



ENTRANCES

ENergy TRAnSitions from Coal and carbon: Effects on Societies

D3.5 Jiu Valley Region Case Study Report



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Abbreviations

CCT	Coal and Carbon Territory
CET	Clean Energy Transition
ENTRANCES	ENergy TRANsitions from Coal and carbon: Effects on Societies
EU	European Union
GDP	Gross Domestic Product
INSSE	National Institute of Statistics
LMA	Labour Market Area
MAF	Multidimensional Analytic Framework
NACE	European Classification of Economic Activities
NEEAP	National Energy Efficiency Action Plan
NGO	Non-Governmental Organisation
NUTS	Nomenclature des unites territoriales statistiques
PAR	Political Administrative Region
RF	Research foci
RQ	Research question
SSH	Social Sciences and Humanities
UAIC	Alexandru Ioan Cuza University of Iași
WP	Work Package

Executive Summary

This case study report presents the results of the ENTRANCES project (ENergy TRANSitions from Coal and carbon: Effects on Societies) for the Jiu Valley region. Jiu Valley is a micro-region in the Hunedoara County of Romania, comprising seven localities in which coal mining has represented the dominant employment opportunity. At the beginning of 1990, the Jiu Valley could be characterized as a strong urbanized zone, almost exclusively related to coal mining, with more than 60,000 of the inhabitants employed directly or indirectly in this industry and with 17 coal mining perimeters exploited. Since 1997 the Romanian government has implemented programs of labour contract buyouts, which resulted in the closure of several mines. There are four coal mines still active and two coal-fuelled power stations in the area.

The main research aim of ENTRANCES is to identify the principal socio-economic, socio-technical, socio-ecological, socio-cultural, socio-political, socio-psychological, and gender-related challenges facing coal and carbon-intensive regions in transition, and the coping strategies that have emerged in recent years. To this aim, a multidimensional analytic framework (MAF) has been adopted, articulated in five components (socio-economic, socio-cultural, socio-psychological, socio-political and socio-ecological & technical), and three cross-cutting elements (challenges, coping strategies and gender).

Before running the actual research on each component, we also performed desk research in order to delineate the case study across its units of analysis, to collect relevant dates and basic information on the region, as well as the information needed for the implementation of the five components. The research on each of the five components relied on a set of specific concepts and methodologies. The socio-economic component focuses on structural change in the economy, i.e., the reallocation of economic activity across different economic sectors and regions. In these respects, we performed a descriptive analysis of technological progress, demography, economic inequality, employment and economic activity over the last three decades. The relevant socio-economic data was collected from national sources, Eurostat, and regional firms. The socio-cultural component is focused on the territorial stress induced by different sources or "stress vectors" in the territory. Territorial stress is manifested in "strains" of different types such as conflicts, tensions, ambivalences, etc. We investigated the "strain situations" and related impacts in Jiu Valley through a focus-group in which six people participated, representing three categories of stakeholders (community leaders, knowledge keepers, and memory keepers). The socio-psychological component refers to the socio-psychological impacts of the closure of coal mines and carbon-intensive industrial units, i.e., the decarbonisation process, on the lives of individuals living in the CCT, and it was explored through a survey completed by 126 residents of the region. The socio-political component analyses the narrative battles for the interpretation of decarbonisation and energy transition, and aims to identify which are the actors that are forming different "constituencies": the constituency designing the transition, the constituency coping with the transition, or opposing the transition. The study involved a semantic analysis of public statements of different social actors about the energy transition and coal phase-out. Several sources for the text analysis have been investigated, covering the period from January 2015 to December 2021, such as strategies and official documents; policy papers and statements of interest organisations, NGOs, and Trade Unions; national, regional and social media. The socio-ecological & technical component refers to the capacity available in the case study region to shape its decarbonisation pathway, focusing on transformative capacity, i.e., the evolving

collective ability to conceive of, prepare for, initiate and perform path-deviant change towards sustainability within and across the multiple complex systems that constitute the regional or urban area undergoing a clean energy transition. We used mixed quantitative-qualitative interviews with ten stakeholders representing four groups, i.e., civil society, private sector, public sector, and third sector, in our investigation of this component.

The main results of our study on the socio-economic component indicate that from 2000 to 2018 Jiu Valley showed a higher percentage of population loss compared to the other regions, including the country and the EU, representing about 28 % of the local population. They also highlight a significant lag in the socio-economic development of this region, for instance through the fact that the share of employed individuals in this region is lower by 10 % than the country's level. The research on the socio-cultural component concluded that there are four stress vectors that further cause more than twenty strain situations in the territory. These stress vectors are the dependence of the region on political interests, the rapid disintegration of the mono-industrial economy, the dissolution of the Jiu Valley administrative cohesiveness, and the reluctance towards new alternatives and inertia. On the socio-psychological component, findings indicate that in comparison to the other case studies from ENTRANCES, Jiu Valley participants have higher place attachment, optimism and resilience, more intense nostalgia and perceived unfairness regarding decarbonization and its impacts, as well as less economic optimism. They also emerged as more engaged than many of the other participants surveyed in this ENTRANCES research in three coping strategies, i.e., personal reinvention, intention to relocate, and resistance and protest. In regard to the negative impacts of decarbonization, perceived stress was found to be negatively related with social bonding, resilience and optimism, while perceived economic hardship was positively associated with perceived stress and nostalgia and negatively correlated with optimism and life satisfaction.

Results of the research on the socio-political component suggest that the most important issue in the realm of the Jiu Valley decarbonization debates and political and practical decisions has been the actual decarbonisation itself, in terms of closing the remaining coal mines in the areas and proposing alternative development pathways, or, alternatively, postponing this decision and procrastinating the phasing out process. These two opposing discourses reflect the tension between the position anchored in the EU - driven strategies of transition from coal of the Jiu Valley and that of pressuring towards postponing the closing the remaining coal mines, which is further related to the effort of the government to renegotiate with the EU the timeline of these closures. Finally, our findings on the socio-ecological & technical component indicate that important decisions within the governance of the Jiu Valley clean energy transition are perceived as made in a top-down manner by governmental authorities, while local and regional authorities have a minor role. The leadership of this was also negatively perceived, as being strongly diffused and fragmented, with no clearly defined responsibilities or coherent strategy to drive the transition and leaving important social needs unaddressed.

CHAPTER 1

INTRODUCTION

1 Introduction

The project ENergy TRANSitions from Coal and carbon: Effects on Societies ENTRANCES, which is a three-year project funded by the European Union's Horizon 2020 research and innovation programme, addresses the Social Sciences and Humanities (SSH) aspects of clean energy. ENTRANCES is coordinated by the University of A Coruña and is conducted by a consortium of 14 European partners, including universities, research institutes, networks and umbrella organisations.

ENTRANCES' overall goals developing a theoretically-based and empirically-grounded understanding of cross-cutting issues related to social aspects of the clean energy transition in European coal and carbon-intensive regions and formulating a set of recommendations able to tackle these issues. The project investigates the challenges facing carbon-intensive regions in transition hinging on the idea that the transition to clean energy should not be considered only as a technological change or an industrial shift but also as a complex and multidimensional process that affects the daily life of local communities. In this regard, the project understands the impacts of the clean energy transition on coal and carbon-intensive regions in terms of the potential activation or strengthening of the de-territorialisation process, i.e., the process of progressive weakening of ties between a community and its territory, and conversely as an opportunity for triggering their re-territorialisation.

One of the key aspects of the project was thus the development of 13 regional case studies dedicated to just as many European coal and carbon-intensive regions in transition.¹ All the case studies were based on the application of the same Multidimensional Analytical Framework (MAF) within the project to grasp the multi-faceted aspects of the de/re-territorialisation processes ongoing in the regions. This report is the one dedicated to the case study of Jiu Valley that was developed by Alexandru Ioan Cuza University of Iasi, Romania (UAIC).

Jiu Valley is a micro-region in the Hunedoara County of Romania, comprising seven localities in which coal mining has represented the dominant employment opportunity. Before 1989, the coal extracted from the 17 coal mining perimeters exploited in the Jiu Valley reached 11 million tons annually. The population in the region was of almost 200,000 inhabitants in 1989, with more than 60,000 employees in the mining industry. Massive layoffs in the mining industry began in 1997, when the Romanian government implemented a program of labour contract buyouts, which began a decarbonization process with several sub-phases of mine closures that generated high rates of unemployment and the depopulation of this traditionally mono-industrial region.

The report is structured into five chapters: Chapter 2 presents the **conceptual, methodological framework** adopted for the development of the case study, including information on how Jiu Valley has been operationalised in different interrelated units of analysis. Chapter 3 is focused on **the analysis of the Jiu Valley Coal and Carbon Territory**, i.e. the territory heavily dependent on fossil-fuel-based industries or the extraction of fossil fuels themselves, with the lenses of the socio-cultural and socio-psychological dimensions. Chapter 4 provides an overview of the **socio-economic situation** of the region. Chapter 5 covers the **analysis of the Clean Energy Transition** underway at the regional level through the lenses of the socio-political and socio-technical dimensions. Chapter

¹ <https://entrancesproject.eu/project-deliverables/>.

6 presents the main **territorial challenges, associated coping strategies and gender-related aspects** and discusses them in the light of all the dimensions included in the study (i.e. socio-economic, socio-cultural, socio-psychological, socio-political and socio-technical dimensions). Finally, some conclusions formulated by the case study team complete the **Jiu Valley** case study report.

CHAPTER 2

CONCEPTUAL AND METHODOLOGICAL FRAMEWORK

2 Conceptual and methodological framework

2.1 Case study objective(s) and organisation

2.1.1 The case study objective(s)

The case study objective can be better understood in light of the research questions of the ENTRANCES project.

- 1) What are the principal socio-economic, socio-technical, socio-ecological, socio-cultural, socio-political, socio-psychological, and gender-related challenges facing coal and carbon-intensive regions in transition? What coping strategies have emerged in recent years?
- 2) What variables have been most influential in the appearance of the *detritorialisation* process and how do they interact? What kinds of strategies are the key determinant of success in terms of *re-territorialisation*?
- 3) What policies or combination of policies would be most appropriate to recover the ties of the territory and community in coal and carbon-intensive regions while fostering their transition toward clean energy?

The three questions as a whole, define the logical itinerary of the project, which starts from an in-depth *description* of the current situation of the regions (RQ1), moves to search the *causes* of the de/re-territorialisation process (RQ2), and identify a set of *policies* for fostering the re-territorialisation of the regions (RQ3).

The main aim of the regional case studies is to answer the project's first research question (RQ1) in all the regions involved in the project, thus also in Jiu Valley. Moreover, the secondary aim of the case studies is to provide the empirical basis for answering the other two research questions, related to the causes of de/re-territorialisation processes (RQ2) and the set of policies needed to activate re-territorialisation (RQ3). However, such two questions will be answered in the next phases of the project respectively through case comparisons (RQ2) and case-related scenario building and policy co-creation (RQ3).

For describing the challenges and coping strategies faced by coal and carbon-intensive regions in transition across different dimensions of change, the main aim of this document is to report the answer that the research has found about the case of Jiu Valley.

2.1.2 Structure of the case study: multiple foci and units of analysis

To deal with the complex research question presented above (RQ1) the ENTRANCES case studies have been structured into multiple foci and units of analysis. This articulated approach is necessary to enhance the clarity of the study and avoid conflation of concepts as concerns the challenges and the coping strategies of the coal and carbon-intensive regions in transition. In this regard, all the ENTRANCES case studies, thus including also the case study of Jiu Valley, have been articulated into three research foci and three corresponding units of analysis.

- **RF1: Territorial Change in the Coal and Carbon Territories (CCTs).** The project decided to focus its analysis of challenges and coping strategies on territories more exposed to the decarbonisation process. The concept of Coal and Carbon Territory (CCT) was developed to this

aim. CCTs are the territories in which the "coal and carbon" features are represented as a distinctive part of the local identity or are a crucial asset for the income and employment opportunities of the local community. It is worth noticing that, in many cases, the CCTs are not administrative regions. The focus on territorial change in the CCTs has been considered the "fulcrum" or the "core" of the ENTRANCES case studies.

While RF1 helps clarify that the research is focused on the territorial challenges and coping strategies of the CCT, the dynamics of de/re-territorialisation of this territory cannot be fully understood if not in the light of the other two research foci and related units of analysis.

