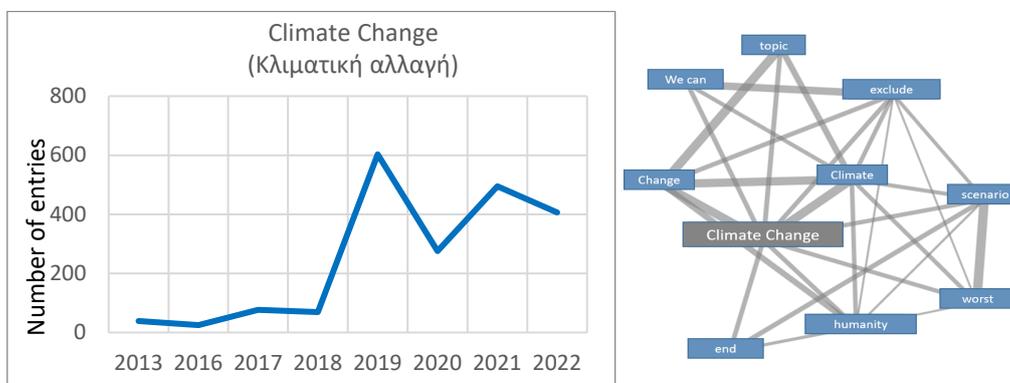


Figure 4-19: (left) Number of entries of the word “Κλιματική αλλαγή” (Climate Change) vs time. (right) Word graph of the word “Climate change” for 2022

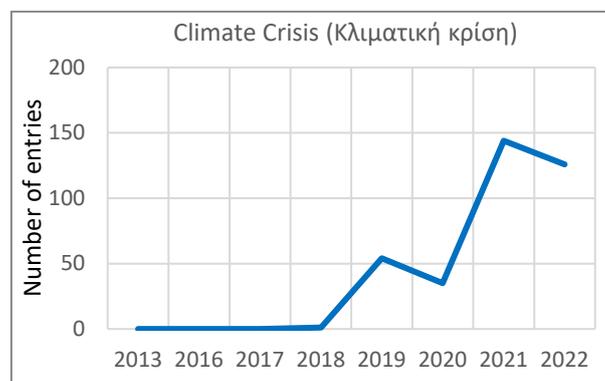


Figure 4-20: Number of entries of the word “Κλιματική Κρίση” (Climate crisis) with time.

The “**European directive**” term also presents the maximum occurrences (26) in 2019. This term is used mainly with a neutral sense informing about the obligation to implement a National Emission Pollution Control Program.

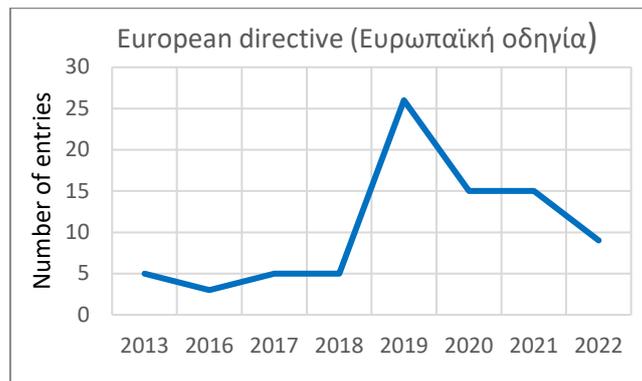


Figure 4-21: Number of entries of the word “Ευρωπαϊκή οδηγία” (European directive) with time.

The terms “**Transition**” “**Energy Transition**”, “**Just Transition**”, “**Green Transition**” clearly depict the beginning of the post-lignite era with the initial discussions about lignite mines closure in Greece. All these words-phrases are firstly mentioned in Greek media in 2018 with a neutral to positive sense, which is increasing towards 2022 (Figure 4-22). This is also reflected by comparing the two word-graphs from 2016 and 2022. In 2016, the negative discussion about the financial crisis affects political background whereas in 2022 the main topic of discussion is the energy transition that has begun (Figure 4-23).

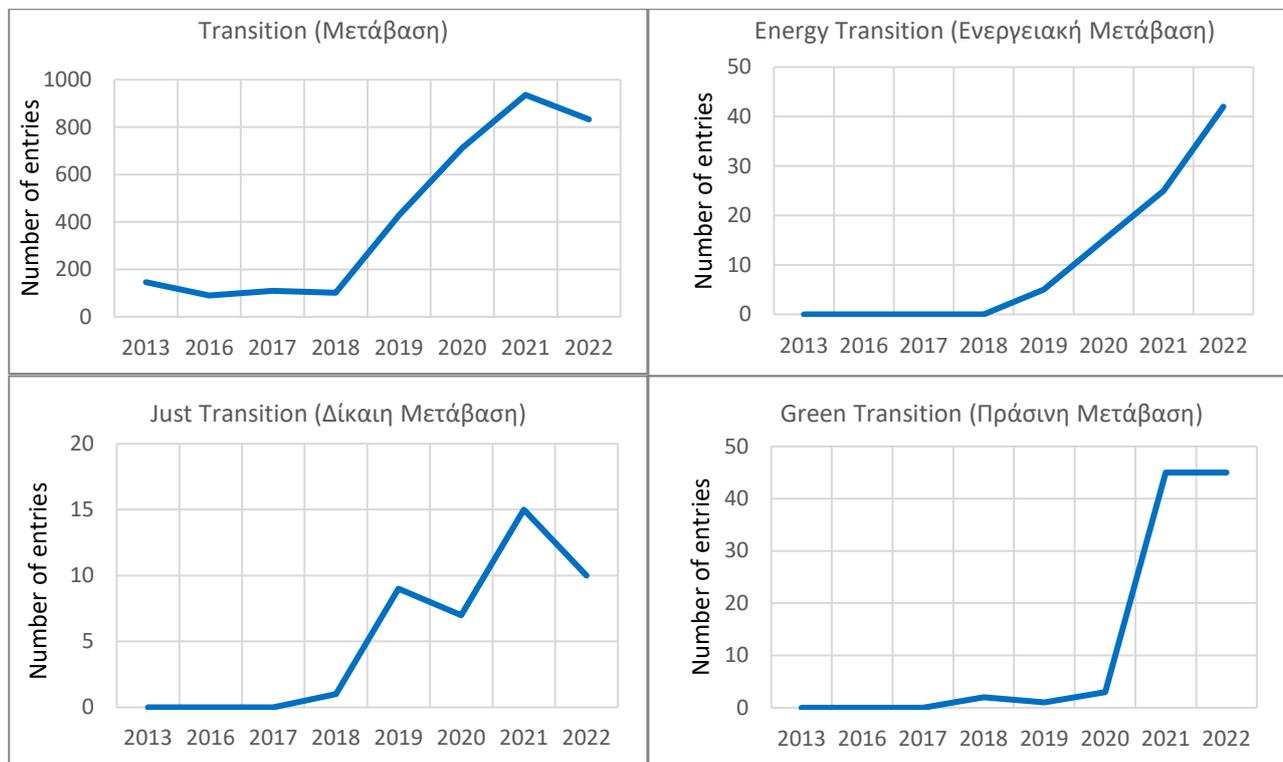


Figure 4-22: Number of entries of the word “Μετάβαση” (Transition), “Ενεργειακή Μετάβαση” (Energy Transition), “Δίκαιη Μετάβαση” (Just Transition) “Πράσινη Μετάβαση” (Green Transition) with time.

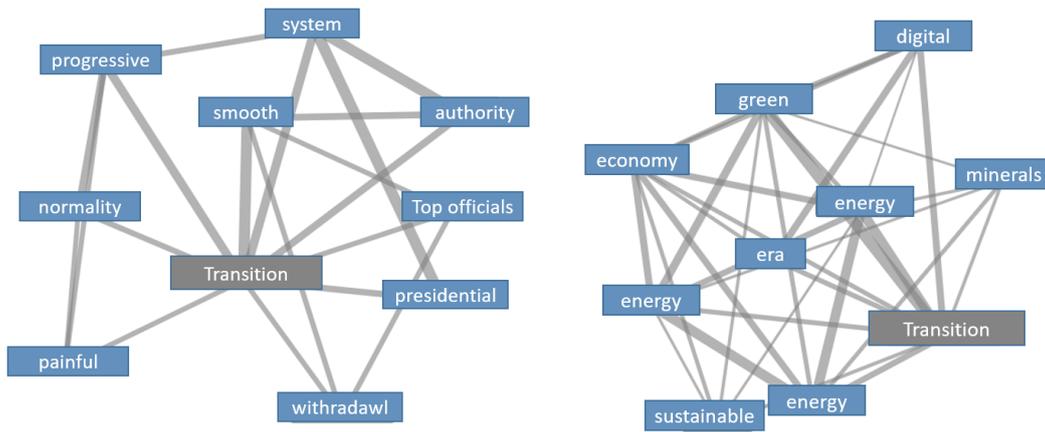


Figure 4-23: Word graph of 2016 (left) and 2022(right) for “Μετάβαση” (Transition).

The terms **“De-carbonization”**, **“European Green Deal”**, **“Green Deal”** and **“Sustainable Development Goals”** reflect the European policy towards the greenhouse emission reduction and the gradual planning of replacing coal and lignite power production in Greece with greener technologies such as renewable energy and hydrogen. These terms are firstly mentioned in Greek media in 2018 with a neutral to positive sense, which is increasing towards 2021 (Figure 4-24, Figure 4-25 and Figure 4-26). As it is shown in the word-graph of 2022 (Figure 4-24), “de-carbonization” is related to the reduction of the greenhouse gases of the shipping sector.

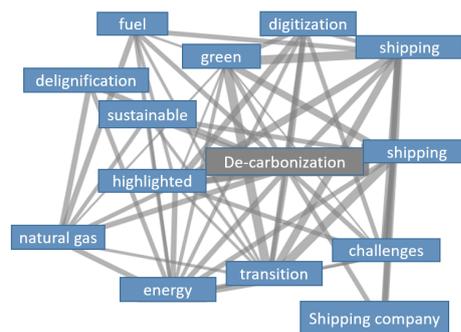
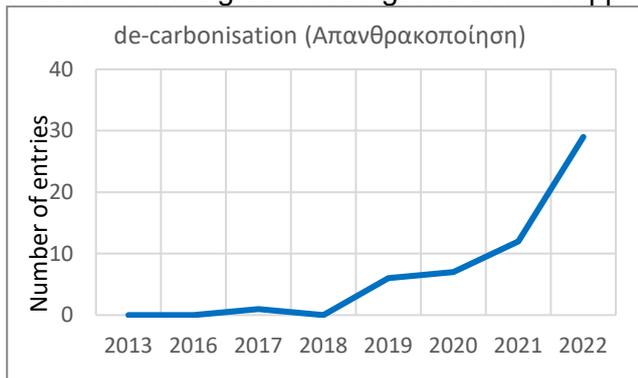


Figure 4-24: (left) Number of entries of the word “Απανθρακοποίηση” (de-carbonization) with time (right) Word graph for “Απανθρακοποίηση” (de-carbonization).

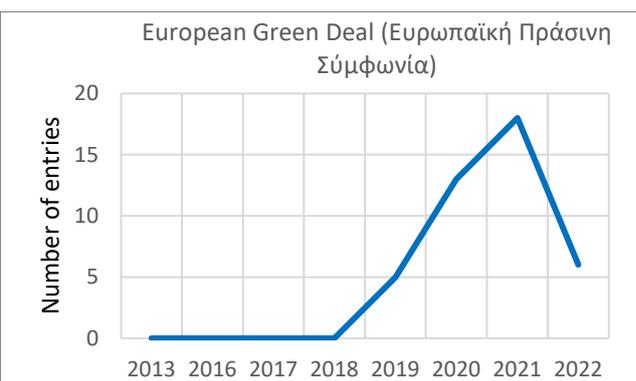


Figure 4-25: Number of entries of the word “Πράσινη Συμφωνία” (Green deal) and “Ευρωπαϊκή Πράσινη Σύμφωνία” (European Green Deal) with time with time.

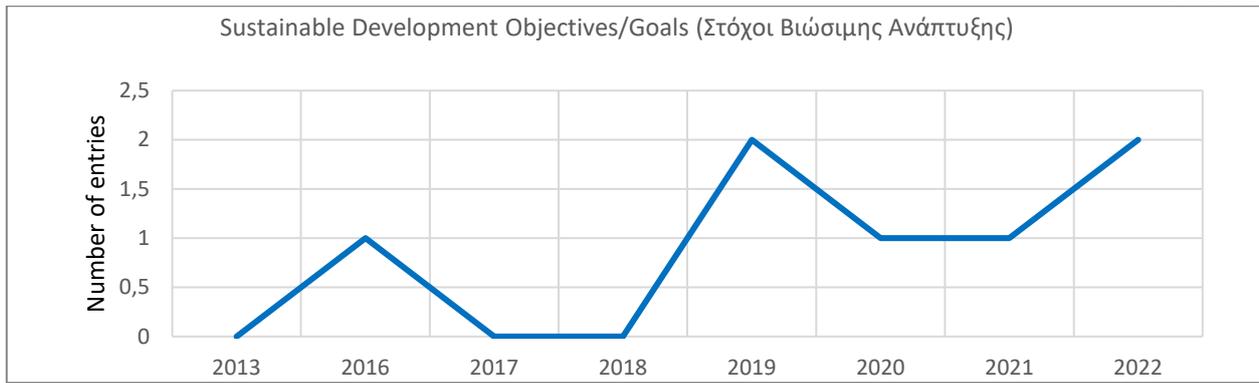


Figure 4-26: Number of entries of the word “Στόχοι Βιώσιμης Ανάπτυξης” (Sustainable Development Objectives/Goals) with time.

4.2.2 Local/Regional level

Regarding the research conducted in the local media of the region of Western Macedonia, from the 45 keywords selected for search in the article titles, there are some representative samples for the transition process in Greece.

A Solidarity / Identity

It is worth to mention that the more entries of word “plant” are in 2022. Plant is a term that may refer to plenty of industries and activities. The increase in the occurrences in 2022 of the word “plant” could be attributed to the discussion about the local power plants and their transformation in local media. Similar to “plant,” the term “Western Macedonia” had more occurrences in 2021, implying that it was frequently mentioned in that year within the context of Category A Solidarity/Identity. This finding coincides with the number of occurrences of term “Western Macedonia” in national level implies that the local level analysis catch the same trend for the word that represents the region where transition occurs.

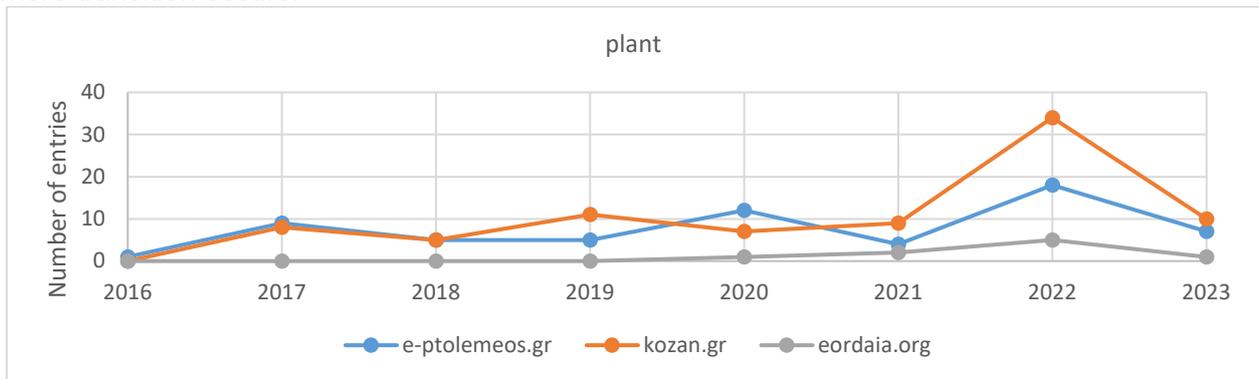


Figure 4-27: Number of occurrences of the word “εργοστάσιο” (plant) with time in local media

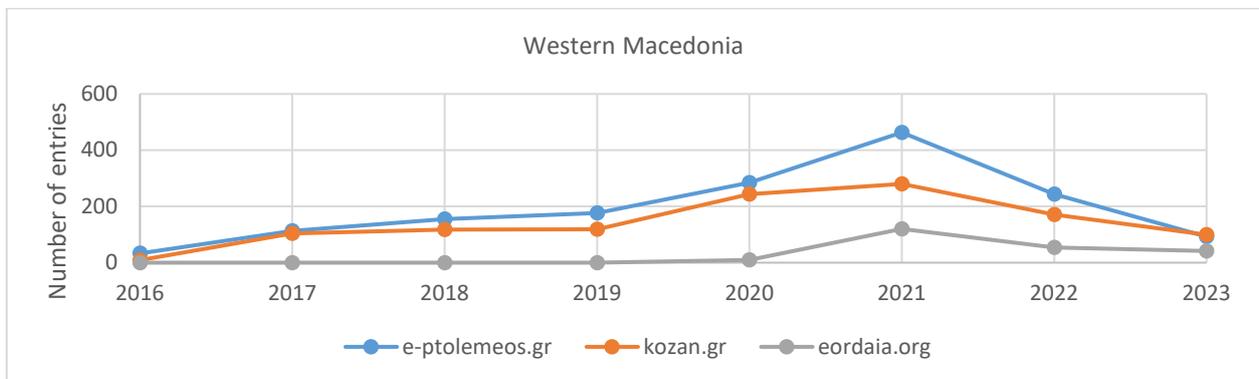


Figure 4-28: Number of occurrences of the word “Δυτική Μακεδονία” (Western Macedonia) with time in local media

B Site Development

De-lignification (απολιγνιτοποίηση) is a term referring to the phasing-out of lignite mining and power production in Greece. The term first appears in 2018, as it was the year the Greek Government announced the transition from lignite. A peak number of entries in 2020 corresponds to the issuing of the Master Plan for the transition process, the Just Transition Development Plan. This is to be expected on local level, as the local communities of Western Macedonia are largely dependent on the operation of the lignite mines and the power stations, and consequently they are the most affected by the transition. The number of entries seems to have a gradual decrease over the years, probably because the energy transition is a more popular issue in these areas, as the transition is well under way.

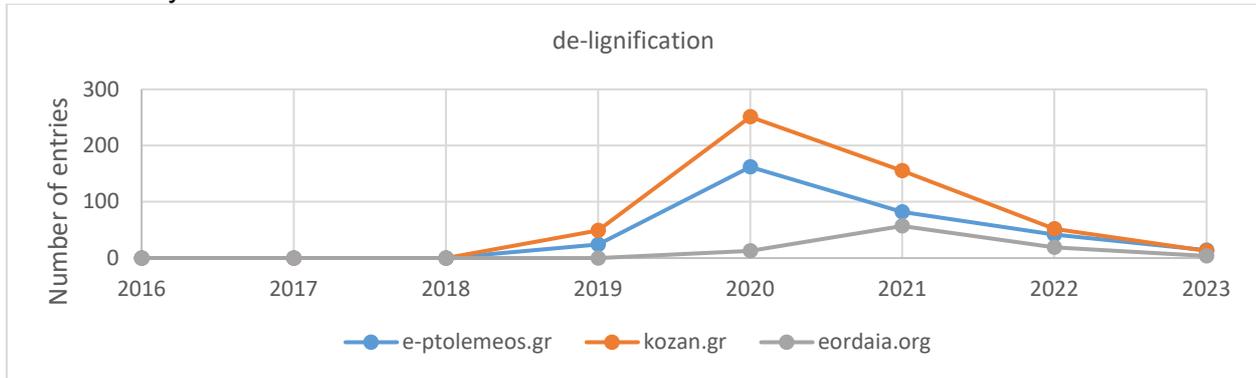


Figure 4-29: Number of occurrences of the word “απολιγνιτοποίηση” (de-lignification) with time in local media.

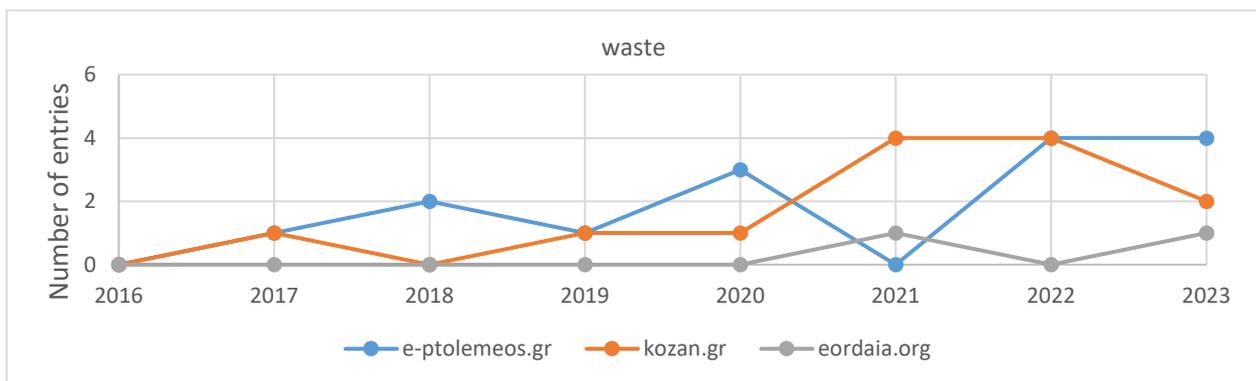


Figure 4-30: Number of occurrences of the word “απόβλητα” (waste) with time in local media.