- **RF2: Structural Change in the Labour Market Area (LMA).** The case study has investigated the change in the socio-economic structure over the last three decades. This is an essential dimension for understanding the underlying dynamics that affected and that still affect the CCT at the structural level. To investigate structural change, *Labour Market Area (LMA)* was established as a secondary unit of analysis. The Labour Market Area was defined as the area including the Coal and Carbon Territory where most of the labour force lives and works.
- **RF3: The clean energy transition in the Political Administrative Region (PAR).** If RF2 investigates medium and long-period dynamics affecting the CCT, the focus on the clean energy transition ensures that the research considers the incipient change triggered by the purposive transformation of the energy system that is promoted to deal with climate change. Such objectives have been recently accelerated through the European Green Deal. In each regional case study, the clean energy transition has been observed at the level of the Political Administrative Region (PAR), i.e. the administrative region encompassing the Coal and Carbon Territories more closely associated with governing the energy transition through a directly elected legislature.

These three research foci and related units of analysis, at least to some extent, overlap with each other. Despite that, they offer different and complementary perspectives in studying coal and carbon-intensive regions in transition. They jointly contribute to understanding the de/re-territorialisation dynamics ongoing in the coal and carbon territory.

The structure of the case study is mirrored in this report as Chapter 3 will deal with Territorial Change in the CCT; Chapter 4 with Structural change in the LMA; and Chapter 5 with the clean energy transition in the PAR.

Box 1: The three units of analysis

Following the structure of the case study, three units of analysis have been delineated in the Jiu Valley case as shown in Figure 1.

Figure 1 – Case delineation

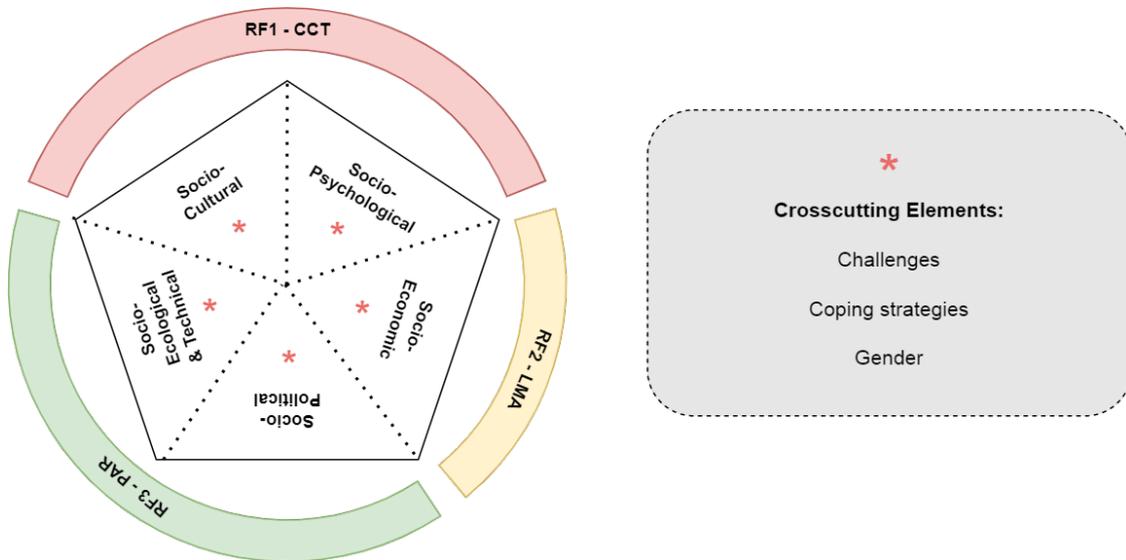


The CCT has been defined as the micro-region in the South-Eastern part of Hunedoara county that includes three municipalities (i.e., Vulcan, Lupeni, Petroșani), three cities (i.e., Aninoasa, Petrila, Uricani) and one commune (Banița) (see Table 8). The Labour Market Area (LMA), relevant for the case study, is one of the eight development regions (NUTS2) of Romania, namely the West Region. The key administrative unit for the case study is the NUTS3 region, Hunedoara County.

2.2 Overview of the multidimensional analytic framework

For studying the complex and multidimensional dynamics characterizing the processes of territory in transition, ENTRANCES embraces theoretical and methodological pluralism – a perspective in which the adoption of different scientific approaches is not considered as a problem but as an asset – as its research strategy and it relies on a process of knowledge integration (Isgren et al., 2017). In this regard, the project yearned for adopting multiple approaches without losing their distinctive ontological, epistemic, theoretical, and methodological features (Olsson & Jerneck, 2018). Therefore, a multidimensional analytic framework (MAF) has been adopted. The multidimensional analytic framework is articulated in five components – each relying on a set of specific concepts and methodology – and three cross-cutting elements, as shown in Figure 2. It also shows how the components relate to the above-mentioned research foci and units of analysis.

Figure 2 – Overview of the multidimensional analytic framework



In the following subparagraphs, all the different components will be shortly described with their overall approach, the concepts and the methodology adopted. Two final sub-paragraphs will be dedicated respectively to a synoptic table, showing the main features of all the components together, and to the cross-cutting elements.

2.2.1 Socio-cultural component

Domain of enquiry

The socio-cultural component relies on the assumption that a territory – even an informal one as the CCT – is a form of social organisation. The component maps whether and in which way the socio-cultural changes associated with globalisation – such as migrations, technological advancement, financial flows, climate change, etc. – are provoking "stress" in the territorial organisation of the CCT. In this respect, the component interprets stress as a pressure to change for the territorial organisation, rather than as the psychological stress produced by socio-cultural factors. The component relies on a theory of the "stress-strain" element of social organisations (Bertrand, 1963), which is devised to analyse change and stability dynamics "in action" in a certain organisation, in our case in the CCT. The core of the theory is simple but insightful: when conflictual or contradictory needs, ideas or processes arise, processes of disorganization take place inducing stress on the organisation which therefore necessitates some sort of adjustment. At the same time, the theory helps us in understanding the stability (or resiliency) of the territorial organisation as all the organisations can tolerate a certain amount of stress. The component identifies the social forces that are exercising pressure at the structural level, the resistance to change – i.e. conflicts or strains generated as a response –, as well as change and stability dynamics in the territorial organisation.

Concepts

Stress-strains. The theory is based on the articulation of the "stress-strain" pair. Stress is an element inherent to the social structure in a given institutional or organisational field, that cannot be observed per se but manifests itself in "strains" of different types such as conflicts, tensions, ambivalences, etc. Therefore, the "strains" can be interpreted also as the manifestation of the stress in action at the structural level.

Strain situation. This is the operational concept adopted for identifying and studying on an empirical base the stress-strain element in the CCT. Three main types of strain situations have been considered: situations of conflicts or disputes (both within and outside the territory), situations of impasses or contradictions, and situations of dependence and related uncertainty. The strain situations are therefore the unit of observation of this component.

Stress vector. It can be defined as a social process that activates stress in the territorial organisation. Stress vectors (or stressor) vary over a wide range of characteristics: for their origins, which can be either from within or from outside; for intensity, as some pressure to change can be stronger than others; for the duration, as some stress-strain can be temporary or contingent while other can be long-lasting in society; for their direction, as each stress vector pushes the territory in a certain direction of change.

Change, resistance to change and ambivalences. The dynamics of change, resistance to change and ambivalence in the CCT are described following four different dimensions of change: the territorial trajectory, by analysing continuities or ruptures; the territorial boundaries, by analysing the distinctiveness or alignments of the territory; the territorial governance by analysing endogenous or exogenous governance; by territorial symbols, analysing both territorial stigma and territorial myths.

Methodology

The analysis of stress-strain was based on a focus group mapping (or participatory mapping) of the strain situations in the CCT. The focus group was composed of local key informants who disclosed their local knowledge of the strain situations generated by a variety of globalisation-related factors. The data collected were transcribed and processed into a consistent set of strain situations. An analysis across all the mapped strain situations allowed us to identify stress vectors, recurring strains and change-stability dynamics characterising the CCT.

2.2.2 Socio-psychological component

Overall approach

The socio-psychological component studies the socio-psychological impacts of the closure of coal mines and carbon-intensive industrial units, i.e., the decarbonisation process, on the lives of individuals living in the CCT. The component moves under the assumption that the economic, social, and political uncertainties caused by the closure of mines and coal-based industrial units may be a strong source of stress, uncertainty, and internal conflicts for the local population, as it not only constitutes an existential threat to their way of life and their primary source of livelihood but also it may turn out in a dissatisfactory relationship with the territory. The component investigates how place attachment is threatened by stress, uncertainties, and deprivation induced by the decarbonisation process, and what are the main coping strategies adopted by the citizens living in the different coal and carbon territories.

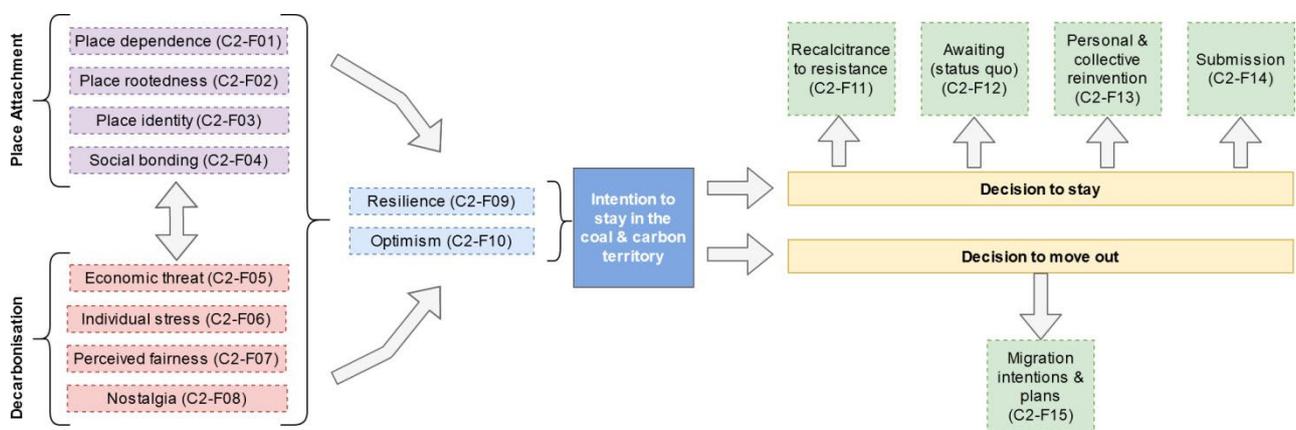
Concepts

Place attachment. The concept of place attachment has been used by scholars to understand the bonds humans share with the physical environment. Leveraging on an integrated model of place attachment (Raymond et al., 2010), the component articulates place attachment in four dimensions: a) place dependence, reflecting the functional dimension; b) place rootedness, reflecting the cognitive dimension; c) place identity, reflecting the symbolic dimension and d) social bondage, reflecting the emotional dimension. *Resilience.* The term resilience, in psychology, refers to positive

adaptation in the face of stress or trauma (Luthar, Cicchetti & Becker, 2000). In the socio-psychological component, the study of resilience is used for achieving a more comprehensive understanding of the response adopted by individuals to the challenges faced by the citizens more directly exposed to decarbonisation in the coal and carbon-intensive regions in transition. *EVLN approach*. The possible coping strategies of citizens are identified in this component based on the "Exit, Voice, Loyalty, Neglect" (EVLN) theory, initially proposed by Hirschman (1970) to study responses to decline in firms, organisations, and states (EVL theory). The theory affirms that when dissatisfaction is experienced in a relation – in our case in territorial belonging - there are a few possible and interrelated coping strategies from the individuals.

The above-mentioned concepts have been organised in a single model composed of several factors, organised in different areas, marked with a different colours in Figure 3.

Figure 3 – Overview of the factors in the socio-psychological model



Starting on the left, Place Attachment and Decarbonisation factors reflect how the two joint processes of deterritorialisation and de-carbonisation are being perceived by the citizens inhabiting the CCT. On the opposite side of the picture, there are the outcomes, i.e., the dependent variables, that the model tries to explain. In the centre, resilience acts as a "moderator" as individuals with high resilience are more able to cope positively with decarbonisation-induced stress.

Methodology

The socio-psychological component was surveyed through a structured self-report online questionnaire consisting of 90 items representing 17 socio-psychological constructs (i.e. the different factors of the model as mentioned above). Most of these items and latent constructs are taken from other studies, where various researchers have applied and tested them in different contexts. All the items have been assessed by the respondent using scales.

2.2.3 Socio-economic component

Domain of enquiry

The socio-economic component focuses on structural change in the economy, i.e., the reallocation of economic activity across different economic sectors (Herrendorf et al., 2014) and regions. Structural change can lead to a change in a region's economic, financial, and demographic composition. The component is thus focused on a descriptive analysis of technological progress, demography, economic inequality, employment, and economic activity based on various data

sources over the last three decades. The socio-economic component focuses on the Labour Market Area but also relies on the other units of analysis as a reference and as a comparison.

Concepts

In the socio-economic component, ten different factors are taken into consideration. All the factors are investigated mainly from a quantitative perspective. The clean energy transition leads to structural change, which impacts the demography (C4-F01). Further it has direct implications for the depletion of coal reserves (C4-F02), the expansion of alternative energy sources (C4-F03), direct employment and production (C4-F04) in the coal industry and carbon intensive industry, indirect employment and production (C4-F05) effects on other industries. Investments into the stock of capital (C4-F06) will respond to the regional economic development. Further, the clean energy transition can change economic inequality (C4-F07), energy security (C4-F08), technological progress (C4-F09) and migration patterns (C4-F10).

Methodology

For the socio-economic component, an extensive set of data was collected from national sources, mainly national statistical offices, and Eurostat.

2.2.4 Socio-political component

Domain of enquiry

The component analyses the narrative battles for the interpretation of decarbonisation and energy transition in the Political Administrative Region of the case study. The component identifies which are the actors that are forming different "constituencies": the constituency designing the transition, the constituency coping with the transition, or opposing the transition. Through analysing the narratives of such actors, the component investigates how the constituencies understand the benefits and losses from the decarbonisation process. Finally, the component shows the inclusion and exclusion dynamics resulting from technological change in the region.

Concepts

The socio-political component relies on the theory of *Technological Dramas* (Pfaffenberger, 1992). This approach understands technological shifts – such as decarbonisation – as technological dramas, i.e., a narrative battle among different actors to determine the meaning and implications of the technology. A technological drama is a discourse of technological "statements" and "counterstatements", in which there are three recognisable processes: i) technological regularisation; ii) technological adjustment; iii) technological reconstitution. The three processes can be described as follows:

- *technological regularisation*, a design constituency tries to impose change, i.e., to appropriate the technological process so that its features implicitly embody the political aim of altering power relation
- *technological adjustment*, the impact constituency – the people who lose when a new technology is introduced or when a technological shift is ongoing – engage in strategies that try to compensate for the loss of social prestige or social power
- *technological reconstitution*, the impact constituency tries to reverse the meaning of the technology imposed through regularisation. Differently from technological adjustment

strategies, the strategies related to technological reconstitution attack the foundation of technical regularisation, and activate a self-conscious "revolutionary" ideology aimed at producing a symbolic inversion and antisignification of the technological regularisation process.

Methodology

The socio-political component was based on a semantic analysis of public statements and counterstatements of different social actors about the energy transition and coal phase-out. The analysis was carried out at the PAR level and focused on statements and counterstatements of key regional stakeholders in the public debate.

2.2.5 Socio-ecological and technical component

Domain of enquiry

The socio-ecological component provides an overview of the capacity available in the case study region to shape its decarbonisation pathway. The focus on transformative capacity allows us to discern how far a region is actually able to deviate from its current (carbon-intensive) path toward sustainable outcomes.

Transformative capacity is understood in this context as an evolving collective ability to conceive of, prepare for, initiate and perform path-deviant change towards sustainability within and across the multiple complex systems that constitute the regional or urban area undergoing a clean energy transition (CET). As a systemic capacity, it is not attributable to any single actor but rather results from the interactions and orientations of multiple actors in the regional or urban economic development system involved in shaping its decarbonisation pathways. The diagnosis of transformative capacities thus enhances knowledge of key capacities hindering or facilitating purposeful transformation, ultimately permitting them to be addressed as part of capacity development activities.

Concepts

Transformative capacity is strongly influenced by the governance of the regional decarbonisation or clean energy transition in question. Three **governance and agency** components are critical to the ability of a regional development apparatus to foster the transformability of a system: the inclusiveness and multiformness of governance arrangements (C1); polycentric and socially embedded transformative leadership (C2); and the empowerment and autonomy of relevant communities of practice (C3). These elements are preconditions for the transformability of a system: there needs to be connectivity and responsiveness built into governance, effective leadership able to bring people together around a vision, and actors empowered to experiment and innovate. These three attributes must be developed by stakeholders in **capacity development processes** to enhance their transformative potential, including enhancing understanding of the systems of which they are a part (C4), engaging in participatory visioning and alternative design scenarios (C5), experimenting with novel solutions to social needs (C6) and ensuring that these innovations can be embedded (C7). Ideally, this can be seen as a learning loop, where system(s) understanding helps inform visions and pathways, which in turn orient experimentation, with successful innovations being embedded and better system understanding resulting from this process. These processes should

be fed back into governance through social learning (C8) as well as the effective involvement of actors at different scales (C9) and levels of agency (C10).²

Methodology

These components were assessed by way of mixed quantitative-qualitative interviews with various stakeholders engaged in the CET. The aim was to obtain and contrast differential stakeholder assessments of transformative capacities. A diverse set of stakeholders were interviewed, representing public, private, third and civil society actors. Respondents were asked to assess statements corresponding to each measure of transformative capacity according to whether and how much they agreed with or disagreed with the statements.³ They were then asked to elaborate their answers in open follow-up questions, which were subsequently transcribed, coded and analysed.

2.2.6 Synopsis of the five components

The features of the conceptual side of the Multidimensional Analytic Framework are summarised in the synoptic table reported in Table 1.

Table 1 – Synoptic table of the five components of the MAF

Component	Research focus	Unit of analysis	Domain of enquiry	Unit of observation	Methodology
Socio-Cultural	Territorial change	Coal & carbon territory	Stress strains in the territorial organisation	Strain situations	Focus group mapping
Socio-Psychological	Territorial change	Coal & carbon territory	Place attachment, decarbonisation, resilience and coping	Citizens	Online survey
Socio-Economic	Structural change	Labour-market area	Change in the socio-economic structure	The area as a whole	Quantitative data collection
Socio-Political	The clean energy transition	Political administrative region	Narrative battles to determine the meaning and “appropriation” of the energy transition	Statements & counterstatements	Text research
Socio-Ecological & Technical	The clean energy transition	Political administrative region	Capacity available in the region to shape its decarbonisation pathway	Multilevel system interaction	Semi-structured interviews

2.2.7 Cross-cutting elements

The three cross-cutting elements of the Multidimensional Analytic Framework, i.e., challenges, coping strategies and gender, are nurtured and can be better understood in the light of each and all the components of the MAF.

Challenge: In the case study we focus on the challenges faced by the CCT, i.e., from the perspective of the CCT. A challenge can be defined as composed of two elements: (i) a current situation (as the territory makes sense of it); (ii) the specific desired outcome(s) of a process intended to change that existing situation. Please note that a challenge is a social construct as the sense of the current situation only exists in a given social context (i) and that the outcome is desirable by the territory

² For full elaboration of transformative capacity and its components, please refer to Wolfram (2016, 2019) and Wolfram et al (2019).

³ Possible responses were: 1 – completely disagree; 2 – somewhat disagree; 3 – neither agree nor disagree; 4 – somewhat agree; 5 – fully agree; don't know.

itself (ii). Depending on the state of awareness of the territory, the degree of clarity and definition of the challenges may vary a lot. In this respect, depending on the cases, the territorial challenge(s) may be rather vague or well structured (e.g., in the latter case also including indicators to assess the success in achieving the challenge).

Coping strategy: A coping strategy is defined here as the strategy adopted to cope successfully with a territorial challenge. For each challenge, there can be several coping strategies. Depending on the case, two or more coping strategies may be coordinated with each other, but also in contrast and competition with each other. A coping strategy can be articulated in (i) a vision or orientation for the territory; (ii) a set of actions undertaken to fulfil the vision.

Gender dimension: The gender dimension highlights how a challenge may affect differently men and women, and how gender differences might be relevant to the coping strategies adopted.

2.3 Activities

2.3.1 Desk research

The case study started with a desk research activity. The desk research was aimed at (i) delineating the case study across its three units of analysis (CCT, PAR, LMA); (ii) collecting relevant dates and basic information on the region; (iii) collecting information needed for the implementation of the five components (including, inter alia, also a stakeholder analysis at the PAR level). The desk research allowed analysing of a wide set of sources, including documents and reports, available data sets, previous research and studies, policy documents and others. The desk research results have been collected in a State of the Art Report.

2.3.2 Focus groups (socio-cultural component)

Focus groups support qualitative measurement on research issues in which an inter-subjective agreement is needed, and for those issues, different types of actors need to triangulate. The analysis focused on the territorial stress induced by globalisation in the CCT. As "territorial stress" is not directly observable, following the socio-cultural component guidelines, the focus group aims at mapping the "strain situations" (i.e. conflicts, impasses, etc.) and related impacts in the CCT.

The focus group was conducted in Petroșani, the largest municipality in Jiu Valley, on two different days (22 and 23 November 2021). The focus group was composed of six people (all of them attended both meetings), out of which two were female, and four were male. All of them live and work in Petroșani. The focus group participants represented all three categories of stakeholders (community leaders, knowledge keepers, and memory keepers).

2.3.3 Survey data collection process (socio-psychological component)

For the survey in Jiu Valley, we decided to use the online platform *Limesurvey* for the questionnaire consisting of 90 items representing the 17 socio-psychological constructs (see Table in the Appendix). Both random and convenience sampling was used in the collection of responses to the survey. First, we used the technique of distributing the online survey in the social media communities that include a high proportion of local residents (i.e., of the target cities in the area). Secondly, we used the snowballing sampling technique, whereby participants in the survey distributed the online research instrument to other prospective participants, as detailed in the next section. The compulsory

sample size for each case study in ENTRANCES was set at 50 respondents. Still, we aimed to recruit a higher number of participants of at least 100 residents in the Jiu Valley communities.

In the first approach described above, we identified several social media groups (i.e., Facebook groups) defined through their focus on specific issues relevant for the Jiu Valley communities. The online survey was then distributed in these virtual groups, with the description of the aims of the research and the invitation to fill in the questionnaire addressed to the residents of the cities in the area. In the second approach using the snowballing sampling technique, contacts with stakeholders, i.e., representatives and members of various organizations in the Jiu Valley area, were established, such as the local university, NGOs, and energy companies. Then, these collaborators were asked to distribute the online survey among their acquaintances and members of their local groups that have been residing in the target area.

The survey was monitored and kept open from September to November 2021, and 126 participants completed it.

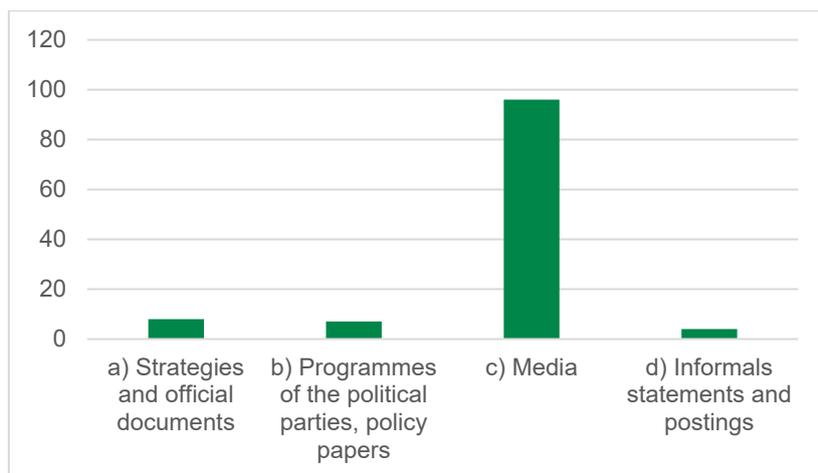
2.3.4 Socio-economic data (socio-economic component)

Socio-economic data has been collected from three primary sources, namely: (1) national sources (National Institute of Statistics – INSSE), (2) European database (Eurostat), and (3) firm-level data. The data was collected for the three units of analysis, CCT, LMA, and PAR, as well as for upper levels, such as NUTS2 region, country and European level. Overall, the period covered ranges from 1991 to 2021 and was focused on: demographic data, economic data, public finance data, and extraction of fossil fuels.