“Waste” (απόβλητα) is a very broad term that may refer to a variety of industries and activities, with mining waste being the most relevant to transition. On a local level there is a general increasing trend, which may be only in part be attributed to the land rehabilitation works that have been undertaken in the region of Western Macedonia in recent years. The trend, however, may be also attributed to other types of industries, apart from lignite mining. Therefore no specific conclusion can be derived on the specific type of industry the word “waste” refers to.

Although “post lignite” is a keyword that has low occurrences in national media, there are references of the term in news titles prior to 2019 in local media. The highest frequencies occur in 2020. That confirms the discussion about the transition in local media.

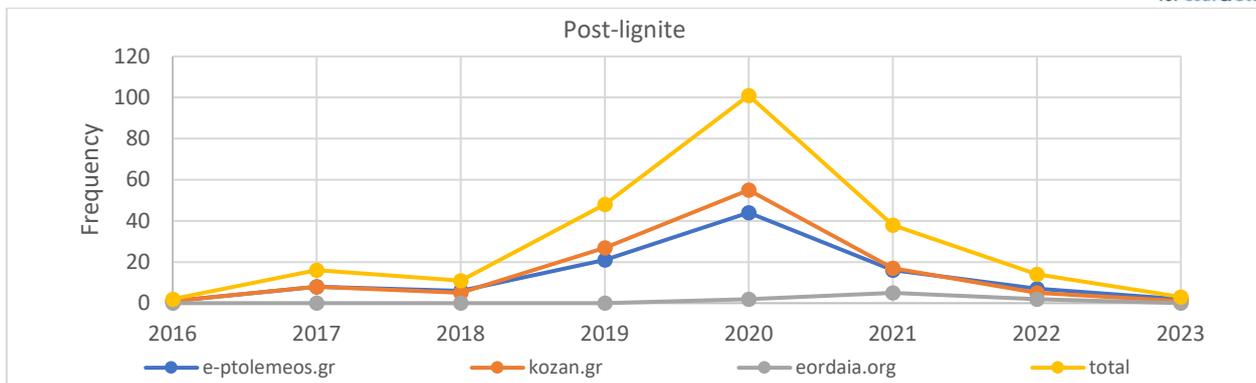


Figure 4-31: Frequency of occurrences for the word "post-lignite" in local media through the years.

C Regional Development

The highest number of entries of word "Transition" appears in 2020 in two local websites e-ptolemeos.gr and kozan.gr. The Master Plan for the transition process was issued in 2020 stimulating discussions in local news. Local media seem to catch the trend of "transition" earlier than the national media (2021).

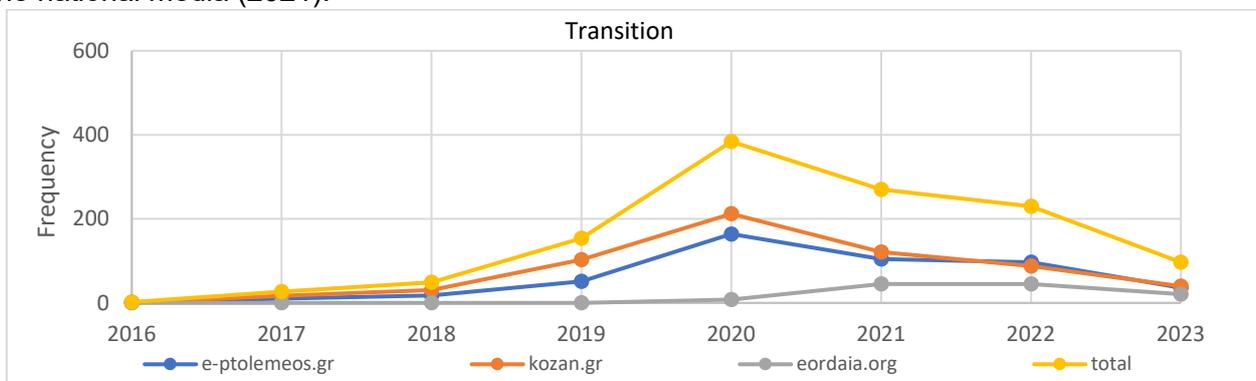


Figure 4-32: Frequency of occurrences for the word "Transition" in local media through the years.

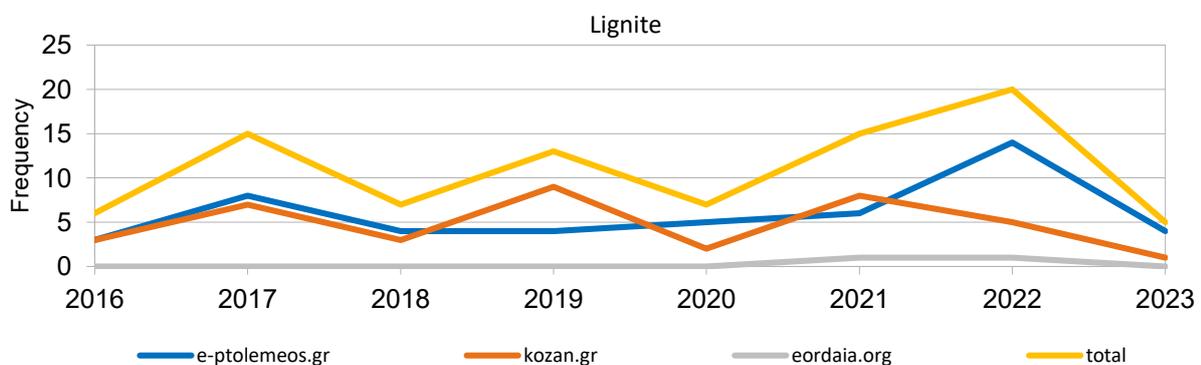


Figure 4-33: Frequency of occurrences for the word "Lignite" in local media through the years.

Lignite shows a varying trend through local news media at the three local websites that were chosen for Western Macedonia. Starting from 2016 through 2023 (Figure 4-33) it has two peaks at 2017 and 2019 but the highest frequency appears in year 2022.

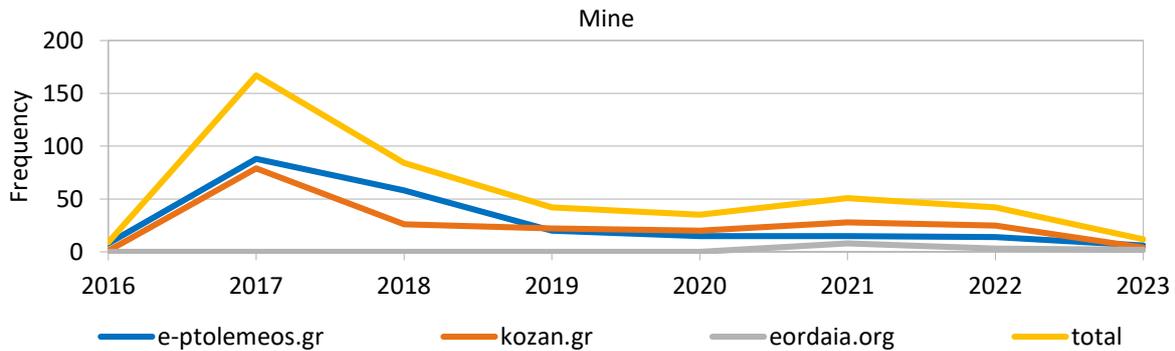


Figure 4-34: Frequency of occurrences for the word "Mine" in local media through the years.

The word "mine" shows the same increasing trend, however it has a high peak at 2017 due to the fact that a huge landslide has happened at Amyntaio's mines back then.

D Technical Tasks

Regarding to the local media analysis in category D, the word **drainage** (Απορροή) appears infrequently during the period of 2016-2023 (Figure 4-35). Specifically, the word appears with low frequency in 2017 on the site e-ptolemeos.gr and reappears with even fewer entries in 2020 on kozan.gr, while there are no appearances on eordaia.org.

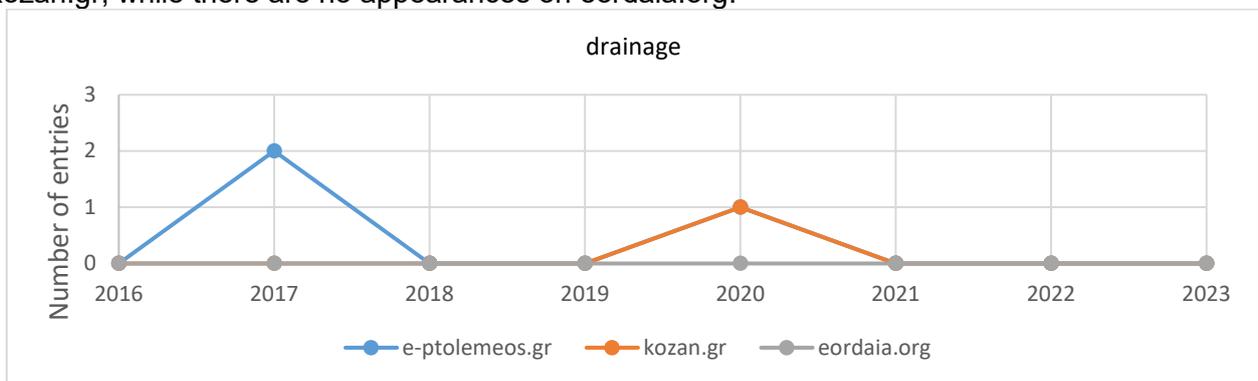


Figure 4-35: Number of entities of the word "drainage" during 2016-2023 at local media.

Figure 4-36 shows that for the word "**Geotechnical**" (Γεωτεχνική), there are no entries until 2018. Specifically, according to kozan.gr, the first time that the word appears is 2018 and then reappears in 2020. Since the 2020, the word seems to appear on all three sites, with the peak of entries being in 2022 on eordaia.org.

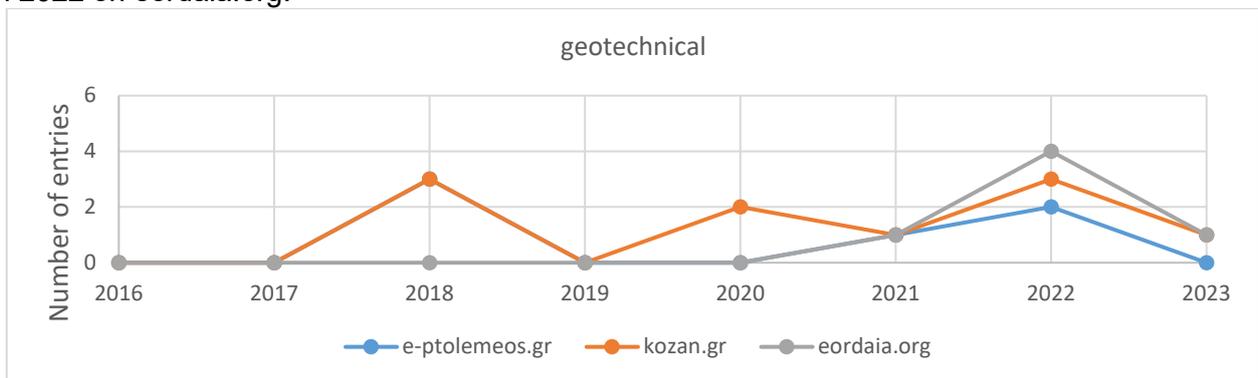


Figure 4-36: Number of entries of the word "geotechnical" during 2016-2023 at local media.

E Landscape Zone

In accordance with Category E (Landscape Zone), the term 'solar park' also appears in local media results. Based on Figure 4-37 and the local media research, the word first appeared in 2016. Regarding the three local media sources, only e-ptolemeos.gr shows a steady increase from 2016 to

2023, with a peak in 2022. This could be related to the same announcement, as illustrated at the country level in terms of the new large-scale Photovoltaic Park. According to kozan.gr, the word depicts a continuous rise in the frequency of entities with a high value. In contrast, eordaia.org showed no results until 2020, except for 2021 and beyond, where it illustrates an increase similar to the other local sources.

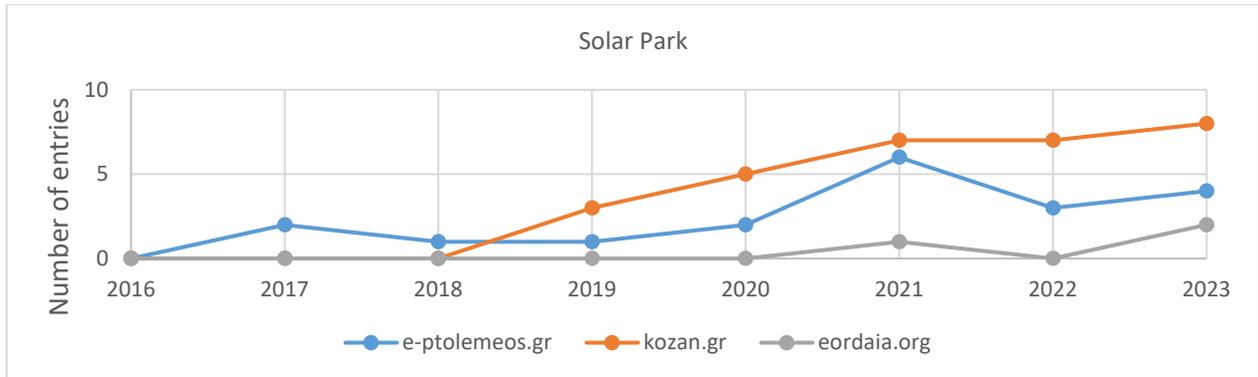


Figure 4-37: Number of entries of the word "solar park" during 2016-2023 at local media sources.

In accordance with Figure 4-38, the term 'Territorial plans' had no occurrences from 2016 to 2019. It is worth noting that in 2020 and 2021, 'Territorial plans' experienced a peak in entries on kozan.gr and e-ptolemeos.gr, respectively. In contrast, eordaia.org showed entries only in 2021 with a low value.

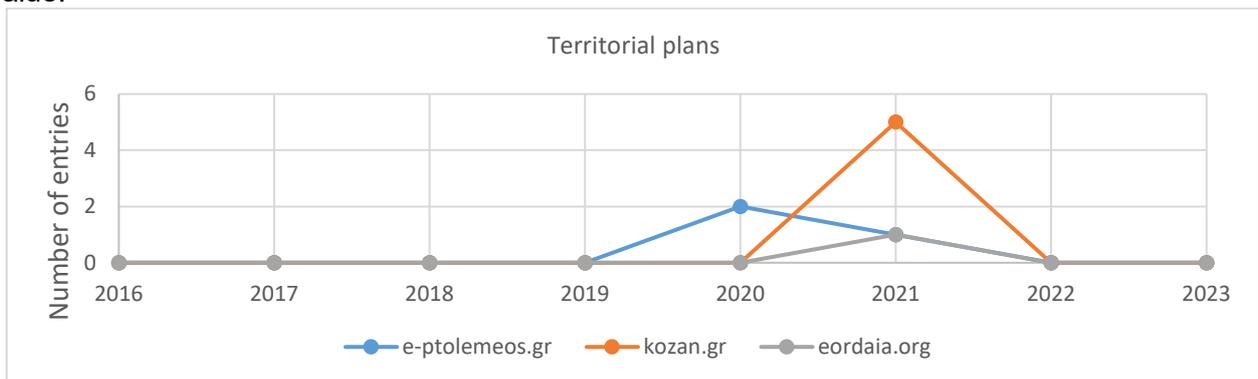


Figure 4-38: Number of entries of the word 'Territorial plans' during 2016-2023 at local media.

F Perception EU

The maximum occurrences for the term **“Climate change”** in local-regional media appear in 2019, which is in accordance with the findings at national scale. The terms **“Just Transition”**, **“Green Fund”**, **“Green Transition”**, **“Energy Transition”** and **“Just Development transition”** have their maximum occurrences in 2020, 2021 and 2022. (Figure 4-39) This is expected as in 2021 the National Energy & Climate Plan (NECP) has been developed for the transition regions.

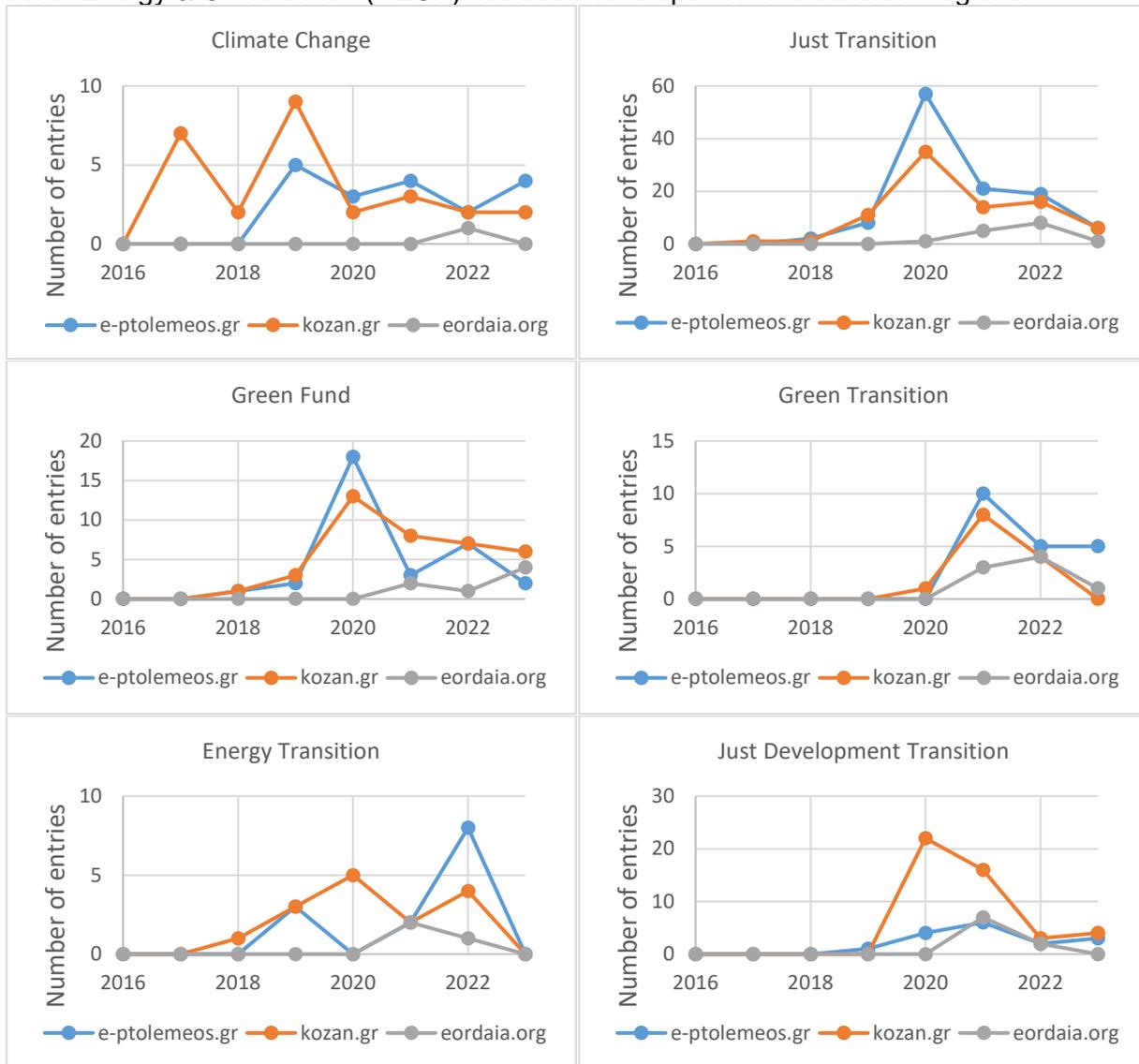


Figure 4-39: Number of entries of the word “Climate change”, “Just Transition”, “Green Fund”, “Green Transition”, “Energy Transition” and “Just Development transition” during 2016-2023 at local media sources

4.3 Perspective on coal transition

The media frequently reports on government policies connected to coal transition, such as phase-out plans, worker subsidies, and financial investments for alternative energy sources. In particular, the **economic impacts** of shifting away from coal mining and coal-fired power generation has long been a source of concern in the region. Western Macedonia has always relied on coal-related sectors to secure economic stability and employment. Job losses, economic diversification, and efforts to bring new companies to the region are frequently discussed in the media. The local population may have mixed feelings about the possible job losses and economic upheaval connected with the phase-out of coal. For example, some phrases that was identified through the analysis are “We know that we must offer new opportunities to the workers and the unemployed in the region, as we will be initiating a significant transition into the post-lignite era.”, “Special program for subsidizing businesses to employ 3,400 unemployed individuals, in the context of the just transition to the post-lignite era”. Another factor that shapes public perception are **environmental issues** such as improved air and water quality and potential issues with land reclamation and pollution treatment. Residents' perspectives on the trade-off between environmental advantages and economic costs may differ. Concerns regarding **energy security** may also have an impact on public opinions. Residents' perceptions of the shift away from coal may be influenced by concerns about the dependability and affordability of other energy sources such as renewables (e.g. In the long term, on the road to de-lignitisation and full substitution by Renewable Energy Sources, we will be dependent on natural gas as an intermediate fuel). The coal industry has had a profound impact on the **identity of communities** in Western Macedonia. The terms “Megalopoli”, “Power plant”, “Western Macedonia” and “Ptolemaida” are the places directly linked with lignite mining and for this reason present the highest occurrences in the category of solidarity-identity during 2019 and 2021 (Fig.4-40 & Fig.4-41). An example of the public perception is highlighted through the following phrases “Delignitization is a critical issue that concerns thousands of lives in two large regions, Western Macedonia and Megalopolis, and is linked to their economic and social stability”, “For 60 years PPC, operating in the region, has linked its existence and operation with the Basin: Kozani – Ptolemaida – Florina”. In the “site development” category, the term “re-use” appears in 2021 while in the “regional development” the term “mine” also is inserted in 2021. An example phrase is “These problems, just as we pointed out, have unfortunately already appeared at the Amyndeon Mine, which is the first mine to stop operating”. Some inhabitants may see the transition as a danger to their cultural and historical heritage, sparking discussions about how to preserve local identity while welcoming change. The positions and rhetoric of political leaders and parties frequently impact public perceptions. The Greek political environment, including Western Macedonia, might influence how coal transition strategies are articulated and received by the public.