2.3.5 Text analysis (socio-political component)

Several *sources for the text analysis* have been investigated, covering the period from January 2015 to December 2021. Figure 4 shows the different types of sources for the text analysis and the number of articles for each class.

Figure 4 – Types of sources for text analysis



Note: The number of articles used to analyse local discourse, narratives and field of power is shown for each source type.

Source: own representation.

The sources can be described as follows:

- a) strategies and official documents
- b) programmes of the political parties, policy papers and statements of interest organisations, NGOs, and Trade Unions
- c) media
- d) informal statements and postings
- e) social Media

The information was collected by searching on Google, using the following keywords (and variations thereof): “decarbonisation”/ “transition to decarbonisation”/ “decarbonisation of mines”/ “coal extraction”/ “coal extraction and miners”. The initial pool of data was composed by 185 documents. Of these, 115 papers were coded and analyzed. The most used terms in the press are those that refer to: miners' problems (frequent miners' strikes because of low payments or delays, accidents at work and health problems); mining problems (inadequate infrastructure and work conditions), coal extraction, political promises related to mining and employee problems.

2.3.6 Semi-structured interviews (socio-ecological and technical component)

Mixed quantitative-qualitative interviews with various stakeholders engaged in the CET have been conducted. The aim was to obtain and contrast differential stakeholder assessments of transformative capacities. In total, ten stakeholders were interviewed, representing public, private, higher education and research institutions, non-governmental organisations, and civil society actors. The sample of participants was gender-balanced, including five men and five women. Respondents were asked to assess statements corresponding to each measure of transformative capacity.⁴

The ENTRANCES research team within the Alexandru Ioan Cuza University of Iasi conducted ten interviews in March and April 2022. The interviews were conducted online on the Webex platform. The average duration of an interview was of one hour. All interviewees gave their consent to participate in the study and their answers to be recorded. All recorded material was stored in personalized online clouds accessible only to the ENTRANCES research team. During the discussion, the interviewer also noted participants' answers to the quantitative scale questions. The questionnaire is available in Table 10 in the Appendix.

2.3.7 Data reporting, interpretation and the case study report

The broad set of research activities carried out for the development of the case study implied an extensive data processing and reporting activity. For each of the above-mentioned components, a short report describing the data collection procedure as well as a dataset were produced. This will allow making the data collected available to the public in the future in accordance with the FAIR principles. All the data collected have been interpreted by the case study team with two complementary approaches: through a component-focused interpretation (see Chapters 2-4); in the

⁴ Possible responses were: 1 – completely disagree; 2 – somewhat disagree; 3 – neither agree nor disagree; 4 – somewhat agree; 5 – fully agree; don't know.

light of a holistic understanding of the case (see Chapter 5). The results of such an interpretation are reported in the next chapter of the case study reports.

CHAPTER 3

ANALYSIS OF THE COAL AND CARBON TERRITORY

3 Analysis of the coal and carbon territory

3.1 Overview of the coal and carbon territory

3.1.1 Historical development

Although the first observations on the existence of coal strata were made around 1782, when they self-ignited and burned for a long time, it was only in 1840 that the first surface operations began, simultaneously at Vulcan, Petroșani and Petrița, and in 1845 massive migrations of German miners occurred mainly from Bucovina, but also from the rest of Transylvania. During this first phase of the historical development of Jiu Valley as a mining area, which entailed the onset and development of coal mining from 1840 to the 1st World War, the coal extracted from the Jiu Valley mines reached 2.3 million tons per year. The second phase, during the 1st World War and the Great Depression between World Wars (1918-1939), entailed the contextual decrease of coal mining and industry development in the region.

Afterwards, since the beginning of the 2nd world war to 1954, coal extraction was significantly increased in order to ensure the acute energetic needs of the country during the war and during the post-war Soviet occupation of Romania, when many of the natural resources of the country were controlled by the SovRoms, companies that were introduced as an interface between the URSS and Romania and who managed the draining of the Romanian resources towards the URSS.

“The glory days” of coal mining were those from 1954 to 1989. In 1954 the Romanian state became the owner of the mining extractions in the Jiu Valley, accelerating the country's industrialization and technological development. The two power plants (Mintia and Paroșeni) powered by Jiu Valley coal were built over the following years. Many other large plants and technological platforms will be built during the next decade. As the Jiu Valley coal was used both for energy and steel production, the local coal quickly became an essential natural resource of the country, thus motivating large investments in the acceleration of local coal industry development. Before 1989, the coal extracted from the Jiu Valley mines reached 11 million tons annually. Under the official slogan “The country needs as much coal as possible”, this intense development has also entailed a tremendous social change in the region, brought through two strains of migration. Firstly, the massive deficit of mining workforce was addressed by detaching employees from enterprises all over Romania into Jiu Valley, creating a massive social heterogeneity in the region. Secondly, this amplified the pre-existing social complexity of the local population, as Jiu Valley had already been an important area of work migration from other regions of the Austro-Hungarian Empire in the first phase of its development; coupled with the large increase of population during the communist regime (i.e., until 1989), this made Jiu Valley the most multi-cultural region of Romania. Specifically, the population of the Jiu Valley increased from 2,556 inhabitants (according to the 1818 census) to almost 200,000 in 1989. Proportionally, the number of employees in the coal mining sector grew from several hundred to 60,679 employees in 1989. From the socio-economic standpoint, the state extensively subsidized miners' incomes and benefits in order to ensure miners political obedience. These supported the gender-differentiated social system by enabling large families to live handily on one income.

Overall, from 1945 to 1989, coal production increased by more than four times, the number of mining perimeters almost doubled, and the mines in the Jiu Valley have known the greatest technical and technological progress. At the beginning of 1990, the Jiu Valley could be characterized as a strong

urbanized zone, almost exclusively related to the activity of coal output and dressing (more than 60,000 of the inhabitants work directly or indirectly in mining field). However, in these mono-industrial cities, the population was comprised of primarily low-qualified, low-educated people with low chances and limited possibilities of professional reconversion.

The downfall of the Jiu Valley coal mining began after the fall of communism in 1989 to 2021 and entails several sub-phases, each associated with a distinct decarbonization stage through mine closures. The start of this dissolution is that of the “mineriads” in 1990, specifically the three violent protests of the Jiu Valley miners, when miners were manipulated to participate in the Romanian political struggles by engaging in mass and brutal interventions in Bucharest. The consequence of these episodes was the “uncontrolled social disaster” that followed, stemming from the perception of the miners (generalized across the rest of the country) as being aggressive and irresponsible, coupled by an economic reasoning that deemed the Jiu Valley coal as being “too expensive”. Massive layoffs in the mining industry begin in 1997, when the Romanian government implemented a program of labor contract buyouts, enticing miner participation with large severance packages along with regular unemployment benefits, and several mines were closed. This program decreased mining employees from roughly 42,000 in 1997 to about 15,000 by late 2000, enabled closure of two of thirteen mines, and prompted talk of closure of another five to eight mines. This downward process is still underway, with only 4 mines still operational in the area.

3.1.2 Ecological and environmental situation

In 2019, coal production in the four mines from the Jiu Valley region was 597,000 tons (European Commission, 2020). While the mining activity in the Jiu Valley is considerably lower compared to previous years, it still poses some fundamental environmental challenges, which add up to the already existing impact. In Hunedoara County, 3.9% of the total area is covered by degraded and unproductive land, which is double compared to what can be found in the West Region area (TRACER, 2019). Moreover, numerous tailing slumps and ash dump sites resulted from the power and heat generating industry and coal exploitation. A total of 39 dump sites cover 193.86 ha from the entire Jiu Valley surface. Most of these dumps were located directly on the ground and did not respect the necessary environmental protection standards. These sites led to soil, subsoil and groundwater contamination.

The water quality (both surface water and groundwater) was especially affected in the past by mining exploitations. The used and residual water from the mining processes posed a critical threat to the environment and led to the partial extinction of water fauna near the Petroșani municipality (Roman, 2022). However, in recent years, water pollution decreased due to the reduction in mining activities and the implementation of more environmentally aware processes (cleaning dump sites). In recent years, the analysis of the pollutants in the water has shown that they are within normal limits. Currently, the ecological status of the Jiu River basin is 80.3% good (TRACER, 2019).

The soil also shows substantial degradation, especially around the mining facilities and the dump sites. Traces of heavy metal contamination can be found. Infertility is another problem, with some areas near the dump sites lacking vegetation even more than 20 years after the closure of the sites (TRACER, 2019). Ground and tailing dump instability do not represent an issue in the Jiu Valley region.

Air pollution is higher near the trailing dumps, but the levels of NO₂ or SO₂ are generally within the accepted thresholds (Traista, Sarbu & Badulescu, 2006). The power plant operations and the ventilation systems of the mining exploitations also contribute to the region's air pollution level. For instance, the ash particles from the ash dump near CEH - Paroşeni CHP affects the city of Vulcan during periods with stronger winds (TRACER, 2019). Incidents of noxious smoke leaking from former coal exploitations (such as the one in the perimeter of the former Dâlja mine in 2019) also raise concerns about the quality of environmental protection measures that have been implemented in the process of mine sealing. Generally, respiratory system illnesses have a higher occurrence rate in the Jiu Valley communities compared to the rest of the country.

The ecological challenges are important, especially those regarding water and soil pollution. However, the steps taken toward environmental protection show some noteworthy results. In recent years, the areas representing the closed mines were reclaimed and used for forestation or agriculture. Also, semi-natural revegetation appeared near some of the tailing dumps and ponds (TRACER, 2019).

Still, some environmental problems raise considerable challenges. Some tailing dumps and mining land are still not environmentally restored and cannot be used for agriculture and forestry. Also, in Romania, the percentage of households that uses coal-based heating systems is relatively high.

3.2 Socio-cultural component

3.2.1 Summary of results

List of the strain situations mapped

A total of 23 strain situations were mapped in the focus group. A list of the strain situations and related features is provided in the table below. Table 2 provides an overview of the strain situation mapped, classifying each strain situation in relation to (a) type of the strain situation; (b) areas of change and related stress factors; (c) position in space; (d) position in time. A short description of each strain situation is provided in the Appendix for the socio-cultural component.

Table 2 – List of the strain situations mapped

⚡	Name	Type	Area	Factors		Geo	Time
				1st	2nd		
1	The massive layoffs in the mining industry	Exo conflict	Finance-	F13	-	Jiu Valley	1997
2	The “mineriads” in 1990	Exo conflict	Finance-	F13	-	Jiu Valley	1990
3	The trolley line between Jiu Valley municipalities	Endo conflict	Finance-	F09	-	Jiu Valley	2020
4	The hydroelectric power plants	Exo conflict	Multiple	F09	F15	Jiu Valley	2017
5	The conflicts on the Coroiеști ponds	Endo conflict	Finance-	F11	-	Coroiеști, Petroșani	2021
6	The incertitude and reticence of investors	Dependence	Finance-	F11	-	Jiu Valley	1990
7	The road to Herculane	Exo conflict	Multiple	F09	F15	Jiu Valley	2009
8	The inability of local authorities to attract investments	Impasse	Finance-	F13	-	Jiu Valley	1990
9	Fragmentation and poor collaboration between Jiu Valley municipalities	Impasse	Finance-	F13	-	Jiu Valley	n.a.
10	Scarce workforce specialized in the new technologies	Impasse	Techno-	F16	F17	Jiu Valley	n.a.
11	Lack of trust in the digital technologies	Impasse	Techno-	F16	F17	Jiu Valley	n.a.
12	Age-based digital divide	Impasse	Techno-	F16	-	Jiu Valley	2021
13	Insufficient digitalization of public services	Impasse	Techno-	F17	-	Jiu Valley	n.a.
14	Old-time nostalgia in the local media	Exo conflict	Media-	F08	-	Jiu Valley	2000
15	The negative image of the socio-economic state of Jiu Valley conveyed by the national media	Dependence	Media-	F07	-	Bucharest	2000
16	The stereotypical and offensive portrait of the Jiu Valley residents conveyed by the national media	Dependence	Media-	F07	-	Bucharest	2000
17	In-migration of mining workforce	Endo conflict	Ethno-	F03	-	Jiu Valley	1840-1918
18	Youth out-migration	Impasse	Ethno-	F01	-	Jiu Valley	1997
19	Aged people out-migration	Impasse	Ethno-	F02	-	Jiu Valley	1997
20	Return migration	Impasse	Ethno-	F05	-	Jiu Valley	2019
21	The underdevelopment of the tourism industry	Impasse	Multiple	F04	F13	Jiu Valley	2000
22	Recrudescence of populist and nostalgic movements	Dependence	Ideo-	F14	-	Jiu Valley	2017
23	“Pandemic hysteria”	Impasse	Nature-	F19	-	Jiu Valley	2020

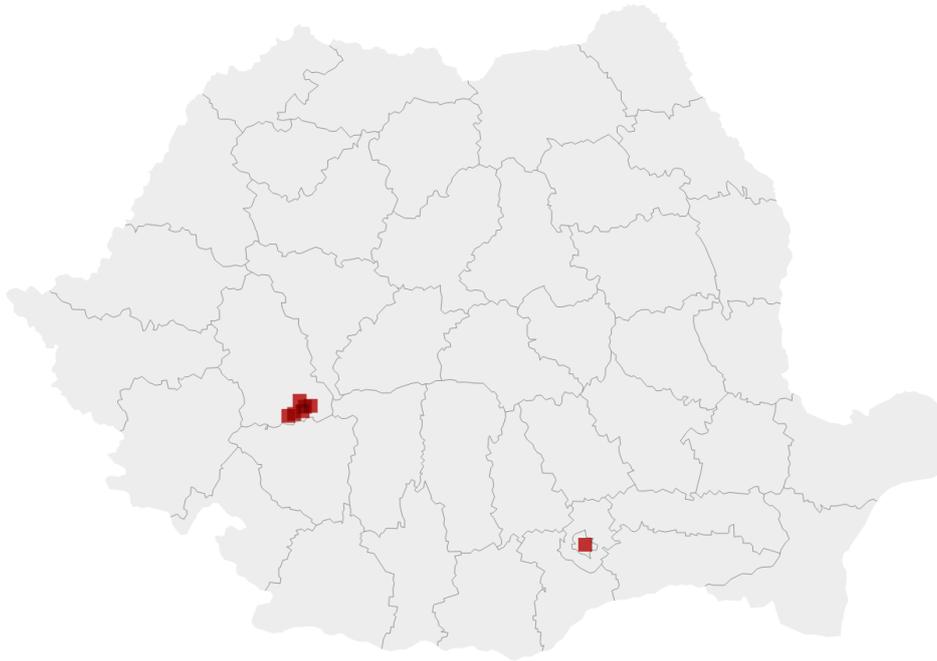
Note: The factors refer to the socio-cultural factors, dynamics and patterns identified by the ENTRANCES project in Deliverable 1.2.. The symbol ⚡ stands for strain situations.

Source: ENTRANCES Focus Group Discussion.

Distribution of the strain situation in the geographical map

Most of the 23 strain situations mapped (i.e., 21) cannot be localized in a specific point of the map as they are related to the whole Jiu Valley area / to all the municipalities in the CCT. These strain situations are represented in red in the map below (see Figure 5). The other two strain situations are situated in the country's capital (Bucharest).

Figure 5 – Distribution of the strain situations in the geographical map



Created with Datawrapper

Note: The red symbols indicate the geographical position of the strain situations mapped.

Sources: ENTRANCES Focus Group Discussion.

Distribution of the strain situations in the time map

Table 3 shows the starting year of the strain situations mapped and the duration of the strain situation.

The table below shows the starting year of the strain situations mapped and the duration of the strain situation. The table shows that except for ≈17 (“In-migration of mining workforce”), all the strain situations are located in the last historical phase. Of all the strain situations mapped, only one can be considered over, while all the others are still present in the Coal and Carbon Territory. The duration of many of the strain situations mapped is rather high, with some of them lasting more than 20 or even 30 years, as they are anchored in two distinct events that occurred at such time distances from the present: the 1990’s “mineriads” and the beginning of decarbonization (through the closing of coal mines) in 1997.

Table 3 – List of strain situation

Years	Phase	Strain Situation	Duration (years)
1840 – 1918	1. Onset and development of coal mining	1840: In-migration of mining workforce (☞17)	78
1918 – 1939	2. Decrease of coal mining / extraction during the 1st World War and the Great Depression	No strain situation mapped started in this period	-
1940 – 1954	3. increased coal extraction during the war and the post-war Soviet occupation	No strain situation mapped started in this period	-
1954 – 1989	4. The “the glory days” of coal mining	No strain situation mapped started in this period	-
1990 – 2021	5. The downfall of the coal mining industry	1997: The massive layoffs in the mining industry (☞01)	1
		1990: The first “mineriads” (☞02)	1
		2020: The trolley line between Jiu Valley municipalities (☞03)	2
		2017: The hydroelectric power plants (☞04)	13
		2021: The conflicts on the Coroiеști ponds (☞05)	1
		1990: The incertitude and reticence of investors (☞06)	30
		2009: The road to Herculane (☞07)	10
		1990: The inability of local authorities to attract investments (☞08)	31
		1990s: Fragmentation and poor collaboration between Jiu Valley municipalities (☞09)	About 30
		2000s: Scarce workforce specialized in the new technologies (☞10)	About 20
		2010s: Lack of trust in the digital technologies (☞11)	About 10
		2021: Age-based digital divide (☞12)	1
		2010s: Insufficient digitalization of public services (☞13)	About 5
		2000: Old-time nostalgia in the local media (☞14)	21
		2000: The negative image of the socio-economic state of Jiu Valley conveyed by the national media (☞15)	21
		2000: The stereotypical and offensive portrait of the Jiu Valley residents conveyed by the national media (☞16)	21
		1997: Youth out-migration (☞18)	34
		1997: Aged people out-migration (☞19)	over
		2019: Return migration (☞20)	2
		2000s: The underdevelopment of the tourism industry (☞21)	21
		2017: Recrudescence of populist and nostalgic movements (☞22)	4
		2020: “Pandemic hysteria” (☞23)	2

Note: The symbol ☞ represents strain situations.

Source: ENTRANCES Focus Group Discussion.

3.2.2 Interpretation

Stress vectors

For each of the factors considered in the research - which identifies a class of possible stressors in the territory -, a set of specific stress vectors - i.e. actual change process producing stress in the territory - can be identified by analyzing the strain situations mapped. While the strain situations have been represented using the "strain" symbol (e.g. ≈05), the stress vectors will be coded in progressive order and marked using another special symbol (↗05).

- **Dependence on political interests:** The socio-economic status and future of the Jiu Valley mining industry and its workforce have been almost completely dependent on central governmental decisions. After the dramatic change of the Romanian regime in 1989, the so far solid place within the socialist economy and industrial network of the mining industry came to be threatened during the uncertain times of the transition towards capitalism. This led to the emergence of stress vector ↗01: the dependence of the mining workforce on political interests. In turn, this vector allowed for the manipulation of the miners towards taking part in national political debates in the 1990s, which culminated with three violent interventions of the Jiu Valley miners in Bucharest (≈02). These incidents dramatically altered the ways in which miners were publicly and politically perceived, further causing incertitude and reticence in potential investors (≈06), as companies that might have had the interest to invest in the Jiu Valley emerging post-communist economy were held back by their reticence following these violent '90s events. The perception of miners as easily manipulated by political agents towards their personal interests was also associated to the constant tendency of the national media to convey stereotypical and offensive images of the Jiu Valley residents (≈15), as well as a negative image of the socio-economic state of the region as a generalized community stigma (≈16).
- **The dissolution of the Jiu Valley cohesiveness:** The Jiu Valley was developed by the communist regime as a mono-industrial complex comprising of distinct municipalities and industrial sites that were strongly connected and regulated by a common top-down strategy. Since 1990 this articulated administration has gradually dissolved towards a collection of distinct municipalities and industrial units (over the last 10 years the dominant role in this industrial and economic area being played by CEH, Hunedoara Energy Complex). This dissolution process created independent and even inter-competitive separate administrative units, and it represents another stress vector (↗02). It created the premises for several strain situations that have emerged and that involve conflicts between representatives of these municipalities (≈3, ≈5) on issues regarding the common development of the region (≈3) or the environmental management of former coal preparation sites (≈5). Other strain situations entail conflicts between local authorities and the civil society, represented by environmental NGOs (≈4, ≈7). At a more general level, there is a chronic lack of collaboration between representatives and public administrators of the municipalities across Jiu Valley, which hinders effective negotiations with investors interested in developing their business on a large scale in the region (≈9). Moreover, from the administrative standpoint, Jiu Valley is too fragmented to be eligible for funding under the regular programs of the European Commission, further emphasizing the need to agree on a common perspective for the development of the region and on a unique representative body.

- **The rapid disintegration of the mono-industrial economy:** The economic transition after 1990 brought the dissolution of the former structures of the socialist planned economy, and a consecutive uncertainty in all work sectors across the countries. In the Jiu Valley, this was amplified by the increasingly threatened status and future of the mining industry. Together these factors constitute another stress vector (✓03). The disintegration of the mono-industrial economy in the region is related to several strain situations. First, it entailed the massive layoffs in the Jiu Valley mining industry (≈1), which began in 1997 based on the governmental decision that it was no longer worthy to exploit Romania's natural resources generally, and hard coal in particular. Jiu Valley paid the highest socio-economic costs stemming from this decision in comparison to the rest of the country, and the region became characterized by social and financial insecurity. Another effect of this stress vector is the scarcity of the workforce specialised in the new technologies (≈10), partly because of the scarcity of new tech / digital companies present in Jiu Valley, and as a specific component of a general lack of specialized workforce (in any domain apart from mining) in Jiu Valley. Relatedly, this stress vector produced massive out-migration from the region, not only among the retired miners after mine closures (≈19), but, more relevant for the present times, the continuous youth out-migration because of the negative employment prospects in the region (≈18).
- **Reluctancy towards new alternatives and inertia:** Although the region is in need of substantial socio-economic development through new approaches and initiatives, there is a consistent reticence towards actually replacing habitual approaches with new alternatives, which represents another stress vector (✓04). It generates a lack of trust in the digital technologies of residents and, more importantly, businesses (≈11). This complements the insufficient digitalization of public services, as all administrations in the region display a lack of flexibility in adapting their bureaucratic procedures to the new technologies, which creates strains and difficulties for both SMEs and regular citizens (≈13). It is also associated to age-based digital divide, i.e., the fact that elder residents have significant problems in using necessary digitally – mediated procedures (≈12). At the ideological level, the local media has conveyed nostalgia focused on the “golden age” of mining in the Jiu Valley (≈14) and has emphasized the responsibility of the national government to offer support in order to alleviate the dramatic effects of their political decision against coal mining, which further fosters cultural and behavioural inertia. This provides a local ideological background for populist attempts of political leaders intending to capitalize on the social tensions associated with the dissolution of the mining industry (≈14). On the practical level, this stress vector also contributes to authorities' relative neglect towards the development of the local tourism industry (≈21), although this alternative path is frequently conceived as a possible solution to the chronic socio-economic issues of the region, and even stated as such in official strategic plans.

Stress-strain

Conflict and disputes. The analysis of the strain situations allows us to single out a set of recurring conflicts within the Coal and Carbon Territory. Most of them are related to the economic and administrative consequences of the specific and ways in which decarbonization was managed in the Jiu Valley, by focusing on mine closures (≈1) and the gradual restriction of the associated industrial activity, without implementing consistent policies that would provide alternative developmental pathways for the region. This approach produced inertia, nostalgia (≈14), dependency on political

agendas (≈2), but also a lack of coherence of the developmental visions of the distinct municipalities within the region, which further led to several conflicts (≈3, ≈4, ≈5, ≈7).