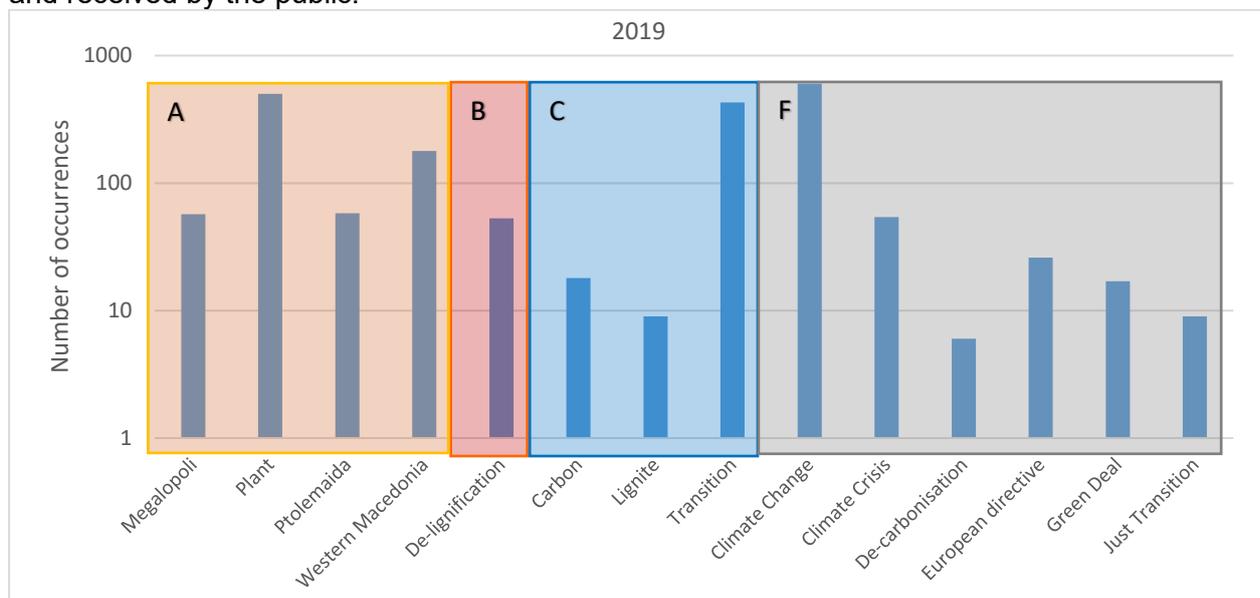


Figure 4-40: Number of occurrences of content-related words in logarithmic order in the Greek corpus of 2019. The

colored boxes indicate the category. Orange: A) Solidarity/Identity, red: B) Site development, blue: C) regional development, grey: F) Perception EU

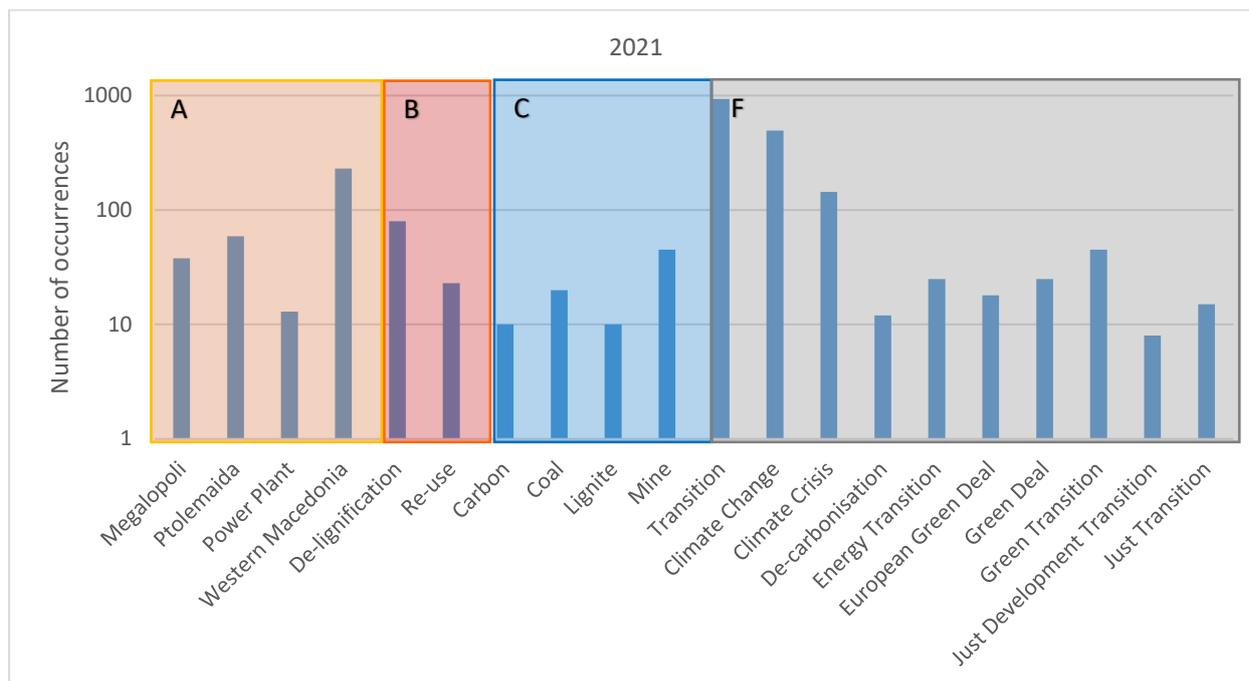


Figure 4-41: Number of occurrences of content-related words in logarithmic order in the Greek corpus of 2021. The colored boxes indicate the category. Orange: A) Solidarity/Identity, red: B) Site development, blue: C) regional development, grey: F) Perception EU

5 Germany

5.1 Evaluation of the media landscape

Freedom of the press and freedom of opinion are among the most important foundations of the state in Germany. Around 63 million people in Germany are **online**, and the daily **newspapers** are constantly increasing their digital reach. When it comes to media use, however, **television and radio** still play the largest role (Fazit Communication GmbH 2022). Broadcasting in Germany is organized in two ways and is primarily regional in character. It is divided into public radio, which is financed by the license fee, and private radio providers, who generate their income mainly from advertising. Each of Germany's 16 federal states regulates its own private and public broadcasting. Germans are avid newspaper readers and the non-tabloid press is a trusted news source. There are several national newspapers, but the press is strongest at the regional and local level. However, regional dailies are affected by the generally shrinking market and decreasing diversity. (DIW Econ GmbH 2022)

The media landscape has never been as diverse as it is now. In North Rhine-Westphalia alone, there are 44 private local radio stations on over 100 frequencies. There are also numerous regional television stations, media platforms and the Internet. The transmission paths and technologies have also developed further in recent years. The media landscape in North Rhine-Westphalia offers a wide range of local offers in the form of newspapers, radio, television and, last but not least, online media. However, the variety of offers does not always automatically mean a variety of providers. Publishers have concentrated in many parts of North Rhine-Westphalia and have long since turned into multimedia providers. There are also new developments in the other media types. The centralization that can be observed (from editorial structures and working methods) and the associated standardization of newspaper content increases due to continued, unchecked decline in the circulation of the daily press published in North Rhine-Westphalia. These statements show that the choices available to readers have continued to shrink. (Landesanstalt für Medien NRW 2020)

After China, India, Japan and the USA, Germany is the fifth largest newspaper market in the world and the largest in Europe. The media landscape currently includes around 320 mostly regional daily newspapers, 16 weekly newspapers and 1,300 consumer magazines. Due to digitization, the range is changing significantly in Germany. In 2021, around 260 titles with a circulation of 2.2 million are distributed digitally every day as e-paper. Media usage behaviour is also changing significantly: 78 million people in Germany (93 percent) regularly surfed the web in the first quarter of 2022, and 73 million were active on social media. The digital revolution has also brought about a new concept of the public sphere in Germany, because everyone can take part in the discourse and form opinions via social media and blogs. (Fazit Communication GmbH 2022)

Along with the impending transformation of the media world, in Germany as well as globally, there is a declining trust in established media, as well as a trend towards disinterest in information, culminating in the avoidance of news consumption. Furthermore, there are initial trends towards the use of AI in the production of media content. Further job cuts in the media sector can therefore be assumed, although the impact on "serious" journalism cannot yet be estimated. (cf. König 2023: 26f.)

In the contemporary regional literature of the Ruhr area, the memory of past mining history is held in high esteem and the present is increasingly pushed into the background. Caspers et al. (2019: 213ff.) describe this as literary remembrance in times of ongoing structural change. The identity-forming montane era is often used to ward off a negative image - inwards and outwards (cf. Korte & Dinter 2019: 5). Yet there are many positive developments, such as the establishment of the largest university landscape in Europe, or the expansion as a central logistics location between Milan and Manchester (ibid.).

In the field of tension between mining folklore, structural change and a changing media landscape, an above-average decline in print media, especially newspapers, can be observed. For example, the decline of the regional newspaper with the highest circulation, WAZ, was from 800,000 copies in 2010 to 550,000 copies in 2016. Today, the number is likely to be much lower. Nevertheless, regional newspapers, public television, and radio are the main source of information for forming opinions within the Ruhr area. According to this, around 58% of the population inform themselves daily via television, 55% via radio and 44% use the daily newspaper for this purpose. Social media and internet platforms are only used by a quarter of the population as a daily source of information.

National newspapers such as the *Süddeutsche* or *FAZ* are only used by around 11%. Topics of structural change are regularly covered in the media, creating a widespread awareness of change but also of ongoing problems. The existing sense of regional cohesion often collides with the awareness of structural inequalities. In addition, if there is a high degree of proximity between politics and the population, this creates tensions, as politics is perceived as inefficient both regionally and nationally. However, this does not necessarily translate into a significant loss of trust in the media. Yet, there is an increasing critical questioning of the neutrality of journalists. In the long term, it can be assumed that changes in media use by younger generations will direct the focus even more towards national and global politics, and that regional topics on structural change could thus play a diminishing role in social discourse. Nevertheless, there can be no talk of a decreasing identification with the mining history. A wide variety of fields, including popular football culture, hold on to the memory. Moreover, the fields of activity for post-mining development will accompany the region for the near future - even if the media discourse is perceived less and potentially decreases. A study on the parallel increase in the perceptible demand for transparency and participation with regard to structural change and energy transition in comparison with declining media presence would be a conceivable option. (cf. Korte & Dinter 2019: 25-38)

5.2 Discussion of main search attributes

After application of the defined search attributes and transfer of results into the evaluation scheme the most relevant entries in the media are discussed in more detail in the following chapter. Quotations from the database are marked with inverted commas.

A Solidarity / Identity

The term **industrial culture** (*Industriekultur*) stands for the study of the entire cultural history of the industrial age. It first appears in the database in 2010 and shows an increased number of entries in 2011, when the *Industriekultur Saar Ltd. (IKS)* was closed down. It was founded in 2001 by the government as a structural change instrument for the implementation of the so-called Ganser Report on the development/redevelopment of brownfield sites. Although the project did not fulfil the expectations in the end, the term itself has a positive tonality. In the Ruhr region, it became a famous term connected to "The Route of Industrial Culture", a project of the Ruhr Regional Association (RVR). Since 2013, it is the most frequent co-occurring term in the database. It is a thematic route for tourists, which connects the "most important and touristically attractive" industrial monuments in the Ruhr region, such as collieries, gasometers, coking plants, blast furnaces, production sites or hoists. The disused industrial sites not only keep industrial history alive, but also bear witness to structural change and are today's venues for art, culture and the creative industries. "The Route of Industrial Culture connects 52 destinations: formerly important industrial plants, workers' settlements designed by renowned architects, museums and parks created on spoil heaps." Industrial culture is also often mentioned in connection with the "Night of Industrial Culture", called "Extraschicht". It combines 500 events at 50 industrial cultural venues in 22 cities in the Ruhr region and has been taking place each year in June since 2003. "At the "Extraschicht", disused blast furnaces, gas storage facilities and collieries became the setting for concerts, theatre performances and shows at the weekend". These events create a sense of connection and identity with the region and its history, especially among the younger people. They help to raise awareness of the industrial buildings as valuable witnesses of industrial culture and continue to shape the area as far as this is possible, sensible and economically justifiable. In addition, these events are reported on nationally, not least because the venues provide grateful motifs for the reporting.

The term **mining tradition** (*Bergbautradition*) is frequently used in the sense of transition but does not solely refer to the transition in the Ruhr area but also to the mining activities in the Ore Mountains, which ceased long ago. The most frequent co-occurrences like "to remember" or "long" suggests that the term "tradition" is more used in connection with happenings or occurrences in the greater past.

Glückauf! is the common underground miners' greeting, which is still used among former employees of the mining industry. Since many of them have switched to the new post-mining sector after the mines have closed down, the greeting is still used in this sector as well. The greeting expresses respect, solidarity and identity with the mining sector in general. According to the results of the media analysis, there are only a few entries in the media between 2008 and 2010 and

these few entries do not relate to the topic of transition. In 2011, the expression was used more frequently in regional news in the Saar region, as the hard coal mines were shut down there at that time. This could be an explanation for the higher numbers of entries in the media in 2011. However, the word is more frequently occurring in other contexts, for example in the sports news, as many (football) clubs use “Glückauf” in their name. A stronger relation to the transition topic comes up around 2017 and 2018 when the last remaining hard coal mine in the Ruhr area and in Germany was shut down. Here the news reported a lot about closing ceremonies and the history of mining.

The word **Saint Barbara** (Heilige Barbara, the patron saint of miners) is more used in the sense of remembering history and religion and does not refer to transition in the German database.

Socially acceptable (sozialverträglich) is difficult to assess because the sentences are too short to evaluate if there is a sufficient relation to the topic. It is an adjective, which is often used in relation to job losses in general, not only in the mining sector.

B Site Development

The term **revitalization** (Revitalisierung) shows hardly any relation to the topic. It is more frequently used in other contexts regarding specific construction projects. That is why the most frequent co-occurrences are place names or specific projects. Here, it is most often connected to positive statements, as for example: “In addition to new construction, a large part of the potential also lies in the revitalization of existing plants”.

Recultivation (Rekultivierung) is most often co-occurring with landfill sites showing a stronger relation to the topic in general (Figure 5-1). In 2019 and 2020, search results are more focussed on gravel mining as the recultivation of opencast mines became an urgent topic in the regional frame. Simultaneously the total number of entries increases (Figure 5-2). The sentiment is shifting to more negative feelings, especially in connection to the issue of how recultivation measures may be financed. The most frequent co-occurring words in 2022 refer to the closure of coal mine sites and the usage of areas, indicating that recultivation is an urgent issue within the closure of coal mines.

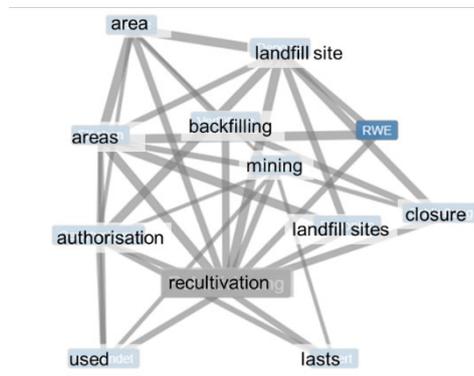


Figure 5-1: Wordgraph (Recultivation) 2022. The line width increases with significance of a co-occurrence.

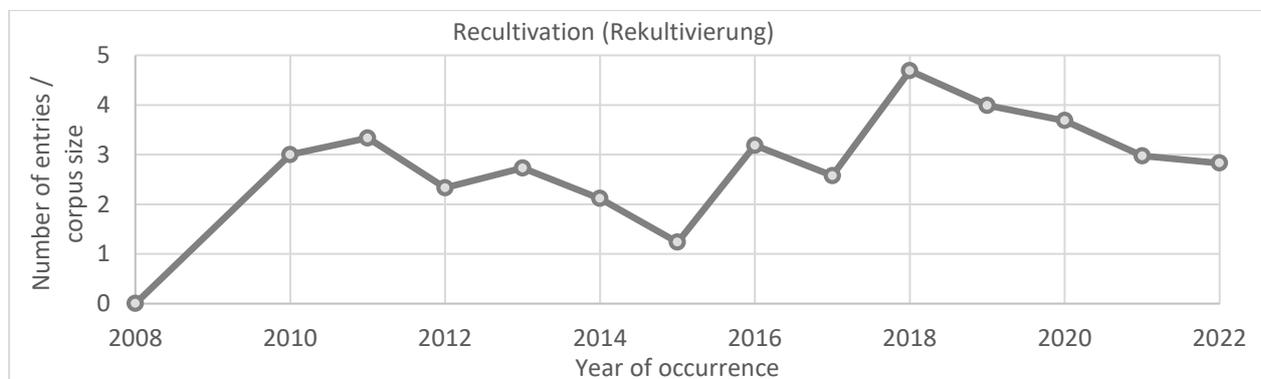


Figure 5-2: Relative frequency of “Recultivation” in the German database between 2008 and 2022.

Post-Mining (Nachbergbau) is a young term that has been developed together with the foundation of the research institute of post-mining (Forschungszentrum Nachbergbau, FZN, at THGA University in Bochum). That is why there are no entries in the media before 2013. All of the results

are crawled from local news sites, signalling that the issue of post-mining did not reach a super-regional level at that time. Between 2015 and 2018, there are no search results for the word. Only in combination with the closure of the last colliery in 2018, there are reports about post-mining again, with a strong interrelation to the THGA and the FZN especially.

Mining legacy (Bergbaualllasten) does only have minor hits across the years. It is a term composed of two words. It can be assumed that the word parts are used much more frequently like this: “The legacy of mining”. However, the search function of the tool does not cover this form of search.

Between 2008 and 2015 the term **Re-use** (Nachnutzung) is most frequently used in combination with the airport project in Berlin. Only in 2016, other industrial brownfields are co-occurring more frequently with the word. There is no exclusive content relation to transition and the sentences are too short to evaluate any sentiments. Other projects than those connected to the coal transition are more in the focus.

Colliery wasteland (Zeichenbrache) has only minor hits in general, but those hits are strongly related to the transition topic. Although it is a term that has a negative tonality by itself, it has recently been used more often in positive reporting about successful projects: “Dudda wants to build on this, for example through the planned *International Technology World* on the Blumenthal colliery wasteland, which he says is a prime example of the EU's Green Deal”.

The term **remediation** is applied to all projects that are connected to specific sites or companies. Thus, there are many search results, which have little or no relation to the transition topic. Its nearest co-occurrences are “energetic”, “new construction” and “million euros each year”.

The word **reactivation** is used in various senses, such as reactivation of any kind of accounts, facilities, functions, and more. It does not show a sufficient relation to the coal mining transition phase.

C Regional Development

In Category C) the search attributes **RVR**, **open pit mine**, **hard coal** and **lignite** are too general and do not have a sufficient content relation to the topic of coal transition.

In 2011, the nearest co-occurrence for **structural change** (Strukturwandel) is “agriculture” which is resulting from entries that are more frequent in the media as the disappearance of farms each year is strongly connected to this issue. In 2012 and 2013, more entries refer to other kinds of structural change in a variety of industry branches. It is thus not exclusively used in the sense of coal transition. In 2014, the term was applied in the context of the German education system. However, the number of entries refers to the same sentence that has been crawled 41 times. An issue that should be noted in using the online tool in general. In 2015, the Ruhr area is more in the focus again, as it appears as the most frequent co-occurrence. In 2018, resulting entries refer to coal transition more frequently as the coal commission was appointed in these times. Those entries seem to have a more negative perception because of people being uncertain about what will be decided.

With the **Coal Phase-out Act** (Kohleausstiegsgesetz), which was entered into force on 14 August 2020, Germany wants to gradually reduce coal-fired power generation and end it completely by the end of 2038 at the latest. The word first appears in 2011 in the database. Since then until 2018 different parties demanded it repeatedly. The highest number of entries is in 2020, when it was passed in the German Bundestag. The feelings are often negative, because the reporting is mostly about the content that is negotiated in the law. Co-occurring terms like “farce”, “Protest action” and “constitutional complaint” are indicative for the debate around the draft of the act. After its approval, the general perception turns more positive again since the law finally provides a concrete timetable for the phase-out of coal and thus forms a milestone for transformation.

The term **coal regions** appears to be used in a more positive sense as it often is connected to cultural heritage and the people, indicated by co-occurrences like “social” and “support”. In 2021 and 2022, the results display mixed feelings: The approval of structural funds is very positive but the fear of a negative development on the labor market is still palpable as the necessity of a long-term employment perspective for today's coal regions is often underlined.