Impasses and contradictions. Most of the strain situations identified were categorized as impasses. Some also relate to the fragmentation of Jiu Valley municipalities (≈9) and to inertia and nostalgia (≈11, ≈12, ≈13, ≈14), while others concern the demographic fluctuations produced by the evolution of the mining industry in the area (≈10, ≈17, ≈18, ≈19, ≈20). Finally, other impasses and contradictions stem from the inability or disinterest of local authorities to properly manage the development of the region (≈8, ≈21).

Dependence and uncertainties. Several types of stress by dependence and uncertainty were identified as reflected in the strain situations collected. Some refer to the long-term effects of the conflicts in which Jiu Valley miners were involved by political forces, in relation to the degree of trust that potential investors would place in the region and its inhabitants (≈6) and to the risk of recrudescence of populist movements (≈22). Others refer to the dependence on the frames that the national media has used in characterizing Jiu Valley communities (≈15, ≈16).

Strategies for coping with territorial stress. There are two main strategies for coping with some of the strain situations identified that were more or less explicitly put forth by our participants. The first is that of pressuring local authorities administrating the Jiu Valley municipalities to resolve their disputes and collaborate towards to unitary development of the region. This kind of pressure may emerge either in a top-down manner, from the national government, or from the civil society. The second is that of implementing more transparent management of the investments from the future EU funding provided for the transition and development of the region, which may contribute to stimulating the emergence of a more substantial private sector in the communities in the region.

Change, resistance to change, and ambivalence

The analysis of the strain situations and the complementary information collected about the Coal and Carbon Territory allowed us to describe some key dynamics of change, resistance to change and ambivalence in the territorial organisation of the CCT. Such dynamics are shortly described below.

a. Territorial trajectory: between continuity and rupture.

The vision that emerged from the analysis of the strain situation in regard to the territorial trajectory of the Jiu Valley is that of an undesirable and downwards continuity, prolonging the identity of the region as a coal mining area that confronts, at the same time, the socio-economic consequences of a mismanaged long-term decarbonization process. The initial major decisions that have driven this process were mainly motivated by political and short-term financial considerations, without a future-oriented strategy of stimulating alternative economic pathways, and the consecutive strategies that have been proposed for this aim have fallen far behind their promises. Consequently, the mining sector, although greatly depressed in comparison to its “golden age”, is still an important economic player in the region, and the latest state decisions suggest that the actual closure of this sector is to be postponed indefinitely. There are some alternative pathways that have been designed to represent a “rupture” from this trajectory, especially towards the development of tourism and of local small and medium enterprises. Yet, they need more substantial support and more collaborative effort of authorities than that invested so far in order to be efficiently implemented.

b. Territorial boundaries: between distinctiveness and alignment.

Results suggest that the region is still perceived as having a strong distinctiveness in terms of its coal mining identity. Not only does the long-lasting mining tradition and culture contribute to this distinctiveness, but also the current lack of industrial and economic alternatives that would replace coal mining and that would reduce local nostalgia for the times when this industry was at its peak development.

c. Territorial governance: between endogenous and exogenous.

Territorial governance of the region is mostly exogeneous, as major policies and decisions regarding its structural changes, and decarbonization in particular, are made at the central governmental level, under the EU relevant frameworks. Similarly, financing for major local development initiatives and strategies is also frequently decided upon at the central level (for instance concerning touristic infrastructure development, or cross-regional roads), although some support for such initiatives has also been provided by local budgets.

d. Territorial symbols: between myth and stigma.

There is a salient stigma perceived by the local community as deriving from the violent incidents in the 1990s in which Jiu Valley miners were involved, and from the chronic socio-economic underdevelopment of the region. This stigma is appraised as being attributed to the area and its inhabitants, especially by the national media. Furthermore, there is a strong nostalgia towards the “golden age” of the local mining industry, mainly among those with a pessimistic outlook on the future of the region and on the state’s capacity and interest to support its development and socio-economic recovery. No alternative symbols or myths were identified.

3.2.3 Gender dimension

The layoffs in the mining industry (≈ 1) have increased many women’s workload, as they were forced to look for employment opportunities while still carrying out their household responsibilities. Traditionally, miners’ families included only one employee, i.e., the male, who received a salary large enough to support the financial needs of the whole family, while the wife was in charge of all the household chores. The change in the husband’s employment status did not regularly entail a change in the distribution of these household responsibilities.

3.3 Socio-psychological component

The transformation of the energy system and the decarbonisation process are expected to have a noticeable impact on the socio-psychological wellbeing of the inhabitants of coal and carbon-intensive regions across Europe. In this component, we have measured the long-term and short-term impacts of the decarbonisation process on the socio-psychological wellbeing of the people and de/re-territorialisation of the affected regions. It can provide crucial support to policymakers and investors, helping them to make informed decisions on immediate and appropriate measures and actions to retain the population and maintain the demographic, social and economic configuration of these regions while achieving a sufficient level of decarbonisation in the coming decades.

Our main objective is to measure socio-psychological stress in the general population of the territories more directly challenged by the ongoing decarbonisation process, conventionally referred to in the project as the Coal and Carbon Territory (CCT). Through a quantitative survey, the project aims at creating new knowledge about the impact of different decarbonisation policies implemented

in the CCT on people's socio-psychological well-being and their coping strategies to deal with this transition.

3.3.1 Summary of results

Profile of respondents

On the gender criterion, the 126 participants from the Jiu Valley area were distributed into 73 women (58 %) and 53 men (42 %). Concerning participants' age, the largest category was represented by respondents in the 46-65 years age group (55, or 44 %). The second largest group was that of participants in the 31-45 age group (37, or 29 %), followed by those in the 18-30 age group (25, or 20 %), and of those aged over 65 (9, or 7 %), respectively. In terms of education, the largest category of participants consisted of those who completed professional education (106, or 84 %), followed by those with secondary education (12, or 10 %), and by participants with university education (8, or 6 %), respectively. Concerning participants' professional profiles, most of them held occupations in the sector of services (75, or 60 %), followed by those in the industry sector (19, or 15 %), and by participants working in the public sector (16, or 13 %), while the same number of respondents were currently unemployed (16, or 13 %). Most of the participants were not currently employed in coal-intensive industrial units (119, or 94 %), while only 7 (6 %) were employed in such units. Yet, 29 (23 %) of the participants had been employed in coal-intensive industrial units.

Table 4 – Respondent profile

Sample Size	126 Complete cases				
Gender	Males (73, 58%)		Females (53, 42%)		
Age	18-30 (25, 20%)	31-45 (37, 29%)	46-65 (55, 44%)	65+ (9, 7%)	
Education	Primary (0, 0%)	Secondary (12, 10%)	University (8, 6%)		Professional (106, 84%)
Occupation	Industry (19, 15%)	Services (75, 60%)	Public Servants (16, 13%)		Unemployed (16, 13%)
Working in Carbon Industries	Yes (7, 6%)			No (119, 94%)	
Worked in Carbon Industries	Yes (29, 23%)			No (97, 77%)	
Marital Status	Never Married (24, 19%)	With Partner (12, 10%)	Married (83, 66%)	Divorced/ Sep. (6, 4%)	Widowed (10, 4%)
Living with dependents	Yes (59, 47%)			No (67, 53%)	
Nativity	Born in Jiu Valley (97, 77%)	Born in other parts of Romania (28, 22%)		Born outside country (1, .8%)	
Duration of Stay	0-5 years (2, 2%)	6-10 years (0, 0%)	11-20 years (9, 7%)	20+ years (115, 91%)	

Note: Number and corresponding proportion are provided.

Source: ENTRANCES survey data.

Regarding marital status, the highest proportion of the sample was married (83, or 66 %), while 24 (19 %) had never been married. The other marital status categories included less than 10 % each. A number of 59 (47 %) of the participants were living with dependents (under 16 or over 65). From their place of birth, most participants (97, or 77 %) were born in Jiu Valley, followed by those born in other

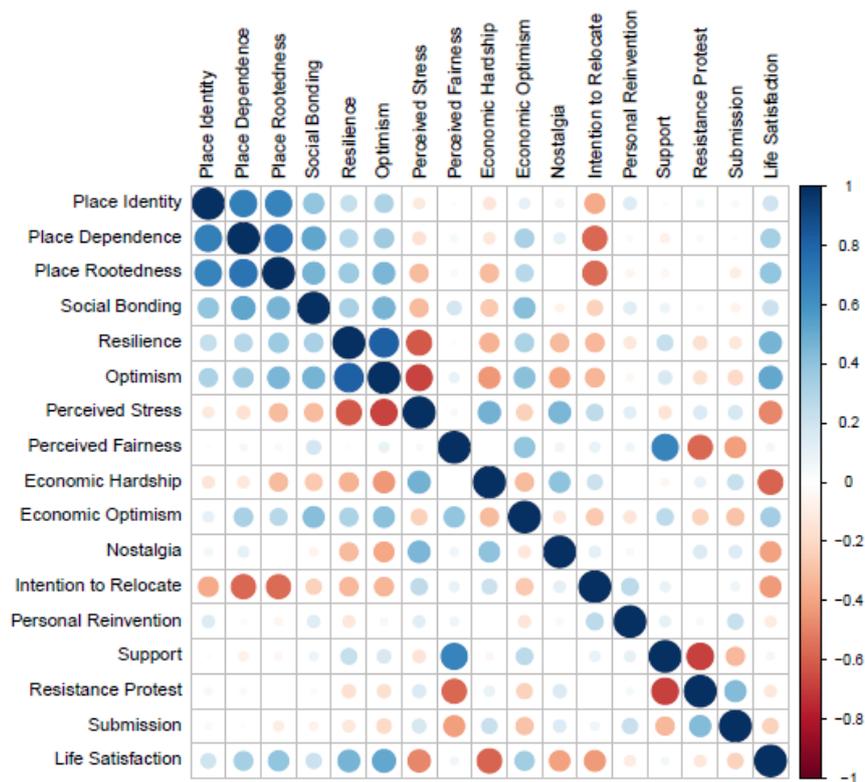
parts of the country (28, or 22%), while only one participant was born abroad. On the criterion of their duration of stay in Jiu Valley, most participants (115, or 91%) had been living there for more than 20 years, while only 2 participants had less than 5 years spent in this area.

3.3.2 Interpretation

Correlation among different factors related to the socio-psychological component

The correlation analysis indicated several strong correlations in the case of Jiu Valley. Specifically, Place Identity presented strong and positive correlations with Place Dependence and Place Rootedness, medium and positive with Optimism and Social bonding, suggesting that higher levels of place identity are associated with higher levels of place dependence, place rootedness, social bonding, and optimism. Further, place dependence strongly and positively correlated with Place Rootedness and social bonding, and medium correlations were observed between the former and optimism, economic optimism, and life satisfaction. On top of these results, place rootedness positively and medium size correlated with social bonding, resilience, optimism, and life satisfaction. As expected, all three aspects of place attachment are negatively and strongly associated with intention to relocate, suggesting that individuals with high scores on the three dimensions have a lower tendency to leave Jiu Valley.

Figure 6 – Correlation among different factors related to the socio-psychological component



Note: Pearson’s pairwise correlation is used to identify groups of highly correlated factors. It is used to select the factor so that our model can have the highest predictive power using as few factors as possible.

Source: ENTRANCES survey data.

Moreover, perceived stress negatively correlated with social bonding, resilience and optimism, indicating that individuals with higher scores on the former perceive less stress. Resilience was strongly and positively associated with optimism and life satisfaction, suggesting that individuals with higher scores on resilience tend to present higher scores on optimism and life satisfaction. Moreover, optimism was negatively and moderately correlated with both intention to relocate and nostalgia; individuals with higher scores on optimism tend to present lower intention to relocate and lower nostalgic attitudes. As expected, perceived stress is negatively associated with life satisfaction, indicating that higher levels of perceived stress are associated with lower life satisfaction.

Perceived fairness positively and strongly correlated with support (as a coping strategy), whereas it was negatively related to both resistance and submission. Moreover, perceived economic hardship was positively associated with perceived stress and nostalgia and negatively correlated with optimism and life satisfaction.