D Technical Tasks

Perpetual obligations (Ewigkeitsaufgaben) does not have enough hits in the database (max. 8 in 2022). Most of the entries are explaining the word itself, as it is exclusively used to describe

the financing of the consequences of hard coal mining by the RAG Foundation. In 2021, the occurrence of the term **mine water** (Grubenwasser) is either connected to specific research questions, such as how to extract valuable metals (like lithium) from it or connected to fears of contamination through PCB or dewatering. It is thus highly connected to the hard coal mining industry. The relative frequency of the word is the highest in 2018 (Figure 5-3). Most of the entries have a neutral tonality describing the technical issues around the planned mine water rebound in the Ruhr are: "In order to lift the mine water only at a few central locations, it is necessary to raise the mine water in order to use underground connecting roads.

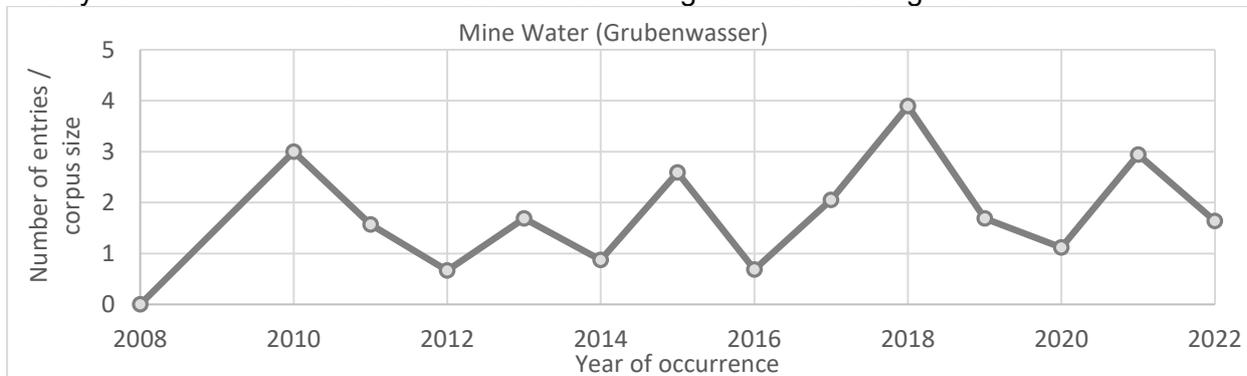


Figure 5-3: Relative frequency of "Mine water" (Grubenwasser) with time

Dewatering (Wasserhaltung) is one of the so-called perpetual obligations in the hard coal mining industry of the Ruhr area. Its entries in the media are mostly restricted to regional media sources and the reporting is predominantly technical. In general, there are only a few entries with a maximum frequency of 20 hits in 2022. The most frequent co-occurrence is RAG (the hard coal mining company) which is responsible for the dewatering in the region. Minor entries refer to the dewatering of open pit mines. The financing is one of the most discussed topics in 2020: "The responsibility for the rehabilitation of the opencast mines, for mining damage as well as for recultivation, water management and possible aftercare therefore clearly lies with the opencast mine operators". In 2022 many entries also refer to a possible usage of the geothermal potential of the warm mine water which has to be dewatered. The discourse on technical tasks is developing from a negative to a neutral to a positive tone. While these issues are initially and primarily seen as a financial burden, the increasing scientific debate not only provides more transparency, but also emphasises the usable potentials.

E Landscape Zone

Either the entire predefined search attributes in this category do not display enough results in the database or the results do not relate to the transition topic. For example, the term **renaturation** (Renaturierung) is used for numerous projects often connected with peatlands. **Landscape Park** (Landschaftspark) does have a number of superregional hits and is often connected to specific sites. More recently, industrial architecture or post-industrial urban landscapes that have been recultivated for recreational purposes in some places are also referred to as "landscape parks", taking over the positive tonality of the term. It is possible that this term will also find international validity.

F Perception EU

In category F (Perception EU regarding transition) the word **coal phase-out** (Kohleausstieg) gave one of the most accurate entries in the media. It is strongly related to the topic of coal transition and exclusively used within this sense. The word first appears in 2010 with only two entries in one million sentences. These entries show the uncertainty about the topic and the term itself ("Coal phase-out before 2018 out of the question"; "meaningful would be the "coal phase-out"). In 2011, the nearest co-occurring word is "nuclear phase-out" as the process about phasing out nuclear energy production is more advanced at that time. In 2012, the term is often used within the context of energy transition, which "will not work without a coal phase-out". Its perception is more neutral. This is changing to feelings that are more negative when it comes to the question of job losses due to the phase-out plans. In the following two years, many sentences are questioning the social

compatibility of the phase-out: “Coal phase-out endangers 50,000 jobs. The industry is also vehemently opposed to the decreed coal phase-out.” The more negative entries are also predominantly surrounding the discussion about the specific timeframe and climate goals, which are urgent topics in the reporting about the World Climate Conference in Bonn. The most frequent co-occurrence is the word “Grünen” which refers to the green party, which especially engaged in accelerating the phase-out in Germany.

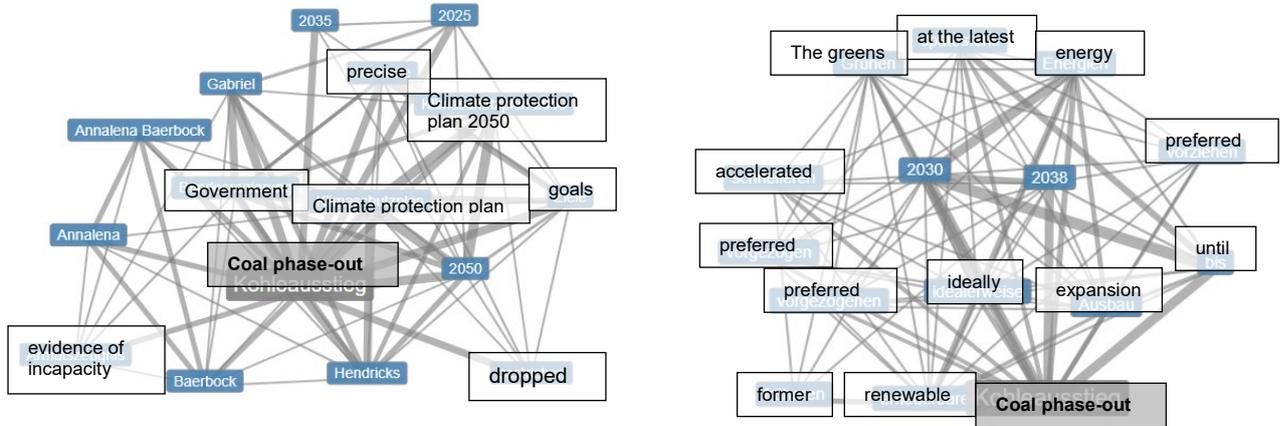


Figure 5-4: Wordgraph of 2016 (left) and 2021(right). The comparison shows how the topics and interests of the media landscape have changed: In 2016, the (often negative) discussion around the coal phase out plans rested upon certain individuals (politicians) whereas the timing of the phase-out is playing the dominant role in the reporting of 2021.

Between 2016 and 2018, numerous entries refer to specific politicians who are involved in the progress, such as the minister for the environment (Barbara Hendricks) and the climate policy spokesperson of the Green parliamentary group in the Bundestag (Annalena Baerbock), highlighting the political debate around the topic (Figure 5-4). In 2019, the relative frequency increases to more than 120 (Figure 5-5). Most frequent co-occurrences are “2038”, “2030”, “coal commission”, “German government” and “Lausitz”. These words display the evolving discussion about a timeframe, the financing in general and the increasing connection to the lignite mining in the Lausitz region. In 2021 and 2022, the timing and the debate on whether the coal phase-out should be brought forward is the predominant topic of the reporting. Different parties “demand the immediate coal phase-out” however, the question is still how this is to be implemented. A special concern is whether the economy can cope with the shift to renewable energy supply.

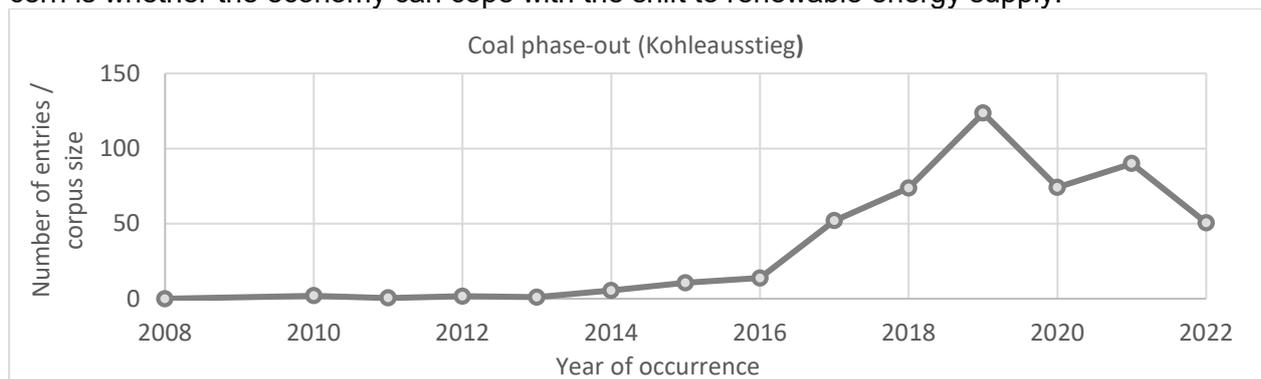


Figure 5-5: Relative frequency of the word “Kohleausstieg” (coal phase-out) with time.

Transition (Transition) is used for any kind of transition processes, like economic, political or medical. The most frequent co-occurring word before 2016 is Terrafugia, which is a company that designed a flying car called Transition. It is also a frequently used term in computer sciences and part of the name of a Media Development Aid Organization. In 2016, the content shifts more to the transition of cities or places. In 2017, the word “energy” appears for the first time as the most frequent co-occurrence. Transition is most often applied within the context of the SET (Startup energy Transition) Festival, which took place alongside the Berlin Energy Transition Dialogue, an international conference organized by the Federal Foreign Office and the Federal Ministry for Economic Affairs and Energy. In 2018, the term **Just Transition** appears in the database as one

of the nearest co-occurrences. Since 2019, this has been the most frequent co-occurrence each year. However, as noted above, results also indicate sentences that deal with other topics. All results that are content related are often appearing neutral and reserved or positive while words like social or fair are often interrelated. There are hardly any negative sentences.

Just Transition is a term that is exclusively used in the sense and context of coal transition. It is a proper name about a special political concept and is applied without translation in German reporting. It firstly appeared in the German media landscape in 2017 with only one hit in the database. The highest number of entries appears around 2020, when the European Commission publicly proposed the Just Transition Mechanism in January 2020. Tonality is mixed. There is often a positive sentiment, as especially the funding is seen as a helpful support for managing the structural change in the German coal regions. “The Just Transition Fund is the only social policy lever in the European Green Deal”. On the other hand many entries revolve around the question of how exactly the money will be distributed. The uncertainty about the topic leads to a more neutral tonality of reporting. “Certainly, the current pace of coal phase-out, especially in Central and Eastern Europe, is mainly influenced by the European Green Deal, including the creation of the Just Transition Mechanism and the corresponding fund.”

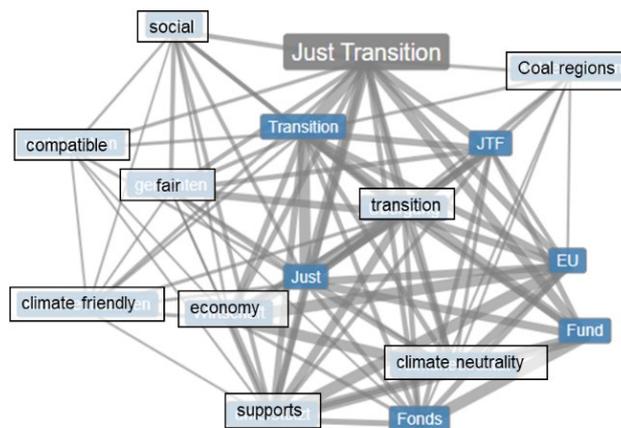


Figure 5-6: Word graph for the term “Just Transition” used in the German media in 2022. The significance of co-occurrences is indicated by the line width.

The term **decarbonisation** (Dekarbonisierung) is exclusively used to describe the transformation of the economy, especially the energy economy. It first appeared in the database in 2010 and is introduced as a concept for the world economy. Until 2015, the reporting is reduced to national formats (like tagesschau.de or presseportal.de) without a regional reference. In 2015, the number of entries increases due to the G7 Summit at Schloss Elmau in southern Germany. Among other things, the G7 countries agreed to reduce global greenhouse gas emissions by 70% by 2050 and to fully decarbonize the global economy by 2100. In the following three years, frequent co-occurrences are “2050”, “transport”, “energy transition” and “target”. Indicating that the decarbonisation is discussed in the frame of the transport system and the target to shift freight transport to rail. Since 2018, regional media sources have also been reporting on the issue as effects on industry and enterprise businesses come into discussion. Since 2019, “digitalization” is the most frequent co-occurrence. Together with Decarbonisation and Demography, it is demarked as a megatrend of the present in Germany. The increasing number of entries shows how the topic is getting more attention in the national and regional media landscape. Recently, in 2021 and 2022 the word “hydrogen” is one of the most frequent co-occurrences: “Nevertheless, it is becoming increasingly clear that decarbonisation and the achievement of climate targets are not possible without green hydrogen.”

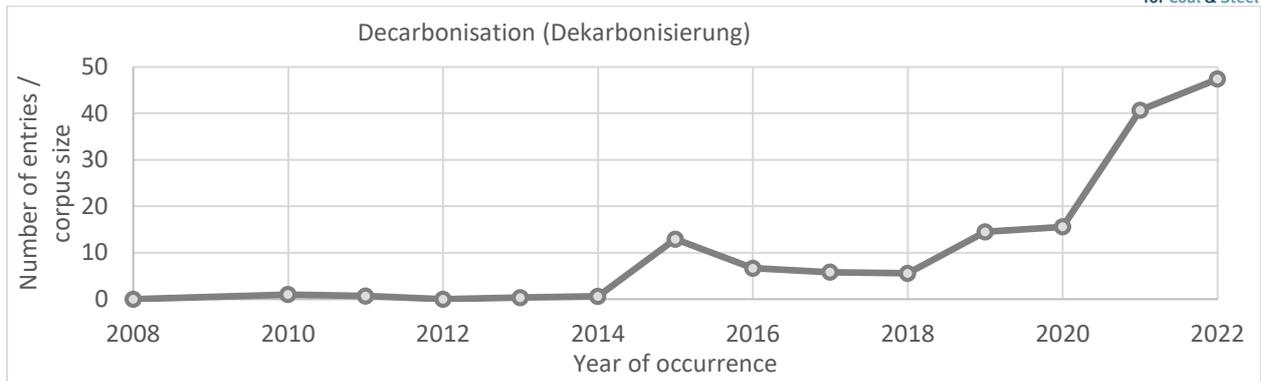


Figure 5-7: Relative frequency of the word “Dekarbonisierung” (decarbonisation) with time.

“Green Deal” is first occurring in the database in 2008:” Meanwhile, in the UK, there is an idea of a Green Deal.” The following 5 years there are hardly any entries. In 2019, the number of entries increases to a relatively high number due to its discussion within and around the EU-Commission: “Commission President Ursula von der Leyen will soon announce a Green Deal for climate protection and introduce it to the Council and Parliament”. The number of entries more than doubles in 2020, but the co-occurrences do not change, showing that the reporting concentrates on the EU-Commission. We did not find any critical entries in the database.

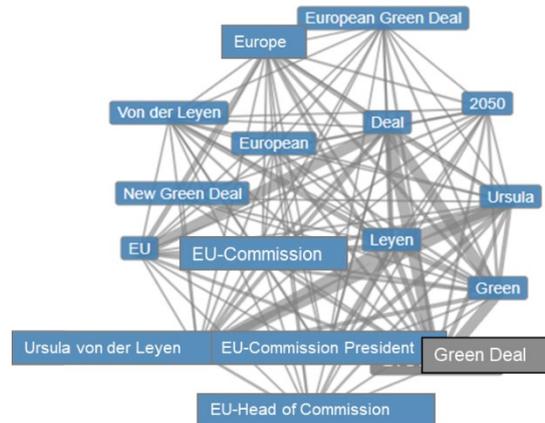


Figure 5-8: Wordgraph 2019 for “Green Deal”

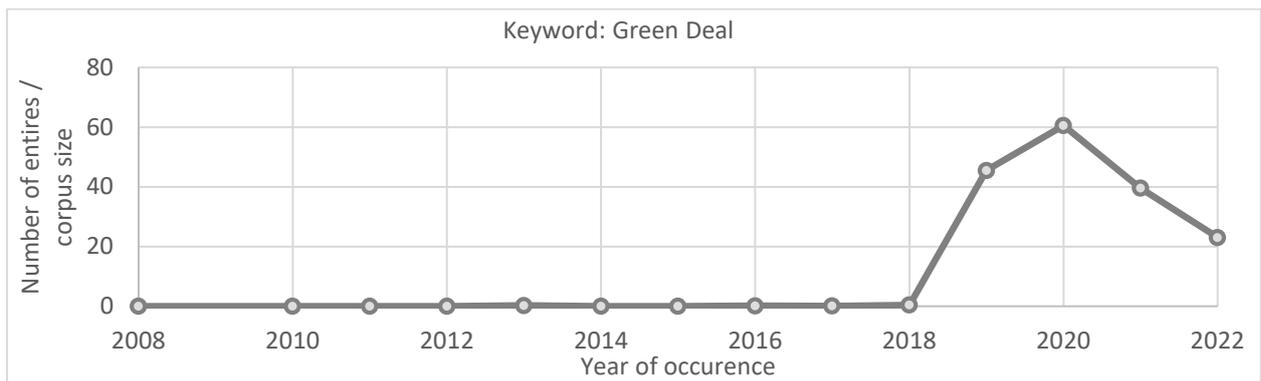


Figure 5-9: Relative frequency of “Green Deal” in the German database between 2008 and 2022.

5.3 Perspective on coal transition

Coal production and use has been a main focal point in Germany’s energy policy. In the 1950s and 60s energy policy mainly focused on first increasing then stabilizing the production of coal in the German hard coal mining regions (mainly Ruhr area and Saarland). After losing international competitiveness, the German coal industry was politically protected by subsidies to counteract the decline of domestic coal. In the 1970s and 80s the oil and nuclear energy complemented the energy mix, enforcing a decline of German hard coal production. The oil crisis however visualized the dependency on imports, making domestic coal more attractive again (Müller-Hansen et al.

2021). In the 1990s, energy supply declined, partly due to the restructuring of the economy of the former German Democratic Republic, the closure of some inefficient and polluting power plants in the new federal states and the privatization of utilities and lignite mines. (Renn and Marshall 2016). Controversies over the safety and disposal of nuclear waste have dominated energy policy over the last three decades far more than issues related to coal power. In the last twenty years, energy policy has been strongly influenced by efforts to promote renewable energies and the energy transition. In 2011, the conservative government announced the *Energiewende* ('energy transformation') and decided to reduce the amount of fossil fuels from 80% of the energy supply to 20% by 2050. Debates on coal evolve from coal as an economic base to coal as an environmental problem.

Since then, the dynamic situation of the energy transition and the coal phase-out have been addressed both regionally and nationally, as well as controversially. It has been demanded by major parties and various actors in the media and became an issue in public and political debate. The energy transition discourse transformed from a marginal position to political hegemony.

Buschmann and Oels (2019) argued that the institutionalization of the 1990 Electricity Feed-In Act created a discourse coalition for renewable energy that grew strong and fast. It paved the way for the adoption of the Renewable Energy Sources Act in 2000 and the decision to phase out nuclear power, which came into force in 2002. Until 2009, Germany's renewable energy policy progressed. In 2009, when the Liberal Party came to government, the new conservative-liberal government extended the lifetimes of nuclear power plants. This was legitimized with the energy mix discourse, which argued nuclear energy as a safe and affordable bridging technology into the solar age. At the same time, the 2010 energy concept secured the further expansion of renewable energies, promoted nuclear energy as a bridging technology and gave coal and gas a stabilizing role. Then in 2011, the accident in Fukushima forced the conservative-liberal government to return to shorter operating times for nuclear power plants. With the rapid growth of renewable energies, the costs of the energy transition multiplied, leading to discourses that problematized the support system for renewable energies. The discussions enabled a conservative-social democratic government to reform the Renewable Energy Sources Act in 2014 and 2016 and to limit the subsidized expansion of renewable energies to fixed quotas. (Buschmann and Oels 2019)

According to our analysis, the coal phase-out was discussed most frequently in the media in 2019, when the coal commission advised the government on the phase-out plan. In terms of content of media entries, the period by which the phase-out is to be completed, the European Coal Commission, the German government and Lusatia play a role. The topics illustrate well how the coal phase-out affects the various decision-making levels: from the international European framework to the national and regional discourse.

In 2018, the year of closure of the last hard coal mine in the Ruhr region, the national *Süddeutsche Zeitung* ran the headline "The Ruhr area manages structural change - More than just coal" (cf. Wernicke 2018). The article examines the downsides of the coal phase-out for the region, such as an above-average rate of unemployment and welfare recipients, or the correlating billions of euros in old debts. These problems can only be solved locally to a limited extent and are dealt with in the state capital of Düsseldorf or even Berlin.