Mean score with standard deviations for all constructs

The values in the following Table 5 suggest that the participants in our sample have high levels of Place Identity and medium to high levels of Place Dependence, Place Rootedness and Social Bonding. Of all four dimensions of place attachment, social bonding emerged as having the lowest mean. At the same time, place dependence had the highest standard deviation, indicating the most increased heterogeneity of answers to the items of the place attachment scale. Medium to high resilience and general/personal optimism can also be noted by examining the mean values of answers, together with small standard deviations, which suggest homogeneity of answers. Our sample reported a medium level of perceived stress, indicated by the mean score just above the middle point of the response scale and by the small standard deviation. The statistical indicators also suggest that participants perceive an average level of fairness regarding decarbonization and its impacts, and a medium level of economic hardships brought by decarbonization. The medium value on the economic optimism factor indicates that our participants are pretty pessimistic about the economic future of their region. However, the considerable value of the standard deviation also suggests that this vision is not consensually shared. The level of nostalgia in our sample is above the medium level, with a somewhat lower heterogeneity in this respect.

Regarding coping strategies, three of the five factors emerged as having mean scores above the middle point of the response scale (i.e., Intention to relocate, Personal reinvention and Support), suggesting that these strategies (especially the first) have a low to medium relevance for our participants. Large standard deviations (above 1) can also be noted in the case of these three factors, indicating that a certain percentage of our sample might still consider them appropriate; the strategy of Support is especially relevant in this regard. On the other hand, the two different strategies (Resistance and Protest, and Submission) have response means just above the middle point of the scale, suggesting a higher degree of relevance for our sample. Finally, the corresponding mean score indicates that our participants have a high level of life satisfaction.

Table 5 – Mean score and standard deviations for all factors

Factors/ Latent constructs	Sub constructs	Mean score	Standard deviation	Cronbach's Alpha
Place Attachment	Place Identity	4.58	0.59	0.93
	Place Dependence	3.83	1.06	0.88
	Place Rootedness	4.03	0.54	0.63
	Social Bonding	3.62	0.94	0.72
Moderators	Resilience	4.01	0.64	0.83
	Optimism	4.06	0.68	0.73
Decarbonisation Impacts	Perceived Stress	2.53	0.68	0.93
	Perceived Fairness	2.52	0.77	0.80
	Economic Hardship	3.07	0.92	0.88
	Economic Optimism	2.38	1.03	0.88
	Nostalgia	3.06	0.81	0.89
Coping Strategies	Intention to relocate	2.51	1.11	0.90
	Personal reinvention	2.84	1.01	0.79
	Support	2.89	1.25	0.88
	Resistance and Protest	3.04	1.06	0.85
	Submission	3.3	0.86	0.34
Life Satisfaction		3.49	0.82	0.87

Note: Factor means are inverted compared to initial results (in short reports) for questions with responses strongly agree ==1 to strongly disagree == 5. This change has been made to make the answers more intuitive. Cronbach's Alpha provides a measure of the internal consistency of a test or scale indicate (Cronbach, 1951); it is expressed as a number between 0 and 1. Internal consistency describes the extent to which all the items in a test measure the same concept or construct and, hence, it is connected to the inter-relatedness of the items within the test. The alpha score below 0.7 is not acceptable.

Source: ENTRANCES survey data.

Regional differences in mean scores for different factors

Compared to the case study as a whole, the profile of Jiu Valley participants indicates that they score higher on all the four dimensions of place attachment, namely higher place identity, place dependence, place rootedness and social bonding. Moreover, participants from the case study exhibited higher optimism than the other case studies from ENTRANCES; notably, resilience (the other moderator in question) is at a medium-high level.

Regarding decarbonisation impacts, results suggested higher levels of nostalgia and medium-low levels of perceived fairness and economic optimism. Thus, as compared to the case studies, Jiu Valley individuals tend to exhibit more nostalgia and perceive more unfairness and less economic optimism.

Three out of the four coping strategies investigated showed higher levels of engagement for the Jiu Valley's individuals, namely: personal reinvention (as a way of coping due to the massive cut-offs in the area), intention to relocate (as a way of coping due to low employment opportunities), resistance and protest (as a way of coping due to high nostalgia).

In terms of life satisfaction, Jiu Valley's individuals exhibited medium-high levels compared to the other case studies of ENTRANCES.

Table 6 – Z score and STAN for all factors

Factors/Latent constructs	Sub constructs	Z-score	STEN
Place Attachment	Place Identity	0.68	6.86
	Place Dependence	0.42	6.34
	Place Rootedness	0.56	6.62
	Social Bonding	0.31	6.12
Moderators	Resilience	0.17	5.84
	Optimism	0.35	6.20
Decarbonisation Impacts	Perceived Stress	-0.15	5.20
	Perceived Fairness	-0.43	4.64
	Economic Hardship	0.02	5.54
	Economic Optimism	-0.33	4.84
	Nostalgia	0.20	5.9
Coping Strategies	Intention to Relocate	0.25	6.00
	Personal Reinvention	0.52	6.54
	Support	-0.16	5.18
	Resistance and Protest	0.25	6.00
	Submission	-0.06	5.38
Life Satisfaction		0.09	5.68

Note: The Z-score provides an indication of how far from the mean a data point is, more technically it is a measure of how many standard deviation below or above the population mean a raw score is. The STEN scores (Standard Ten) shows results using a simple standardized scale from 1 to 10 that have a normal distribution. They have a mean of 5.5 and a standard deviation of 2 and are then rounded to the nearest integer. To interpret the STEN scores, all case studies will focus on STEN scores below 4 (which should be interpreted as low compared to the case studies as a whole) and above 6 (the high scores). All STEN scores around 5 show that the case study is not very different from the other ENTRANCES case studies.

Source: ENTRANCES survey data.

3.3.3 Gender dimension

Gender is one of the essential dimensions of our study. In terms of gender comparison, t-test results indicated no significant differences between women and men regarding place attachment. Thus, women and men presented similar scores on place identity, place dependence, place rootedness and social bonding. Similarly, there were no significant differences between women and men regarding resilience and optimism. Decarbonisation impacts posed no differences between women and men; perceived stress, fairness, economic hardship and nostalgia were similar for women and men. Further, both sexes scored similarly on all five coping strategies: intention to relocate, personal reinvention, support, resistance and protest, and submission. Lastly, no significant difference between women and men was observed in life satisfaction.

Table 7 – Gender differences in mean score for all constructs

Factors/ Latent constructs	Sub constructs	Mean score		T-test (df 124)	P-values
		Men	Women		
Place Attachment	Place Identity	4.55	4.59	-0.40	0.68
	Place Dependence	3.87	3.80	0.36	0.71
	Place Rootedness	4.03	4.02	0.69	0.94
	Social Bonding	3.55	3.65	-0.59	0.55
Moderators	Resilience	4.04	3.98	0.51	0.60
	Optimism	4.03	4.08	-0.46	0.64
Decarbonisation Impacts	Perceived Stress	2.48	2.55	-0.60	0.54
	Perceived Fairness	2.41	2.59	-1.34	0.18
	Economic Hardship	2.97	3.12	-0.91	0.36
	Economic Optimism	2.24	2.47	-1.25	0.21
	Nostalgia	3.16	2.97	1.26	0.20
Coping Strategies	Intention to Relocate	2.63	2.42	1.06	0.29
	Personal Reinvention	2.78	2.88	-0.58	0.56
	Support	2.93	2.85	0.33	0.73
	Resistance and Protest	2.92	3.06	-0.76	0.44
	Submission	3.23	3.34	-0.67	0.50
Life Satisfaction	Life Satisfaction	3.40	3.54	-0.98	0.32

Note: Mean-score indicates the mean score for all constructs. Mean score close to 5 shows higher value for all constructs and mean score close to 1 shows lower value for all constructs.

Source: ENTRANCES survey data.

3.4 Conclusion

The first study on the coal and carbon territory reported in this section was focused on the Socio-cultural component. Its results highlighted four stress vectors, that further cause various strain situations in the territory. The first vector is that of the dependence of the region on political interests, as the socio-economic status and future of the Jiu Valley mining industry and its workforce have been almost completely dependent on central governmental decisions and interests. This allowed for the manipulation of the miners towards taking part in national political debates in the 1990s. The incidents during those times dramatically altered the ways in which miners were publicly and politically perceived, further causing uncertainty and reticence in potential investors, and a constant tendency of the national media to convey stereotypical and offensive images of the Jiu Valley. The second vector involves the dissolution of the Jiu Valley cohesiveness towards a collection of independent and even inter-competitive separate administrative units, which created the premises for several strain situations involving conflicts between representatives of these municipalities and, generally, a chronic lack of collaboration between Jiu Valley administrative units, which hinders effective negotiations with investors interested in developing their business on a large scale in the region. The rapid disintegration of the mono-industrial economy is another fundamental stress vector, related to the massive layoffs in the Jiu Valley mining industry, as this territory paid the highest socio-economic costs stemming from the decision to phase-out the mining industry in Romania.

Besides socio-economic underdevelopment and insecurity, this also created massive out-migration from the region and a severe scarcity of the workforce specialised in the new technologies. Finally, reluctancy towards new alternatives and inertia was also another stress vector that emerged in our results. It entails consistent reticence towards actually replacing habitual approaches with new alternatives, and it expresses in several manners. It creates a lack of trust in the digital technologies of residents and, more importantly, businesses, which complements the insufficient digitalization of public services. At the ideological level, this stress vector is related to the local media conveying nostalgia focused on the “golden age” of mining in the Jiu Valley, which further fosters cultural and behavioural inertia and a local ideological background for populist messages that attempt to capitalize on social tensions within the community.

These stress vectors generate more than 20 strain situations. Some imply recurring conflicts related to the economic and administrative consequences of the specific ways in which decarbonization was managed in the Jiu Valley, by focusing on mine closures (□) and the gradual restriction of the associated industrial activity, without implementing consistent policies that would provide alternative developmental pathways for the region. Most of the strain situations identified were categorized as impasses. Besides issues already highlighted above, some impasses concern the demographic fluctuations produced by the evolution of the mining industry in the area, while others stem from the inability or disinterest of local authorities to properly manage the development of the region.

Important results also emerged from the study on the socio-psychological factors associated to decarbonization in the Jiu Valley sample. In comparison to the other case studies from ENTRANCES, we found the Jiu Valley participants to have higher place attachment, optimism and resilience. On the other hand, our sample expresses more intense nostalgia and perceives more unfairness regarding decarbonization and its impacts and less economic optimism. Also, they emerged as more engaged than many of the other participants surveyed in this ENTRANCES research in three coping strategies, i.e., personal reinvention, intention to relocate, and resistance and protest.

Our analyses of the relationships between the survey dimensions indicated that higher levels of place identity are associated with higher levels of place dependence, place rootedness, social bonding, and optimism. In regard to the negative impacts of decarbonization, perceived stress was found to be negatively related with social bonding, resilience and optimism, while perceived economic hardship was positively associated with perceived stress and nostalgia and negatively correlated with optimism and life satisfaction. On the gender dimension, our statistical analyses revealed no significant differences between women and men on any of the dimensions we investigated.

CHAPTER 4

SOCIO-ECONOMIC SITUATION

4 The socio-economic situation

4.1 Introduction to the socio-economic situation

This chapter provides an overview of the socio-economic situation of the region. Important factors for economic development are population dynamics, labour force, capital stock and technological progress.

We refer to the three different delineations of the region, namely the Coal Carbon Territory (CCT), Labour Market Area (LMA) and Political Administrative Region (PAR), as described in Section 2. The delineations correspond to the nomenclature units of territorial statistics (NUTS).

The socio-economic component focuses on structural change in the economy, i.e., the reallocation of economic activity across different economic sectors and regions. Structural change can lead to a change in a region's economic, financial, and demographic composition. This report provides a descriptive analysis of technological progress, demography, economic inequality, employment and economic activity based on various data sources.

4.2 Determinants of economic development

An important indicator of economic development is real gross domestic product (GDP) per capita.⁵ Real GDP per capita (Y/N) can be decomposed into three components, i.e., labour productivity (Y/L), employment rate (L/E) and share of population in working age (E/N):

$$\frac{Y}{N} = \frac{Y}{L} \times \frac{L}{E} \times \frac{E}{N} \quad (1)$$

where Y is real GDP, N population, L employed persons and E working-age population.⁶

Labour productivity (Y/L) depends on technological progress and capital intensity (Solow, 1956; Solow, 1957). On a sub-national level, there is no data available to analyse the capital stock for the CCT and LMA delineations. In addition to private investments, also investments into the public capital stock influence the development of labour productivity. The public capital stock is important for the growth trajectory of a region (Baxter & King, 1993). Technological progress depends on research and development (Romer, 1990; Jones, 2005; Lucas Jr, 2009). Further, technological progress also depends on human capital determined through individual qualifications (Uzawa, 1965; Lucas Jr, 1988; Mankiw et al., 1992).