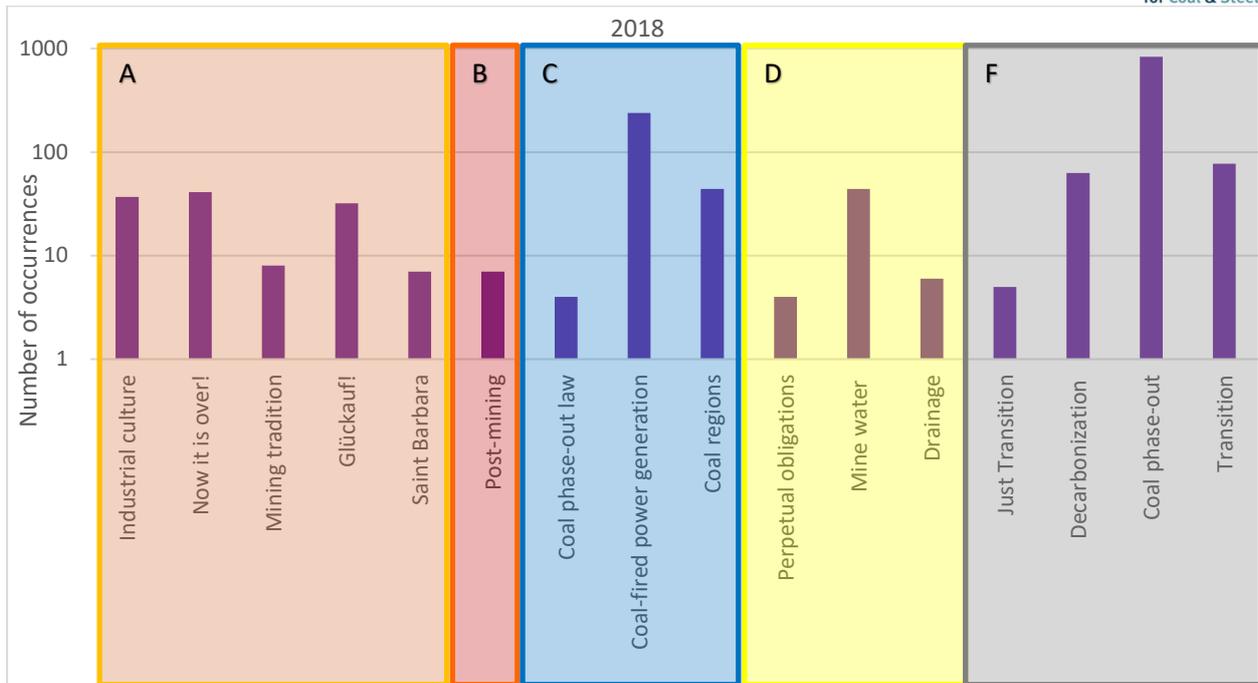


Figure 5-10: Number of occurrences of content-related words in logarithmic order in the German corpus of 2018. The colored boxes indicate the category. Orange: A) Solidarity/Identity, red: B) Site development, blue: C) regional development, yellow: D) technical tasks grey: F) Perception EU.

These findings correlate with the results of our analysis, as the most frequent terms **coal phase out** and **coal fired power regeneration** indicate the national medial significance of the phase-out. Looking into the sentiment analysis, the terms seem to have a more negative tonality on average and the corresponding data sources are mainly superregional. The more positive sentiments are connected with category A) “Solidarity / Identity” (Figure 5-11). Expressions defined here are identity-forming with the cultural history regarding the industrial heritage and occur with higher frequency in the corpus of 2018 (Figure 5-10). These terms have been taken up above all by the regional press around the closure of the last colliery, on the one hand to recall the region's long mining history and on the other hand, if you like, to bid farewell to the profession of miner. Not only those who have experienced the active coal production phase, but also and especially the younger generation identifies strongly with the local-regional area of the Ruhr region. In addition, local politicians are perceived as being much more receptive to the wishes and citizens' wishes and concerns (Korte and Dinter 2019). When analyzing the news sentences about specific after-use projects, it is noticeable that precisely this feeling of attachment and identity with the region and its history is deliberately picked up again in the reporting in order to use the positive tonality.

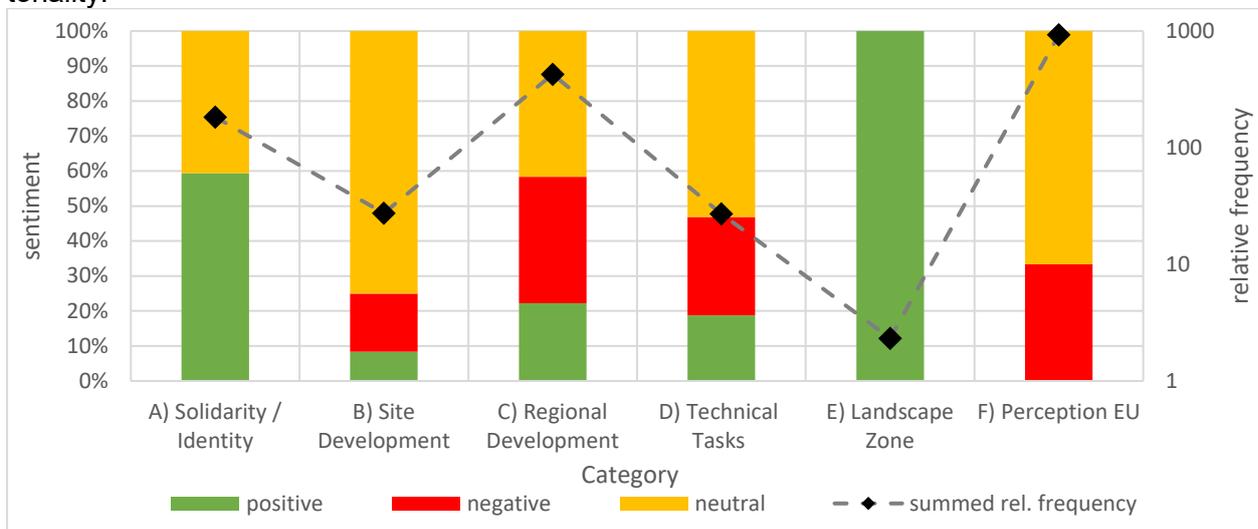


Figure 5-11: Summed tonality and relative frequency of media entries in the defined category for the entire German database.

The Ruhr area's coal transition has received increased media attention in recent years in the context of the federal government's 2020 decision to phase out coal-fired power generation by 2038. Plans by the federal state of North Rhine-Westphalia and the energy company RWE even envisage an early phase-out by 2030 (cf. LPB.NRW 2022). The energy transition is "the biggest project that we have had to pass in terms of the national economy since reunification". The medial discussion around the phase-out is more shifting to national and international significance, as the highest number of entries in the database of 2020 refer to terms of category F) Perception EU. Simultaneously topics around the regional development (Category C) evolve more frequently while the technical tasks get minor attention (Figure 5-12).

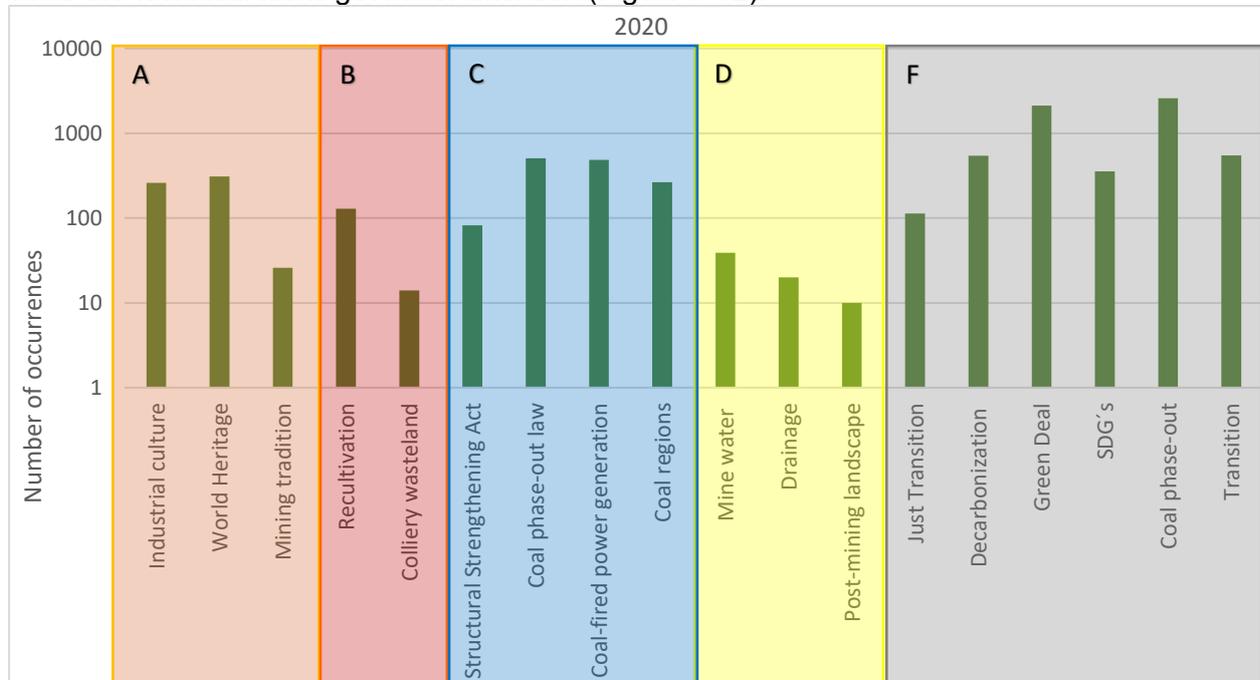


Figure 5-12: Number of occurrences of content-related words in logarithmic order in the German corpus of 2020. The colored boxes indicate the category. Orange: A) Solidarity/Identity, red: B) Site development, blue: C) regional development, yellow: D) technical tasks, grey: F) Perception EU

Recent political decisions at state and federal level in response to the worsening climate crisis are changing the image of the Ruhr area, which has the highest density of coal-fired power plants due to historical developments within Germany. In this context, the reduction of distance areas for wind turbines in North Rhine-Westphalia, which was decided in 2023, should be mentioned. The future dismantling of coal-fired power plants and the simultaneous construction of wind and solar capacities is being discussed nationally in the media, but also in regional media in relation to specific locations. This is a development that is also viewed critically by the local electricity-intensive industry, such as steel production (cf. Helmecke 20.07.2023). In the context of the coal phase-out, the energy question is becoming a question of existence and the future. The move away from coal also creates new opportunities for the densely populated region. For example, more than € 600 million in federal funding is flowing into the rehabilitation of five former power plant sites (cf. Bremken 13.12.2022). This means that the coal phase-out can open up new areas of potential in order to counteract the "threat of a lack of prospects for the region", as Ruhr State Secretary Josef Hovenjürgen put it in a newspaper interview (cf. Korfmann 12.07.2023). In mid-2024, the implementation of smaller distance areas for wind turbines in the relevant federal state development plan is expected. Subsequently, suitable areas will be designated in the regional plan for the Ruhr area.

6 Poland

6.1 Evaluation of media landscape

6.1.1 Historical background

Poland's energy transition history is deeply rooted in its rich tradition of hard coal mining, which has significantly influenced the nation's economy and society for centuries. This chapter provides an overview of the pivotal moments in coal mining history. As demonstrated by the analysis from the WINTER project, these moments, in the case of Poland, correlate strongly with surges in media interest. This historical context sheds light on the complexities and challenges of the topic, offering a more comprehensive perspective on the issue.

Poland's rich tradition of hard coal mining traces its roots back to the Middle Ages, contributing significantly to the nation's economy and societal development over centuries. The country is known for its substantial hard coal and lignite resources, with the majority of mines concentrated in the Silesian Voivodeship. For an extended period, Poland consistently ranked among the top global and EU coal producers, reaching its peak during the prosperous 1980s. However, the early 1990s marked a pivotal turning point in Poland's coal industry. This era witnessed a gradual decline in coal utilization, mine closures, and a sharp reduction in hard coal extraction—a trajectory aligned with the broader European Union's shift away from coal (Szpor, Ziółkowska, 2018). Coal production in Poland saw consistent growth until the late 1970s. However, challenges arose due to the economic structure within the Eastern Bloc. Productivity in mines declined, compounded by limited access to global markets, culminating in a challenging period for the industry in the 1980s. As Poland began its transition from communism in 1989, its hard coal mining industry remained robust, compared to Western European countries reducing coal production. Poland's mining sector, accustomed to preferential treatment and a sense of entitlement, embarked on a journey of restructuring.

Starting in 1990, significant changes were initiated as part of this restructuring effort. These included a reduction in the number of mines, a decrease in coal extraction volume, a shift in sales strategies, and substantial job cuts. Despite considerable public investments aimed at supporting mining reforms and a significant reduction in employment, subsequent reforms failed to enhance the mining sector's economic efficiency. Ineffective communication among stakeholders and political instability further complicated matters. Moreover, addressing the economic and social challenges posed by restructuring, such as workforce transition and retraining, as well as preserving the cultural identity of the Silesian Voivodeship's inhabitants, remained unfulfilled (Kaczorowski, Gajewski, 2008). Mining trade unions have played a significant role in impeding the restructuring of the mining industry at every stage. Their influence has secured high employment rates and generous compensation for Polish miners, making them a potent force compared to their counterparts in other countries. Polish miners benefit from shorter workdays and workdays per year, additional leave, supplementary monthly bonuses, and the option of early retirement, partly owing to the unions' efforts. These unions exert political pressure through lobbying, direct negotiations with politicians, and strikes. The largest miners' strikes, often triggered by mine closures, have evolved into massive demonstrations, occasionally escalating into confrontations with law enforcement.

In 2015, Poland's Law and Justice Party (PiS) won parliamentary elections, emphasizing its commitment to coal. State-owned coal companies, especially Kompania Węglowa, were in dire financial straits, leading to the creation of Polska Grupa Górnicza (PGG), a joint-stock company, with capital injections from public and private sources. However, Poland's coal industry continued to experience losses in production, efficiency, and consumption, characterized by declining production, efficiency, consumption, and imports. Escalating coal prices, miner wages, employment costs, and extraction expenses have fueled arguments advocating mine closures, supported by economic data.

Growing environmental concerns, particularly driven by the EU's Green Deal, have intensified debates about closing coal mines. Despite government assurances, coal's importance in energy security and its cultural significance in the Silesian region remain significant. Recent studies reveal resistance among Silesian miners to the transition away from coal. Consequently, Poland has embarked on a 30-year plan to phase out hard coal mining (with the end date planned on 2049), supported by a social agreement signed in May 2021. This transition aligns with global efforts under the Paris Agreement to limit global warming by reducing fossil fuel dependency. To

address economic concerns and ensure a fair transition, Poland and other coal-dependent nations are looking to the EU's Just Transition Mechanism. This initiative supports regions heavily reliant on coal as they shift towards a zero-carbon economy, safeguarding both employment and the environment.

Current state of coal and lignite mining industry

Currently, Poland holds the distinction of being the largest producer of hard coal, accounting for 52.8 million tonnes, and the second-largest producer of brown coal, with a production volume of 54.6 million tonnes. However, it is important to note that hard coal production in Poland experienced a decline in 2022, amounting to 52.8 million tonnes, marking a 4.0% reduction compared to 2021. Production efforts faced challenges due to mine closures and the commitments of the 2020 social contract, which set a goal to phase out coal mining entirely by 2049. Poland imported 20.1 million tonnes of hard coal in 2022, comprising 17.1 million tonnes of steam coal and 3.0 million tonnes of coking coal. This import figure reflects a substantial increase of 50.2% compared to 2021, surpassing the previous record peak of 19.7 million tonnes recorded in 2018. On the other hand, lignite production in Poland witnessed growth, reaching 54.6 million tonnes in 2022, representing a 4.3% increase over the production volume in 2021. (Euracoal, 2022). According to data from the World Bank (World Bank Group, 2022), as of the end of 2020, it is estimated that approximately 88,000 people were employed directly in the coal and lignite mining conglomerates in Poland.

Energy transition plans

The currently applicable document concerning Poland's energy transformation is the Energy Policy of Poland until 2040. This strategic plan outlines several key objectives, including (Energy Policy of Poland until 2040, 2021):

- A target of no more than 56% coal in electricity generation by 2030, reflecting a significant reduction in coal's role in the energy mix.
- A commitment to achieve at least 23% renewable energy in gross final energy consumption by 2030, emphasizing the growth of sustainable energy sources.
- The introduction of nuclear energy into the energy mix by 2033, aiming to diversify energy sources.
- An ambitious goal of reducing greenhouse gas (GHG) emissions by 30% by 2030 compared to the levels recorded in 1990, demonstrating a commitment to combat climate change.
- A target to reduce primary energy consumption by 23% by 2030 compared to forecasts from 2007, reflecting efforts to improve energy efficiency.

Nevertheless, it has become evident that adjustments are necessary to align the Energy Policy of Poland until 2040 with the evolving realities of the energy landscape. Pressing factors such as escalating energy prices, limitations on Russian fuel imports, the urgent need for energy security, and heightened greenhouse gas emissions have underscored the importance of revising the policy. Although work on the policy update is currently underway, progress has been slow. The proposed changes are expected to include more ambitious climate goals in response to the evolving global climate agenda.

6.1.2 Today's media landscape

The discussion surrounding energy transformation in Poland has gained momentum relatively recently, with talks on this topic and the number of articles related to it increasing since 2018. This surge in interest appears to be driven primarily by external factors, including European Union regulations such as the Green Deal and the Just Transition Fund, as well as global crises like the COVID-19 pandemic and the conflict in Ukraine.

Energy transformation discussions in Poland mainly occur at the national level, where most crucial decisions are made. National media outlets in Poland exhibit a diverse range of perspectives on energy transformation, with the tone of their articles often reflecting their political affiliations. The polarized nature of Polish politics has contributed to a divided media landscape, where outlets associated with different political parties may portray energy transformation as either a promising opportunity or a concerning challenge.

While local and regional media outlets do cover the topic of energy transformation, their focus tends to be on region-specific developments. These reports often provide information on newly established energy projects, such as photovoltaic farms on former coal mining sites. This suggests that local and regional media outlets are more concerned with practical aspects of the transformation within their specific areas rather than engaging in broader policy discussions.

The region most frequently associated with energy transformation discussions in Poland is the Silesian Voivodeship. This area is historically intertwined with coal mining, boasting the highest number of active coal mines and significant employment in the sector. Consequently, much of the regional discourse centers on the transition of coal-dependent industries and the challenges faced by mining companies in adapting to changing energy dynamics.

A multitude of stakeholders actively engages with the media on energy transformation issues. This engagement includes national and regional decision-makers, experts, environmental organizations, and business leaders. These diverse voices contribute to the richness and complexity of the media landscape, presenting various viewpoints and policy recommendations.

6.2 Discussion of main search attributes

A Solidarity/Identity

In the context of issues related to solidarity and identity, the concept of the 'social contract' has come into sharp focus. Discussion of this topic has been gaining momentum since 2020, reaching its peak in 2021 (Figure 6-1), aligning with intensive efforts to craft this crucial agreement. The social contract revolves around the transformation and gradual phase-out of coal mines in Silesia by 2049. It is structured around key principles, including strategies for mine closure, financial support for the mining industry, and the protection of the social well-being of workers affected by this transition.

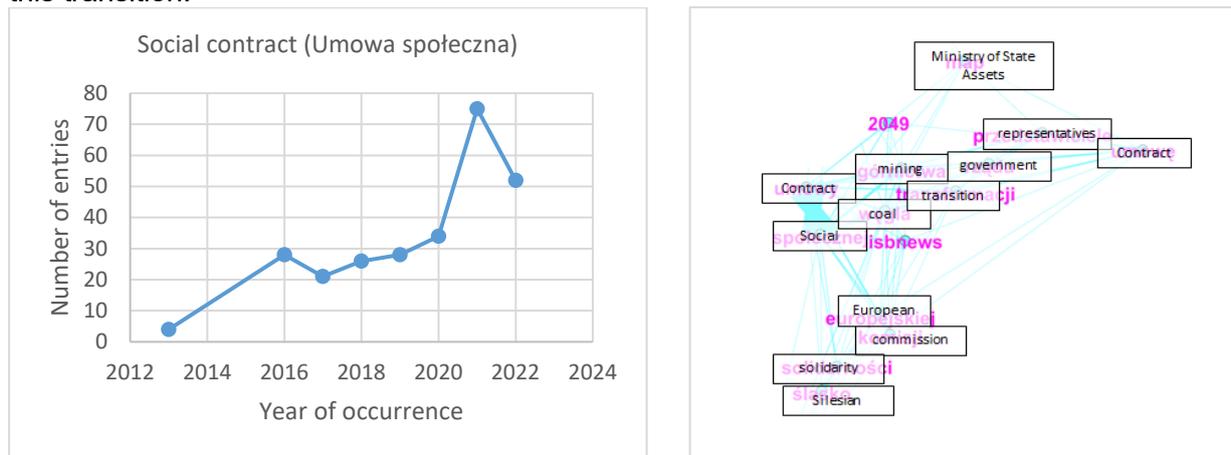


Figure 6-1: (left) Number of occurrences of the term “Umowa społeczna” (Social contract) over time. (right) Word graph with nearest word co-occurrences of the words “Umowa społeczna” (Social contract), 2021.

It is worth noting that unlike the Silesia region, other coal mining regions in Poland lack similar documents or agreements to address the challenges tied to coal phase-out. This underscores that the coal transformation is primarily associated with the Silesian Voivodeship.

In the public sphere, the pace of progress in formulating the social contract was perceived as slow – the process took seven months. In the realm of media analysis, the scope of messaging varied from a neutral and informative tone to a more negative one, especially from trade unions, which played a significant role in shaping public sentiment.

The analysis reveals that the process surrounding the social contract was essentially bilateral and was characterized by negotiations and discussions between the government and the social side, primarily represented by trade unions. The work by Krzywda et al. (2021) also indicates that regional authorities were excluded from these negotiations. These dynamics reflect the complexity and diverse interests present in the context of Poland's energy transition, especially in regions historically associated with coal mining.

Notably, the analysis did not identify any other keywords that would align with the solidarity/identity category.

B Site Development

In relation to the site development category, attention should be drawn to the key term 'rekultywacja' (reclamation). This topic is closely related to the transformation of regions during the transition process. However, co-occurrence words that appear predominantly in this topic mainly pertain to the reclamation of waste landfills. As shown in Figure 6-2, however, this theme remains detached from discussions at the national level and does not constitute a significant part of the discourse surrounding Poland's energy transformation (despite a minor peak in the frequency of this term in 2020, it was not associated with discussions related to energy transformation). This indicates that the focus of the transformation discourse lies in entirely different areas, primarily linked to energy supply stability and social aspects related to employment.

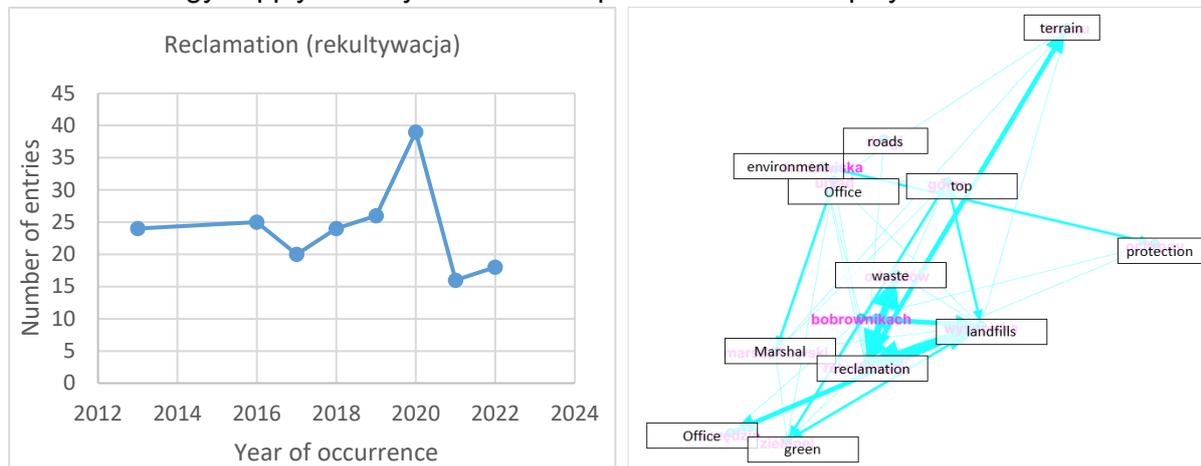


Figure 6-2: (left) Number of occurrences of the term “Rekultywacja” (reclamation) over time, (right) Word graph with nearest word co-occurrences of the words “Rekultywacja” (reclamation), 2020.

C Regional Development

The analysis of the regional development category shows that the topic of energy transition has been present in media discourse since 2018 and is enjoying increasing interest (Figure 6-3). The emergence of this issue in the media coincides with the announcement of the creation of the Just Transition Fund and the European Green Deal. In the initial years, media messages revolved around these topics. The energy transition is commented upon differently depending on its aspect and the stakeholder group discussing it. However, opinions often arise in the comments that the energy transition is progressing much slower than it should and that there is still limited utilization of renewable energy sources (RES). According to the Polish government, the country cannot currently afford the level of transformation expected by the European Union.

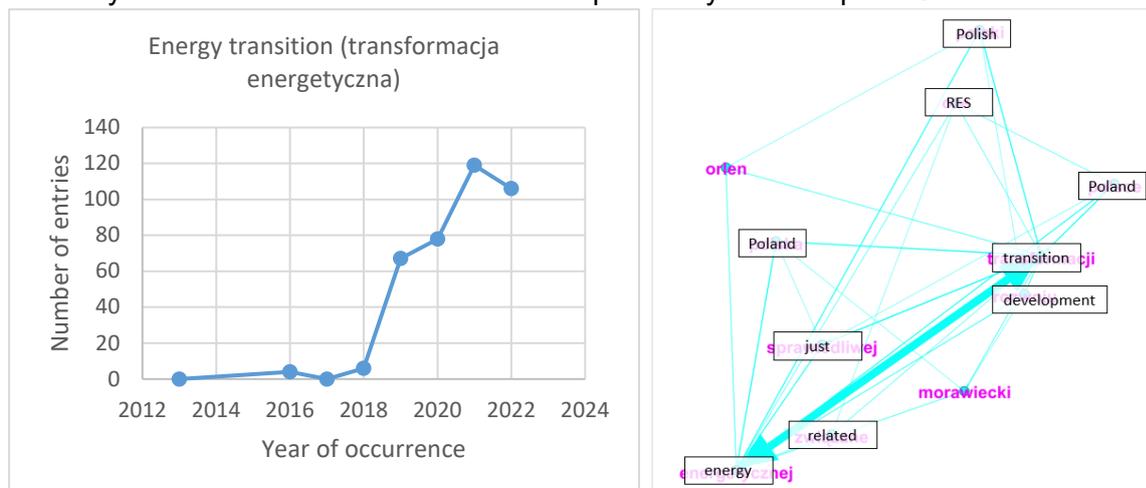


Figure 6-3: (left) Number of occurrences of the term “Transformacja energetyczna” (energy transition) over time, (right) Word graph with nearest word co-occurrences of the words “Transformacja energetyczna” (energy transition), 2021.

Once again, the conducted analysis reveals that in the media, there is a significantly higher frequency of discussion about hard coal mining (specifically in the Silesian Voivodeship) than about lignite mining (in other coal regions of Poland). The following charts provide a quantitative comparison of mentions related to hard coal and brown coal, hard coal mines (KWK), brown coal (KWB), and mining companies (PGG - for Silesia, ZE PAK - for the Konin region) - Figure 6-2 to Figure 6-6.

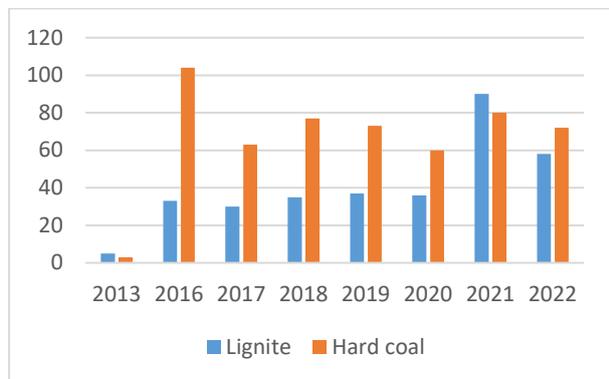


Figure 6-4: Number of occurrences of the terms “Węgiel brunatny” (Lignite) and “Węgiel kamienny” (Hard coal) over time.



Figure 6-5: Number of occurrences of the terms “KWB” (Lignite Mine) and “KWK” (Hard coal mine) over time.

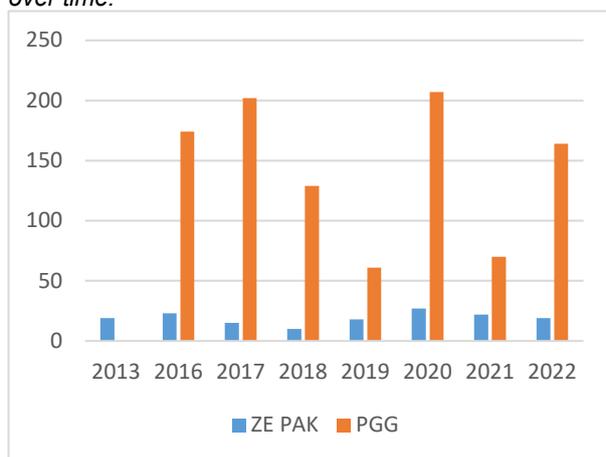


Figure 6-6: Number of occurrences of the terms ZE PAK and PGG over time.

D Technical tasks

In the context of mining technical tasks, it is important to note that topics related to this category occurred relatively rarely. Therefore, analyses concerning such tasks are not included in this report. Within the category of technical tasks, issues related to renewable energy sources were analyzed. Here, too, there is a significant increase in interest in this topic in 2019. However, the analyzed headlines show that these are grassroots initiatives, mostly related to specific investments. It less frequently appears in the context of Poland’s energy mix and the associated energy strategy. Notably, headlines about photovoltaics are often connected with prosumers. Investments in photovoltaics generally receive a positive reception. For wind farms, not only positive opinions are observed but also negative ones related to legal restrictions that hinder investment development or opposition from local communities. There are also topics related to the construction of offshore wind farms in the Baltic Sea. Figures from Figure 6-7 to Figure 6-11 provide a quantitative overview of keyword occurrences for this type of investment.

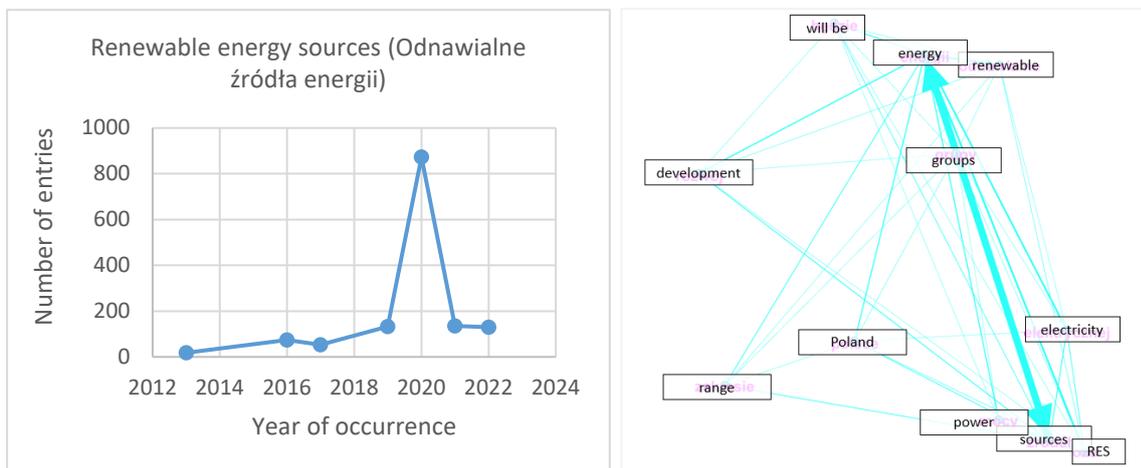


Figure 6-7: (left) Number of occurrences of the term “odnawialne źródła energii” (renewable energy sources) over time, (right) Word graph with nearest word co-occurrences of the words “odnawialne źródła energii” renewable energy sources), 2021.

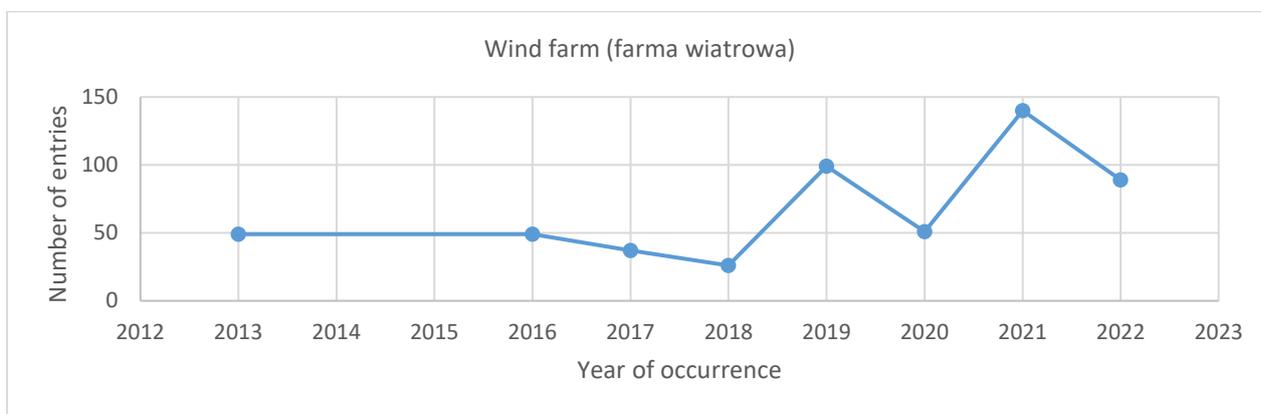


Figure 6-8: Number of occurrences of the term “farma wiatrowa” (wind farm) over time.

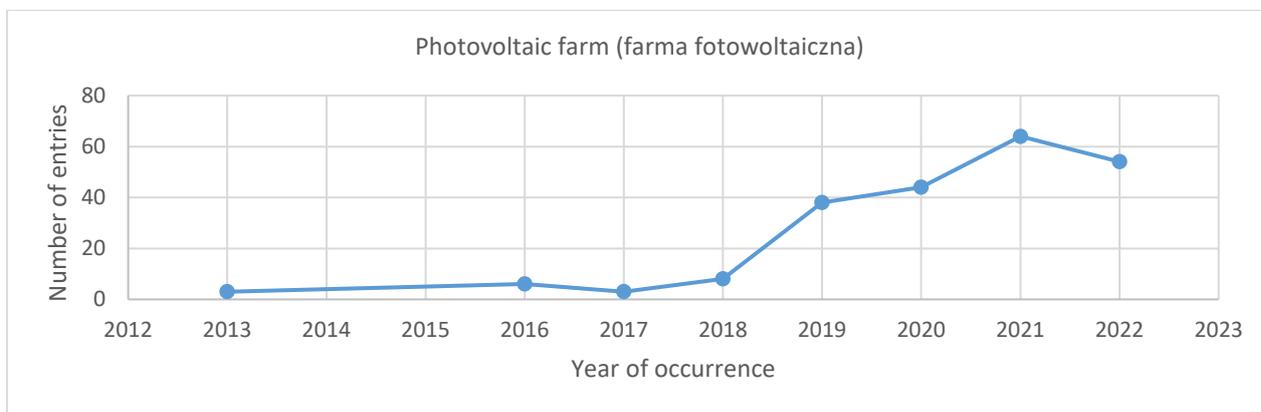


Figure 6-9: Number of occurrences of the term “farma fotowoltaiczna” (photovoltaic farm) over time.

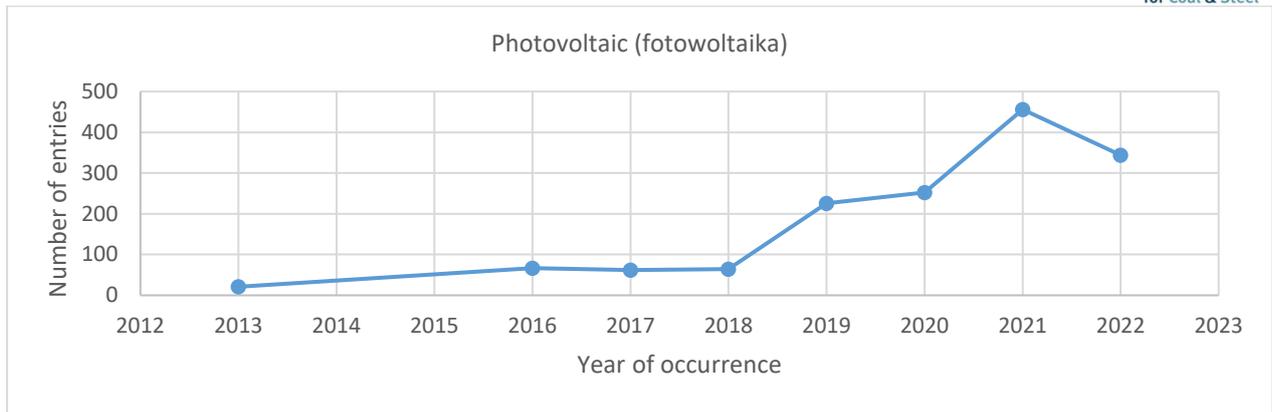


Figure 6-10; Number of occurrences of the term "fotowoltaika" (photovoltaic) over time.

In the context of shifting energy production towards less emission-intensive sources in Polish media, the topic of nuclear power plants has emerged. Currently, there is a significant surge in media interest in this subject, particularly due to the energy crisis and rising energy prices amid the conflict in Ukraine (Figure 6-11). It is important to note that prior to 2022, media narratives regarding nuclear energy were predominantly negative, and proposals for investments were met with strong opposition from local communities. However, the current trend is undergoing a significant change. Plans for the construction of Poland's first nuclear power plant are becoming increasingly realistic, and media sentiment is now characterized as neutral. This shift suggests that nuclear energy is seen as an opportunity for Poland to achieve energy independence from other countries and is considered an inevitable option. It is also worth noting that the increase in interest in the topic of nuclear power plants in 2022 is undoubtedly related to the conflict in Ukraine, as shown in the word graph with nearest word co-occurrences below.

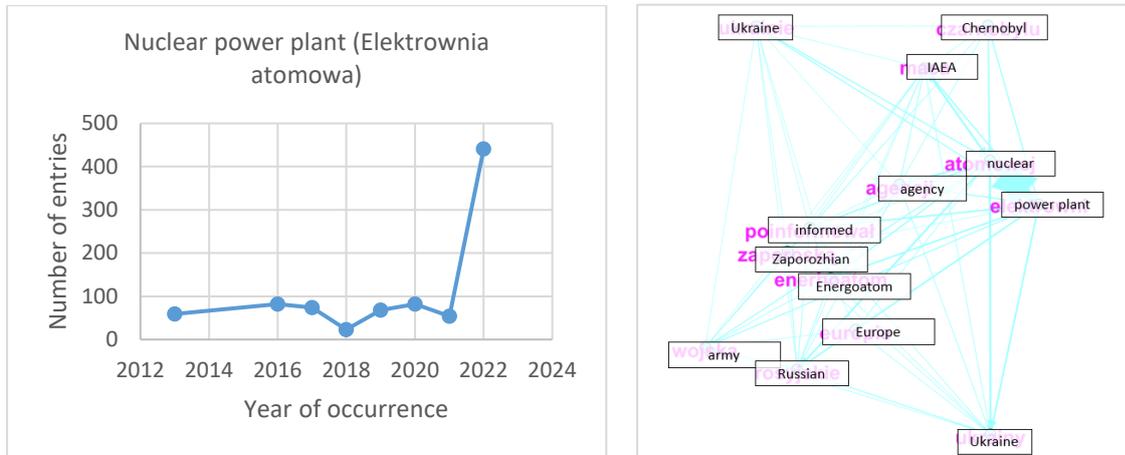


Figure 6-11: (left) Number of occurrences of the term "elektrownia atomowa" (nuclear power plant) over time, (right) Word graph with nearest word co-occurrences of the words "elektrownia atomowa" (nuclear power plant), 2022.

E Landscape zone

In the category of landscape zones in the media, there is noticeable concern among the local community related to dumps, spoil tips, and mining excavations. These objects are presented as problems stemming from inadequate management and even pose threats to life and health. Issues related to coal accumulation on dumps and difficulties in its sale are also raised. In the context of mining excavations, there are social concerns regarding plans to fill them with various types of waste.

In the context of energy transition, these topics arise infrequently and are usually treated as separate subjects. They are relatively seldom discussed in the media (Figure 6-12). It is worth noting that the highest number of mentions in the media within the landscape zone category occurred in 2018, coinciding with the establishment of the Just Transition Fund.

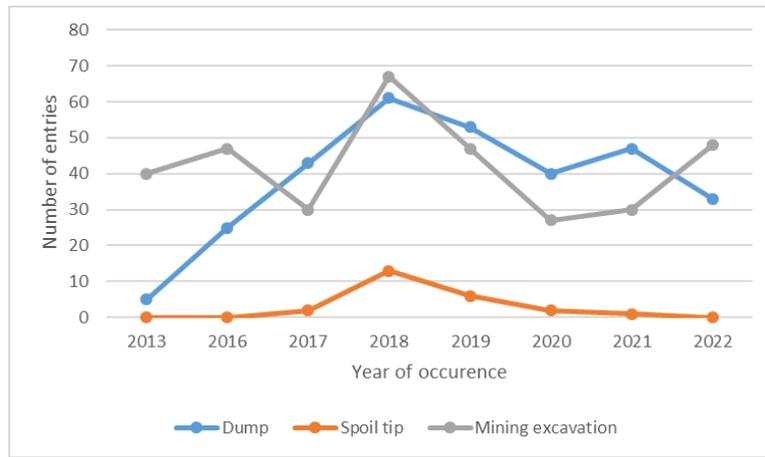


Figure 6-12: Number of occurrences of the terms “hałda” (dump), “zwałowisko” (spoil tip) and “wyrobisko” (mining excavation) over time.

F Perception EU

In the context of energy transition, the greatest interest of Polish media centers around the "Perception EU" category. Both the Green Deal and the European Union's initiatives have been widely commented upon. Despite ambitious challenges, the Green Deal is seen as an opportunity for the development of Polish regions in transition. Figure X provides a quantitative overview of issues related to the Green Deal in Polish media.

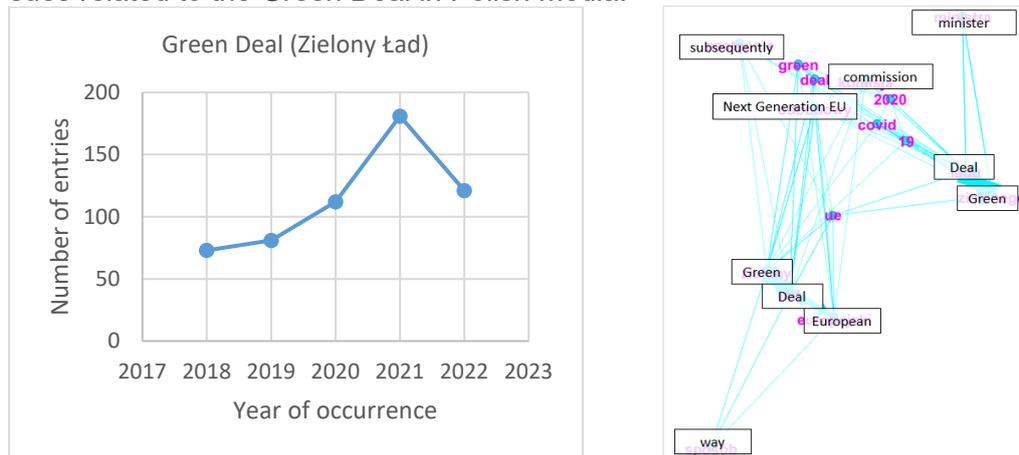


Figure 6-13: Number of occurrences of the term “Zielony Ład” (Green Deal) over time, (right) Word graph with nearest word co-occurrences of the words “Zielony Ład” (Green Deal), 2021.

The term "just transition," as portrayed in the media, is relatively less utilized compared to the concept of the Green Deal (Figure 6-13). Nevertheless, there is a notable negative connotation associated with this term, suggesting that in Poland, a just transition is seen as something that exists only on paper, with little evidence of corresponding government actions.

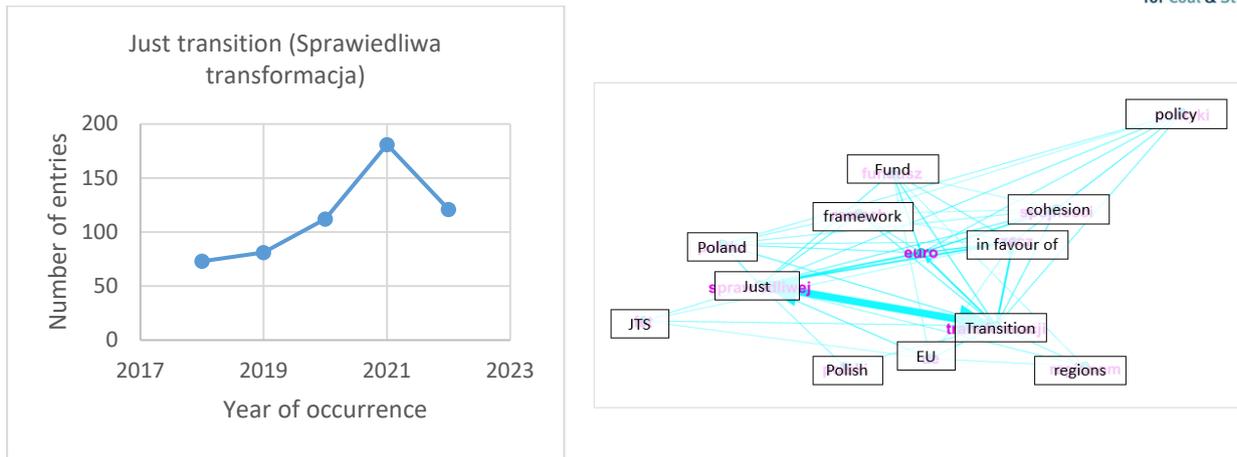


Figure 6-14: (left) Number of occurrences of the term “Sprawiedliwa transformacja” (Just transition) over time, (right) Word graph with nearest word co-occurrences of the words “Sprawiedliwa transformacja” (Just transition), 2021.

With the proposal for the Green Deal and the Just Transition Fund in Poland, a discussion about moving away from coal began. Prior to 2018, media analysis showed no results (Figure 6-14). Once again, significant differences in opinions among various stakeholders become evident. Government officials argue that Poland cannot afford to accelerate the transition away from coal, while environmental organizations emphasize the urgent need to do so. In the co-occurrence word graph, it can be seen that the discourse mainly revolves around the urgent need to move away from coal, but keeping in mind that energy security is important for Poland. The media also shows surveys, indicating that a majority of the population supports the shift away from coal.

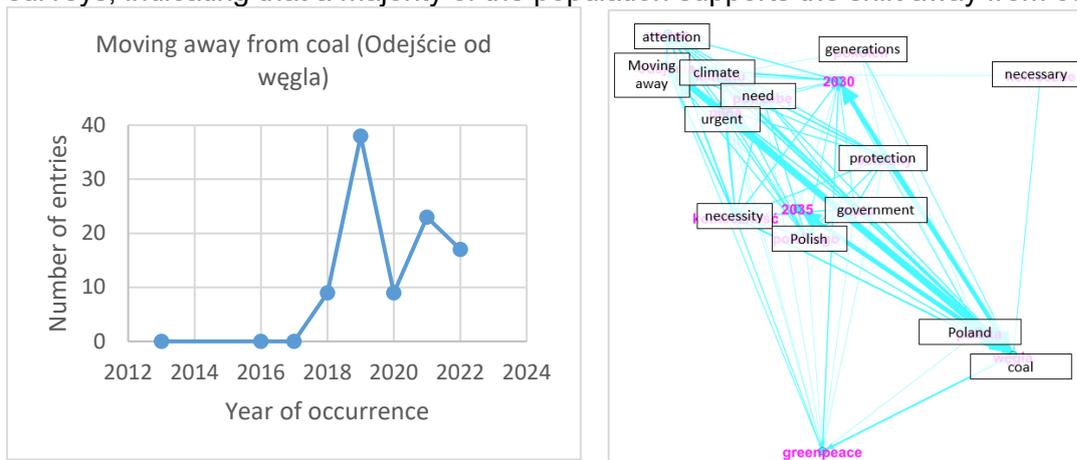


Figure 6-15: (left) Number of occurrences of the term “Odejście od węgla” (Moving away from coal) over time, (right) Word graph with nearest word co-occurrences of the words “Odejście od węgla” (Moving away from coal), 2021.

6.3 Perspective on coal transition

The analysis of media coverage surrounding Poland's energy transformation paints a nuanced picture, revealing a mosaic of perspectives and opinions in this intricate landscape. While the global trend leans towards reducing reliance on fossil fuels, Poland grapples with the implications of its coal-dependent energy sector.

At the heart of Poland's energy transformation discourse lies its enduring dependence on coal. Despite mounting global concerns regarding the environmental and health impacts of fossil fuels, the coal mining industry in Poland continues to receive steadfast support from the current government. This unwavering commitment underscores the formidable challenges and socio-economic consequences associated with transitioning away from coal.

The dialogue surrounding energy transformation in Poland involves an array of stakeholders, each offering a unique perspective. National and regional decision-makers, experts, environmental organizations, and entrepreneurs actively engage with the media, contributing to a rich tapestry of opinions that reflect the intricate nature of this complex issue.

Politicians in power in Poland often express caution about the high costs associated with energy transformation. They emphasize the importance of maintaining energy sovereignty and tend to

view the energy transition sceptically, considering it as externally imposed by the European Commission. These concerns underscore the delicate task of aligning national interests with broader EU goals and regulations.

In contrast to the government's stance, environmental organizations in Poland adopt a decidedly critical view of the nation's energy transformation efforts. They argue that government officials are not doing enough to combat climate change and advocate for an accelerated moving away from coal. These organizations play a pivotal role in keeping environmental concerns at the forefront of the public discourse.

Poland's labour unions play a pivotal role in shaping the discourse around energy transformation. They stand in solidarity with coal miners and advocate for a phased transition that takes into account the well-being and livelihoods of workers who will be directly affected by the shift away from coal. While acknowledging the inevitability of the transition, these unions emphasize the importance of safeguarding the interests of their members.

Conversations surrounding energy transformation in Poland often centre on energy security and social considerations. These discussions frequently revolve around the future employment prospects of coal-dependent regions and workers, but they may neglect to address environmental aspects or the challenges associated with repurposing former coal mining areas.

Media coverage has widely reported on the regional transition agreement, which pertains to the shift away from coal in Poland's Silesian Voivodeship. However, the agreement's reception varies among different stakeholder groups, highlighting the intricacies and divergent interests involved in the transition process.

The European Union (EU) plays a significant role in shaping Poland's energy transformation. EU policies and regulations related to energy transition often encounter scepticism and resistance from the Polish government, reflecting broader concerns in Poland about EU interventions in national energy policies. The EU's ambitious climate goals, including the European Green Deal, have put pressure on member states to reduce greenhouse gas emissions and transition to cleaner energy sources. Poland's heavy reliance on coal presents a unique challenge within this context, as coal remains deeply entrenched in the country's energy infrastructure and culture. Consequently, the Polish government's resistance to EU directives is, in part, driven by concerns about the economic and social consequences of rapid coal phase-out. The tension between national interests and EU climate objectives underscores the complex dynamics at play in Poland's energy transformation.

The Turów mine is indeed a highly contentious issue in Poland's energy transformation landscape. Its expansion and its effects on the environment, particularly in terms of groundwater levels, have attracted significant media attention and public concern. The dispute over the mine has even escalated internationally, with the Czech Republic filing a complaint with the European Court of Justice, citing environmental worries and cross-border impacts. The Turów mine's prominence in media coverage underscores its significance and the controversies surrounding Poland's transition away from coal while maintaining energy security and economic stability.

Views on renewable energy sources in Poland are sharply divided. The government often expresses scepticism or maintains a neutral stance regarding their potential role in the energy transformation. Additionally, wind energy projects face significant opposition from local communities. These communities are definitely more favourable to photovoltaics. These differing perspectives on renewable energy underscore the complex terrain of Poland's energy transition, where the path forward remains uncertain amid contentious debates over the role of sustainable energy sources in the nation's future energy mix.

Recent energy crises have reignited discussions about nuclear power in Poland. While nuclear energy was previously viewed negatively due to concerns stemming from the Chernobyl disaster, perceptions have shifted toward neutrality. Nuclear energy is increasingly seen as a potential stable energy source, reflecting changing sentiment in the face of energy challenges.

Media reports highlight the growing interest of the younger generation in energy transformation and environmental issues. The youth are often portrayed as recognizing the importance of a just energy transition in the context of climate change, signalling potential shifts in public sentiment over time.

Energy transformation is a prominent and hotly debated topic in the Polish media landscape. The country's heavy reliance on coal and the imperative to transition toward cleaner energy sources

have made it a subject of critical importance. However, the discourse surrounding this transformation is marked by a tense atmosphere and diverse, often opposing, opinions from various stakeholders. While some advocate for a swift transition to address environmental concerns and align with global climate goals, others emphasize the economic costs and the importance of maintaining energy sovereignty. The analysis and state plans suggest that the energy transformation process in Poland is likely to be a long-term endeavour, given the complexities of reconciling these divergent viewpoints and the need for careful planning to address socio-economic implications.

7 Consolidation

This chapter aims at comparing the analyzed media presence of the coal transition topic across the three case study regions. As discussed in the Methodology Chapter 2, the analysis relies on a heterogeneous database not only across the languages, but also across the different annual corpora within each language. In order to nevertheless aim for a comparison, the data must be checked and processed beforehand. Following the developed methodological approach of this study, the members of the consortium analyzed the period, which is relevant for the transition phase in each region with a random number of words and terms for each of the predefined six categories (A to F). The results were fed into a consistent evaluation scheme, which yields the following data for each corpus/year: The term itself, the English translation, the selected category and the data provided by the result page of the Leipzig Corpora Collection. This includes statistical data in the form of rank, frequency and frequency class, as well as the most-frequent co-occurrences and their visualization in the wordgraph (see Chapter 2.2). The person who is conducting the analysis must evaluate, if the search results of the web- tool (i.e. the crawled news sentences that contain the searched term) show a sufficient relation to the content of the topic and if the majority of entries has a positive, negative or neutral tonality. Unfortunately, the tool does not offer the possibility to exclude those entries that do not fit the topic, so only terms whose resonance is content related by a majority were analyzed.

In conclusion, the search results are based on the following characteristics:

- Unbalanced databases regarding the different languages
- Unbalanced databases regarding the different annual corpora within each language
- The entries are often not exclusively related to the topic
- There are sometimes too few results to make a significant quantity

Therefore, the data was processed by assessing the following criteria:

- Entries that show a content relation (Content relation: Yes)
- Corpora between 2016 and 2022 (as they are available for all languages)
- Number of occurrences > 5

The (relevant) results filtered based on the above-mentioned criteria are then statistically calculated depending on the frequency class (which is less dependent on the corpus size) and the summed tonality.

In category **A) Solidarity / Identity**, all terms and words, which have an identity-forming and solidarizing character, were to be analyzed. The resulting relevant search attributes differ a lot among the three case study regions. In the following, all terms, which are displayed in quotation marks, are the literal translation of the original search attribute. In Germany, the word “industrial culture” has the highest relative frequency (i.e. numbers of entries relative to the corpus size) among all defined terms, followed by “Glückauf! (the typical miners greeting) and “socially acceptable”, the way in which jobs were to be cut before and during closure of the coal mines. In the Greek case, most relevant words of this category are site or region names, just those places where the coal transition occurs (“Ptolemaida”, “Megalopoli” and “Western Macedonia”), as well as “S.P.P – Steam Power Plant”, “plant” and “St. Barbara”. Among all terms, “Western Macedonia” and “plant” have the highest relative frequencies across the analyzed corpora. In the Polish case, the identity-forming term with the highest number of occurrences in relation to the corpus size is “social contract”, followed by “mining industry”.

In Category **B) Site Development**, the defined words do not differ much among the case study regions Poland and Germany. In the German case, relevant results were found for the terms “Recultivation” (with the highest mean relative frequency), “Post-Mining” and “Colliery wasteland”. The Polish most frequent and relevant terms connected to this category are “Recultivation”, followed by “Post-Mining”. The Greek database yields relevant results for “waste”, “re-use” and “de-lignification”, with the latter showing the highest number of occurrences.

In Category **C) Regional Development** the German database yields relevant results for the terms “structural change”, “coal regions” “coal-phase out law”, “coal fired power generation” and “structural strengthening act”. This category contains the highest number of relevant words in the Polish database compared to the other categories: “Energy transition”, “Open pit mine”, “coal”, “brown

coal”, “hard coal”, “KWB”, “KWK”, ZE PAK”, “Polska Grupa Górnicza”, “PGG”, “Coal basin”. Relevant search attributes in the Greek database with their frequency class in descending order are “Transition”, “Mine”, “coal”, “lignite” and “carbon”.

Category **D) Technical Tasks** contain relevant results for “Perpetual obligations”, “mine water” and “drainage” in the German corpora. The Greek database does not yield any relevant results in this category. Polish relevant terms are “Photovoltaic”, “Nuclear power plant”, “Wind farm”, “photovoltaic farms” and “renewable energy sources”.

In category **E) Landscape Zone**, the only relevant term in the German database is “post-mining landscape”. In the Greek it is just “Solar park” and in the Polish corpora the words “dump”, “mining excavation” and “spoil tip” yield relevant results.

Most relevant results are found in the last category **F) Perception EU**, which summarizes all terms and words that classify the perception of the coal phase-out at the European level. The German database displays relevant results for “Just Transition”, “decarbonisation”, “Green Deal”, “SDG’s”, “coal phase-out” and “transition”. In the Greek corpora “decarbonisation”, “Green Deal”, “European Green deal”, “climate change”, “climate crisis”, “Just Transition”, “Green Transition”, “Energy Transition”, “Just Development Transition” and “European directive” are relevant search attributes. The Polish database yields relevant results for “Just Transition Fund”, “Green Deal”, “Climate Change”, “Just Transition”, “Decarbonization”, “Energy crisis”, “Global warming”, “greenhouse gases” and “moving away from coal”.

7.1 Frequency of media entries across the regions

Comparison of the different frequencies of words and terms defined in the categories (A to F) was carried out using the provided statistical number of the frequency class. The frequency class is the division of words into groups according to their frequency in the corpus. Words of the same frequency class occur approximately equally often in the corpus. The classes are often ordered and numbered according to the frequency of the words they contain, so that the number of the class allows a statement about the frequency of the assigned words (Biemann et al. 2022). The information on the frequency class of each term and corpus within the different languages was summed up and averaged for every category. Taking these numbers as a measurable indicator for the significance of the category, it becomes possible to seek a comparison. **The higher the frequency class, the lower the significance.** The results are visualized in Figure 7-1. The Greek database did not yield any results for Category D Technical Tasks).

Comparing the frequency of all categories in the German database, topics surrounding the category F) Perception EU show the highest significance in the German case. Category A) Solidarity/Identity, B) Site Development and C) Regional Development are most frequently represented in the Greek database. The most significant terms stem from category D) technical tasks for the Polish case study.

Technical tasks of the transition phase (category D), especially those connected to post-mining issues and attributes connected to category E) Landscape Zone show the lowest medial resonance in the German database. Looking into the results of the other two case study regions, those topics seem to have more significance. In the Greek database terms describing the landscape area have less frequent hits. For the Polish case, relevant terms are less frequently represented within the categories of B) Site Development and A) Solidarity/Identity.

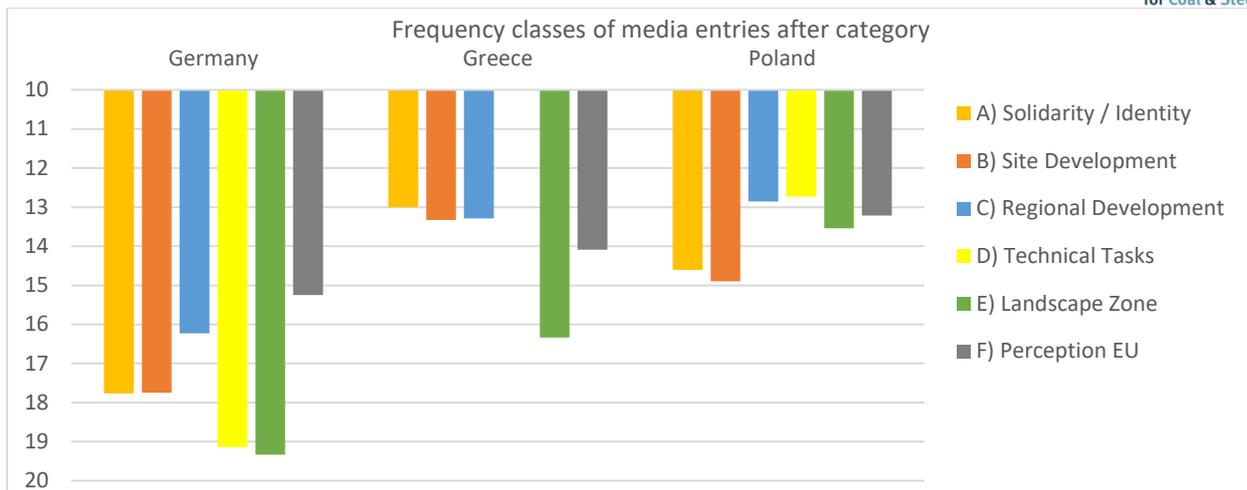


Figure 7-1: Summed mean frequency classes for the defined categories in each case study region. The lower the frequency class the higher the significance of the associated words in the database. No relevant results were found in the Greek database for Category D Technical Tasks).

7.2 Comparison of consistent search attributes

Across all defined relevant search attributes, which were defined by the members of the consortium, only four are consistent literally and content. It is not surprising that they are all from category F) Perception EU. Relevant search attributes are those words which have a significant amount of hits in the database and which display content related results between 2016 and 2022.

7.2.1 Just Transition

Relevant results for “Just Transition” appear firstly in 2018. The relative frequency shows the highest number of entries in Poland in general. In relation to the media entries in the other case study regions, it seems to have a much higher medial resonance here. The entries have a notable negative connotation. The prevailing opinion sees a Just transition only as something that exists on paper, with little evidence of corresponding government actions. Negative voices are for example “It can be assumed that for the government, the term ‘just transition’ does not refer to focusing on renewable sources, but to the fact that Poland will continue developing coal energy, which other countries should accept.” However, there are also many neutral statements such as: “At the beginning of November, Deputy Minister of Labor, Development, and Technology Iwona Michałek informed that territorial plans for a just transition (TPST) and the national plan should be completed and submitted to the European Commission by mid-2021”.

In the Greek media, Just Transition and similar words (green transition, fair transition, etc.) are firstly mentioned in 2018 with a neutral to positive sense, which further increases towards 2022. In the regional data of the Greek media, terms associated with just transition have their maximum occurrences in 2020, 2021 and 2022. The high medial discussion relates to the timing of the development of the National Energy & Climate Plan (NECP) for the transition regions. There are fewer mentions in general compared to the Polish results, but those entries have a neutral to positive tonality. They appeal to the public's sense of community and emphasize the need for change: “It remains clear that a “Just Transition” must be properly planned, taking into account both the concerns and the positions of the last citizen of society”. “Even smaller countries, such as Greece, can have a significant impact on the green transition at international level”.

The number of entries is lowest in the German media in relation to the distinct corpus sizes. Here, the uncertainty about the topic leads to a more neutral tonality of reporting. “Certainly, the current pace of coal phase-out, especially in Central and Eastern Europe, is mainly influenced by the European Green Deal, including the creation of the Just Transition Mechanism and the corresponding fund.”

In conclusion, the highest frequency in Poland is accompanied with a high number of negative entries, indicating a lack of trust. The more neutral reporting in Germany is indicative for the uncertainty, whereas the Greek media support the concept with primarily positive, appealing or factual statements.

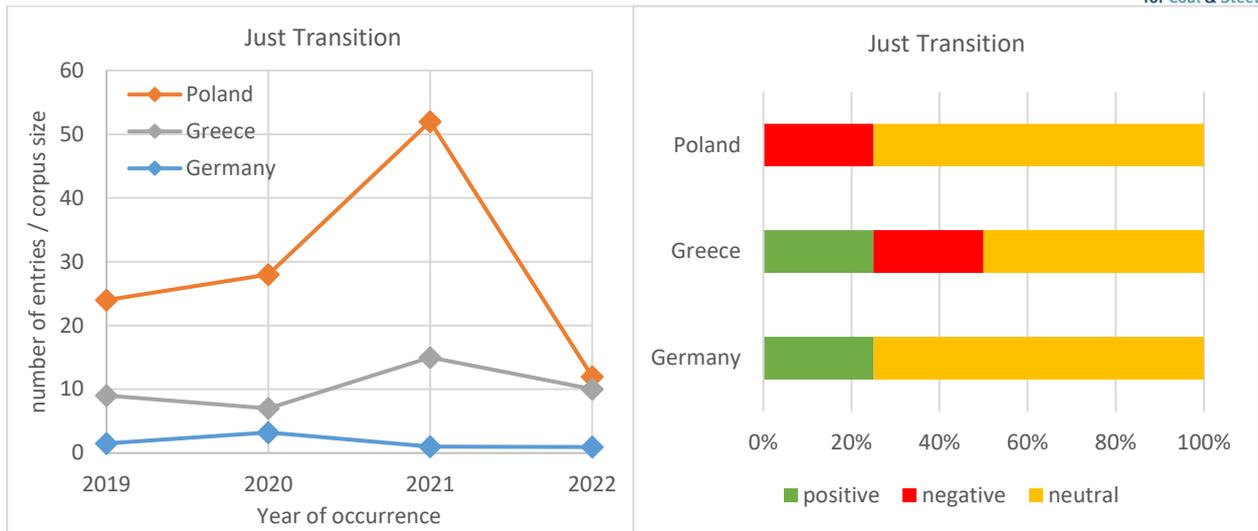


Figure 7-2: Relative frequency and mean tonality of “Just Transition” in the media entries of the German, Polish and Greek database.

7.2.2 Green Deal

Also for the word “Green Deal” the Polish database shows the most frequent results in relation to the other case study regions. In 2021, the word is more than four times as much mentioned than in the German or Greek media. Surprisingly, the mentions are most frequent in 2020 for the Greek and German case, and in 2021 for the Polish case. This may be due to the timing of Poland’s phase-out plan, which was signed in May 2021.

Across all regions, the Green Deal has a neutral to positive tonality, without any significant negative entries. It is seen as an opportunity for the development of coal regions in transition.

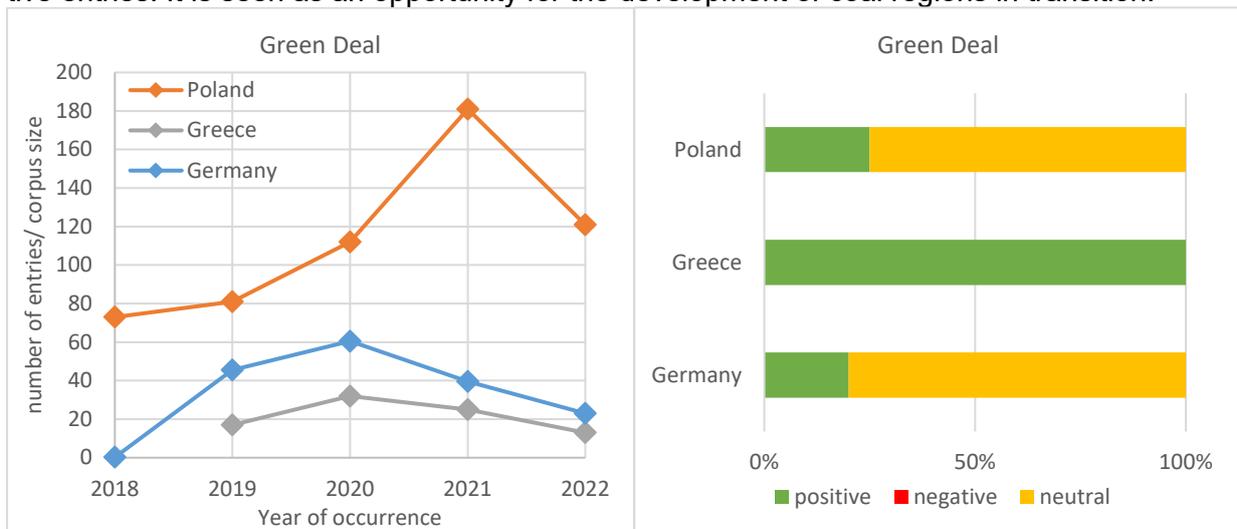


Figure 7-3: Relative frequency and mean tonality of “Green Deal” in the media entries of the German, Polish and Greek database.

7.2.3 Decarbonization

The word decarbonization is more frequently applied in media entries of the German database relative to the other databases. The word is used more frequently in the German media than in the Polish or Greek media. Moreover, it is one of the words whose frequency does not decrease after 2021, but rather increases. This may be because it is increasingly used by the media for their reporting or that the media interest in the topic is actually increasing. In the Polish and German case, 20 to 30% of the relevant results have a negative connotation, whereas all analyzed entries of the Greek database are positive.

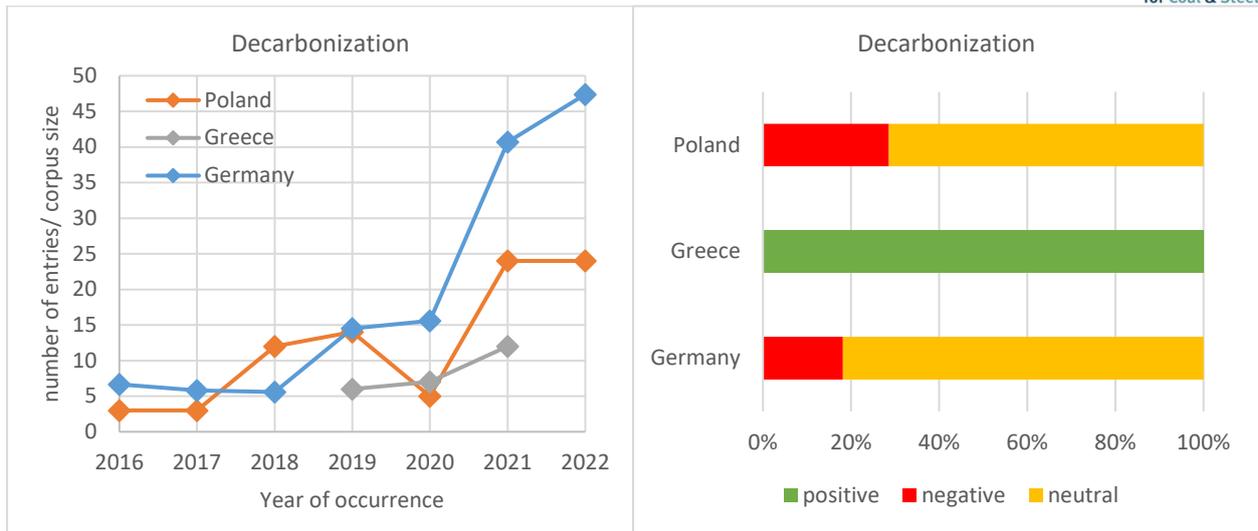


Figure 7-4: Relative frequency and mean tonality of “Decarbonization” in the media entries of the German, Polish and Greek database.

7.3 Evaluation of sentiments

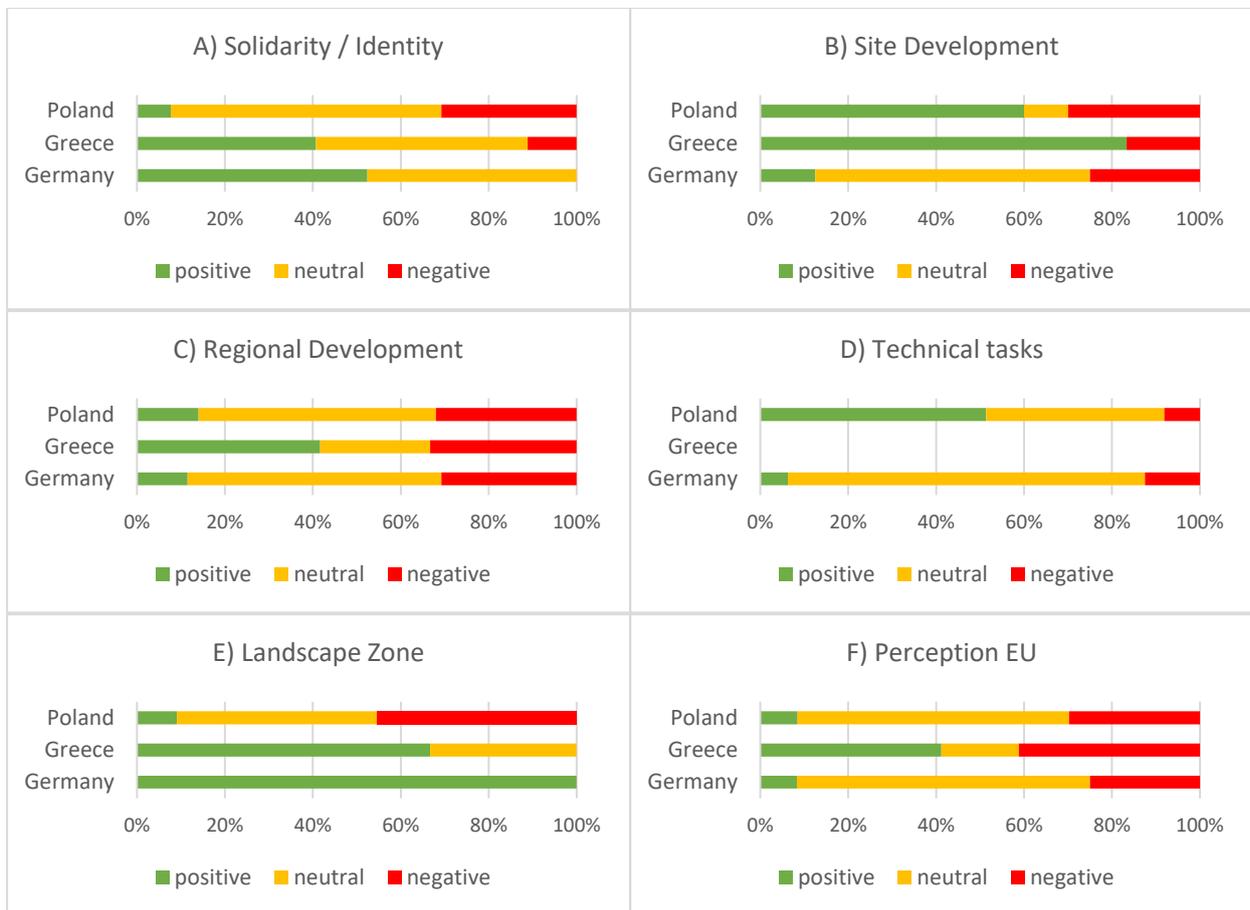


Figure 7-5: Mean tonality (positive, negative, neutral) of relevant search results / media entries for the case study regions.

The mean tonality in category **A) Solidarity / Identity** of the summed sentiment analysis results shows an interesting pattern. The feelings become more positive the more mature the transition phase is: Poland, very early stage, Greece, early stage and Germany, mature stage). For both, the Greek and Polish case, category **B) Site Development** shows the relatively highest number of positive media entries, although there are also negative voices indicating the controversies about the discourse on the related topics. Concerning the topics discussed around **C) Regional Development** feelings are mixed in all regions. In Greece, there is a larger amount of

positive entries whereas the majority of sentences analyzed in the Polish and German case have a neutral character. However it must be noted that the defined terms of this category differ a lot among the languages. A similar situation is displayed within Category **D) Technical Tasks**. A comparison is difficult due to the high differences of the defined words. However, it can and must be noted that the technical tasks surrounding the coal phase-out differ greatly in the case regions. In Germany and the Ruhr region, for example, issues related to post-mining, such as dealing with the rising mine water in the abandoned coal deposits, are of particular importance at present and in the context of this analysis, while in Poland the technical development of renewable energies is in the foreground. The tonality of relevant results in category **E) Landscape Zone** is predominantly positive in the Greek and German database. However, it must be noted that in each of these cases only one term yields relevant results. In the Polish case, more terms display relevant results and those also contain entries supporting a negative sentiment (ca. 45%). Probably the most representative sample contains category **F) Perception EU**. The tonality of this group of words is displaying similar results for the Polish and German case, with just a few positive, more negative and the majority being neutral statements. In the Greek case, the number of neutral entries is much smaller and more positive as well as negative entries can be found. The figures suggest that issues are controversial at this level in Greece. Although there are very many positive attitudes, negative voices are also raised. In the other case regions, according to this analysis, it looks as if a neutral attitude is maintained, which leaves little room for controversy.

8 Evaluation of the Methodology

In order to assess how discourses develop over long periods, researchers need to evaluate a large number of documents. There are many extensive and often rapidly growing digital archives of texts from newspapers, blogs, and social media, as well as various forms of political texts (laws, party documents, treaties, etc.) being of great importance for the social representation of the transition topic. These quantities cannot be managed without computational tools nowadays. Intensive research was carried out on how to assess the requirements of a media analysis with the result, that there is not a tool or agency, which is able:

1. to maintain a balanced database for the media analysis across the regions, including local, regional and national newspapers, broadcast media, relevant blogs and campaign websites
2. to have access to retrospective media entries for the different periods (Germany: 60 years of coal transition; Greece: 3 years of Just Transition; Poland: about to enter Just Transition)
3. to statistically evaluate personal data (like gender and age)

There are clipping providers who have data licenses across borders, but to date there will be no one who is able to assess all of the above mentioned media sources. In fact, based on our research, there was just one provider who has agreed to access databases from abroad for the analysis. However, the costs for this would have exceeded the project's budget by far.

Therefore, the criteria for the media analysis were adopted to a freely available tool, the Leipzig Corpora Collection that works like a corpus-based dictionary for more than 250 languages. In addition to the freely available corpora, further databases available at the Institute for Applied Informatics (InfAI) in Leipzig have been purchased. The media sources are restricted to news websites and were crawled in an annual cycle, typically on a daily basis via RSS feeds. Due to copyright reasons, the result page of the tool just displays the sentence that contains the search attribute. The researcher had to assess those sentences individually in order to obtain information on the relation to the topic and on the predominant sentiment. However, the sentences are sometimes too short to allow deeper evaluation (such as in the case of the word "sozialverträglich", socially acceptable, which has often been used in the context of mine closure as it was the way the companies were ordered to cut jobs). Sometimes the results refer to the same sentence, which has been crawled several times through the year. This is partly due to the trend - as mentioned above - that some news sites simply take over existing reports from larger agencies. Nevertheless, it is also because the records are crawled unsorted and therefore duplicates may occur. In using the web interface, fewer obstacles had to be overcome, so the search method had to be adopted several times. For example, the web interface of the tool does not provide any search operators to specify the search, which was a major hurdle especially for the Greek and Polish cases. Fortunately, the consortium was able to overcome these hurdles by bringing in an expert on the Greek side to process Polish and Greek data outside the web interface.

Major obstacles in performing a multi-case analysis across all regions are summarized in the Consolidation (Chapter 6). The resulting processing of the data reduced the database so that the significance of the results must nevertheless be viewed critically. For example, terms defined for Category D and E do not yield a representative number of relevant results to account for a significant amount.

9 Conclusion

Public and political debates stabilize or change the current energy system. Shifting discourses are therefore crucial to realize policies supporting coal transitions. Debates on coal evolve from coal as an economic base towards coal as an environmental problem.

In Germany, the approval of structural funds is very positive but the fear of a negative development on the labor market is still palpable as the **necessity of a long-term employment perspective** for today's coal regions is often underlined. The positive shift in the discourse on technical tasks shows how the perception of these issues evolve from financial worries to new usage options as a consequence of the **increasing scientific debate**, which not only provides more transparency, but also emphasizes the potentials. Taking over the positive tonality of existing terms like "Landscape Park" to describe specific projects helps in raising a positive view. It is possible that these terms will also find international validity.

According to the results from the Greek media analysis, employment prospects in the mining industry consist as a decisive factor in shaping positive attitudes towards the resources sector. In Particular, concerns regarding **energy security** have an impact on public opinions. Delignification is a critical issue that concerns a high number of citizens in two large regions, Western Macedonia and Megalopolis, as it is highly linked to the **local economic and social stability**. Some inhabitants may see the transition as a danger to their cultural and historical heritage, sparking discussions about how to **preserve local identity** while welcoming change.

In Poland, the shift of tonality from negative to more neutral entries regarding nuclear power suggests that nuclear energy tends to be seen as an opportunity for Poland to achieve energy independence from other countries and is considered an inevitable option. While some argue for a rapid transition to address environmental concerns and align with global climate goals, others emphasize the economic costs and the importance of **maintaining energy sovereignty**. The analysis and government plans indicate that the process of energy transition in Poland is likely to be a long-term endeavor, as it is difficult to reconcile these different points of view. Careful planning is required to consider socio-economic impacts.

The main findings can be summarized as follows:

1. Polish media entries are primarily driven by concerns about the economic and social consequences of a rapid coal phase-out. The negative tonality of the media reports inhibits a positive perception of the transition.
2. In Germany, the coal phase-out affects various decision-making levels: from the European to the national and regional framework but the medial discourse is shifting to national and international significance emphasizing environmental and especially climate issues.
3. Inhabitants and especially the younger generation identify strongly with the local-regional area of the Ruhr region.
4. Greek media support European concepts with primarily positive, appealing or factual statements.
5. Identity-forming and solidarising representations increase with maturity of the transition phase.
6. Increasing scientific debate on new usage options provides more transparency and emphasizes the positive potentials of the phase-out.
7. Taking over the positive tonality of terms helps to increase popularity of the topics.
8. At European level, the timeframe of the phase-out and managing the economic transition to renewable energy supply belong to the most frequent concerns.

The public does not base its decisions on science-based rational thinking, **feelings and emotions play an essential role** in assessing the risk of an unknown technology or remediation measure. Among others, this was shown by the study of Wolkersdorfer et al. (2022). Public opinion is a complex, interwoven network that is influenced by many actors and personal experiences.

The "coal Transition" is an ongoing process. The public's perception and assessment of it is also subject to ongoing change, which is determined by the actual results as well as the problems identified and covered in the media. In this respect, any such media analysis can only reflect an interim status or the findings for a defined past observation period. This also suggests that a similar analysis should be carried out again after a certain period.

10 Perspective

Each region faces the challenge of building a new identity. Redefining something that has been defined for decades, in this case the mining tradition, is challenging. Based on our findings, positive perception increases with maturity of the transition phase.

If energy transformation takes place mainly at the state level, a complicated array of viewpoints and deeply held views may complicate the decision-making process, while underscoring the importance of considering the socio-economic, environmental and political dimensions of this transition. People identify strongly with the local-regional area and according to Korte and Dinter (2019) local politicians are perceived as being much more receptive to the citizens' wishes and concerns. Therefore, it is precisely this high level of **local responsiveness** on the part of political actors that offers the opportunity to improve the social basis for the dialogue. At the local level, direct communication between political decision-makers and citizens is still and absolutely possible. The human need to reduce social complexity can be satisfied best in the local communication space. People are looking for orientation and immediate points of contact. These are easier to find within a local communication space (Möhring 2017).

Due to the digital structural change of the public sphere, social exchange is increasingly shifting from the street to the worldwide web. Media communication must adapt to this development in order to remain accessible. The local medium that is used in all age groups and relatively independent of individual attitudes towards politics is the local radio. It also enjoys consistently strong trust among all social groups. In North Rhine-Westphalia, the so-called two-pillar model ensures a separation of financing and editorial design of local radio stations (Korte and Dinter 2019). This would be a concrete approach to improve the culture of dialogue between citizens, politicians and journalists. Public opinion research is a useful tool not only to understand the social representations of the coal phase-out, but also to provide supportive scientific guidance. The lack of available studies clearly underlines the need for research in this field.

The results will feed into the interview guides and in the development of the survey, which is part of task 3.4 of the WINTER project: Social acceptance for best practices solutions for transition process.

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