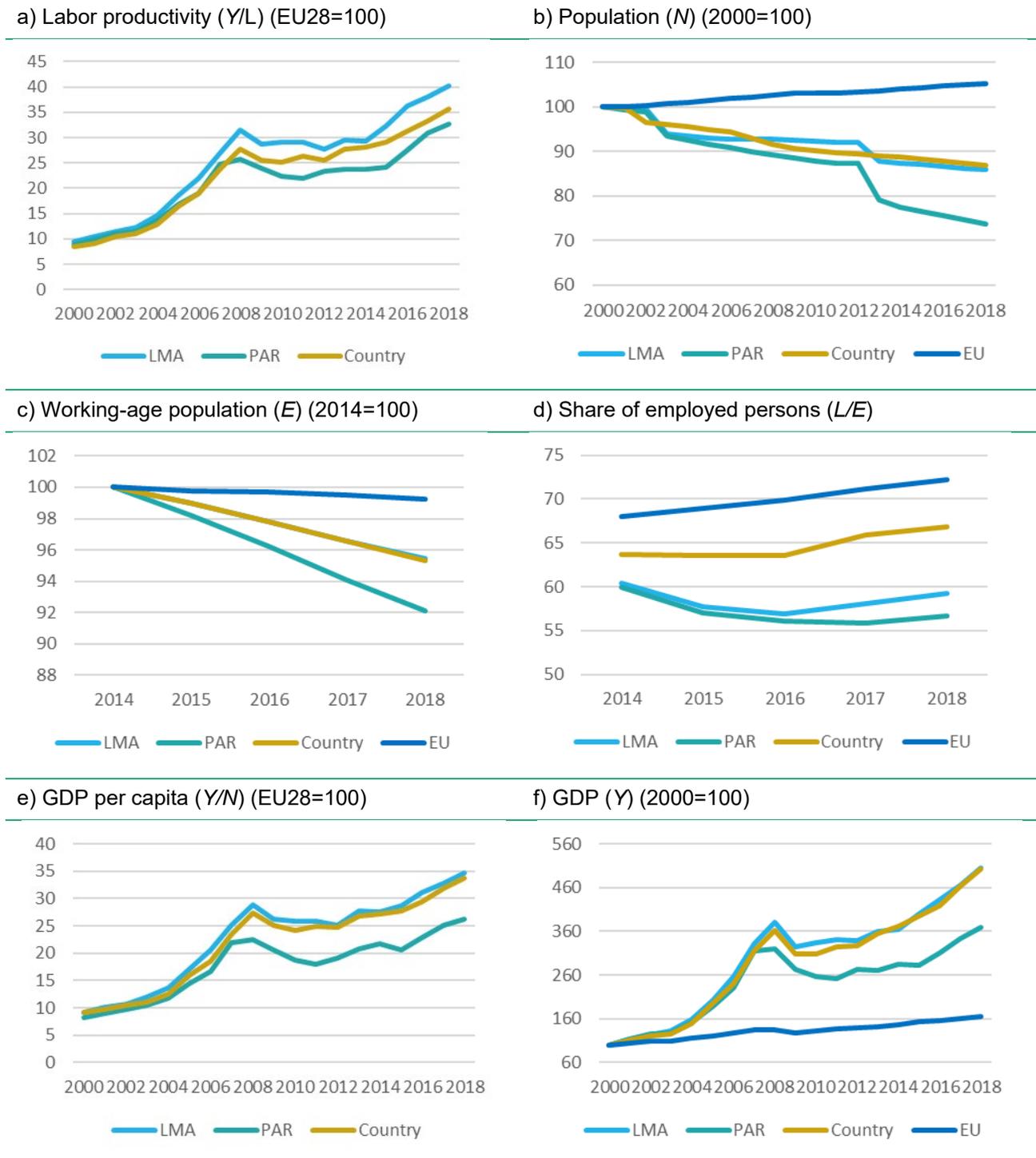
The labour productivity in the CCT has been increasing since 2000, although at a lower pace since 2008. The LMA labour productivity is above labour productivity in the PAR and the country. Regardless of the area analysed, labour productivity is still far below the EU average (Figure 7a)

⁵ Gross domestic product is not created to measure welfare. It measures the transaction value of goods and services over a specific period (see Eurostat 2014, p. 146). Other measures such as mortality, leisure and inequality show a high cross-country correlation with GDP (see Jones & Klenow 2016). Therefore, GDP is a good proxy for welfare despite its apparent shortcomings. Nevertheless, one should use various indicators to finally assess the welfare of a region (see Fleurbaey 2009).

⁶ The population in working age refers to the persons aged 15-64 years. Expected effects of legislated pension reforms will increase the participation rate of older persons in the future.

achieving less than 50 % of the EU average. The same description applies to the country's labour productivity, similar to the CCT.

Figure 7 – Economic overview



Source: National Institute of Statistics.

The country's total population has constantly declined since 2000, dropping approximately 1.2% yearly, while the EU28 population has increased by 5% (Figure 7b). The CCT/PAR showed with -26% a higher percentage of population loss since 2000, representing about 28% of the population, whereas in the LMA area, this percentage is about 15%.

The population of working individuals in the CCT has decreased significantly since 2014, indicating a decline of almost 10% (Figure 7c). In contrast, the LMA area, similar to the country's, showed half of this decline, i.e., by 5%. This decrease in the working-age population indicates the negative evolution of socio-economic factors in all the analysed areas during the timeframe of our analysis.

Since 2014, the share of employed individuals showed a steady and constant proportion of about 60%, with a slight increase since 2016. In the LMA, this proportion is slightly higher than in the PAR area. Overall, the share of employed individuals in the CCT is lower by 10% than the country's level and by approximately 15% less than the EU28 (Figure 7d).

GDP per capita relative to the EU28 values shows an upward trend, despite a short economic weakness after 2008 (Figure 7e). While in 2000, GDP per capita were only less than 10% of the EU28 level, it increased to almost 35% of EU level in 2018, at the PAR level only 25% are reached. The country's GDP per capita has increased since 2018, but it still situates at one-third of the EU28 value.

Over the years, the annual GDP has shown consistent and constant growth, both in the CCT and in the other analysed areas (Figure 7f). Compared to the EU28, Romanian GDP increased by more than 500% since 2000, the increase was similar in the LMA. In the PAR the increase was 369% and 165%.

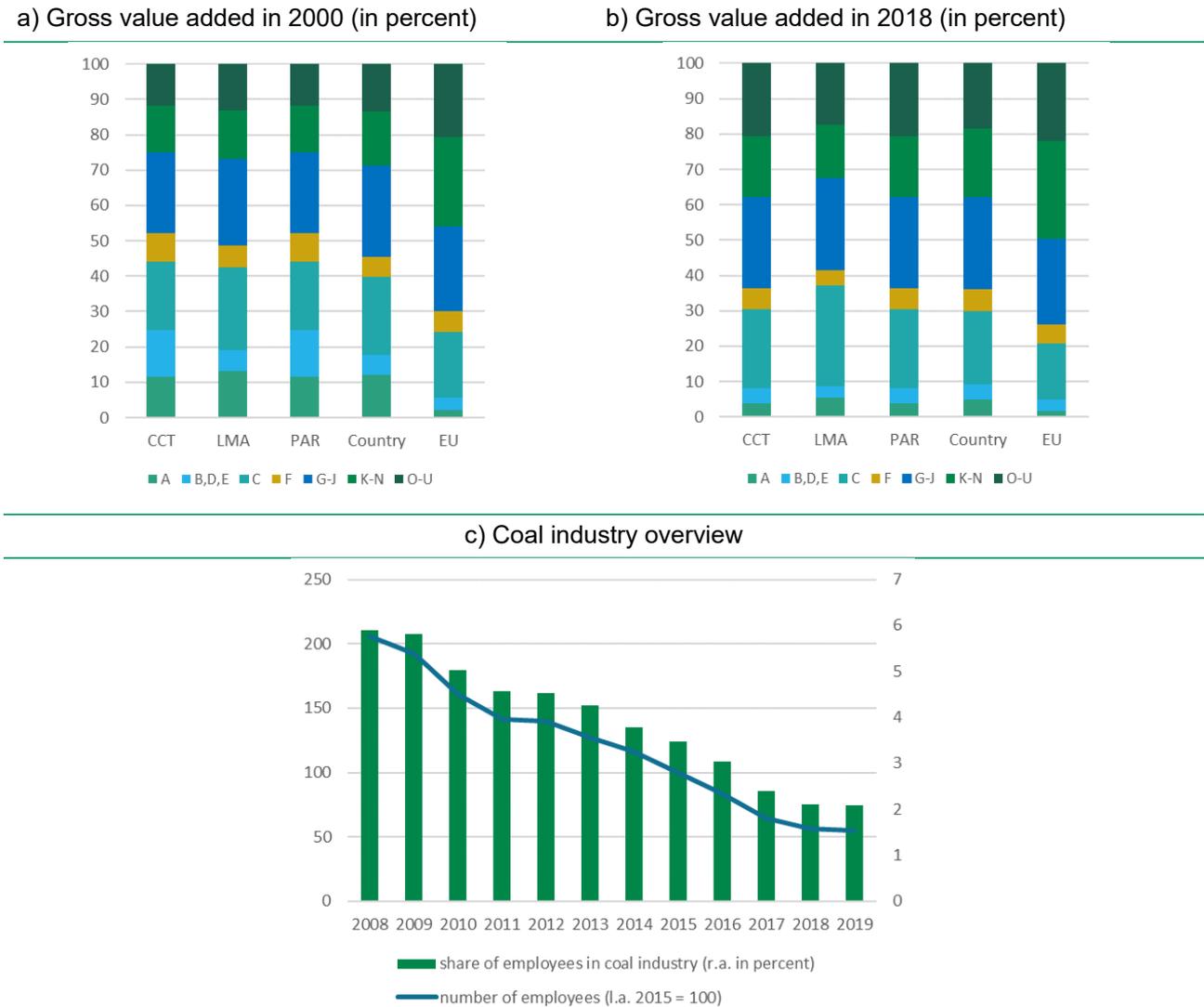
4.3 Sectoral structure

The employment structure in the CCT in coal and mining activities showed a significant decrease since the mines' closure in Jiu Valley. In 2000, the mining and utility sector only accounted for approximately 14% of the gross value added, whereas the Agriculture sector accounted for 12% of the employment, placing this value lower than the country's data (Figure 8a).

In 2018, the agriculture sector decreased, and the Retail and IT sectors gained almost 25% of the GVA; the mining and activities sector significantly reduced in 2018, bringing approximately 4% to the CCT's GVA (Figure 8b). Compared to the country's and EU28 levels', the CCT showed a similar GVA share of mining and utilities. The mining activities significantly decreased in 2018 in favour of the manufacturing industry, both in CCT, LMA, PAR and at the country level.

Since 2008, the number of employees in the mining sector from the CCT decreased from 11,200 to 3,002 in 2019 (Figure 8c). This significant decline in employee numbers is related to the governmental decisions of mine closure and the poor retribution of work in this sector.

Figure 8 – Sectoral Structure



Note: The sectors are classified by: A Agriculture, forestry and fishing; B,D,E Mining and Utilities; C Manufacturing; F Construction; G-J Retail and IT; K-N Finance, real estate and other professional services; O-U Other services (Eurostat 2008).

Source: National Institute of Statistics.

The ratio of sectoral output to employed person decreased in the CCT, LMA, and PAR as compared to the country level (Figure 9a to 9d). The only consistent sector in growth composition consists of the agricultural one. Nevertheless, there was no sector with negative growth in the respective period, neither in the CCT, LMA, PAR, or country level. The sectoral development of the CCT in mining activities was one-third of the country level and equal to the EU28 ratio.

Figure 9 – Growth decomposition (2018-2000)



Note: Sectoral growth (dY/Y) is decomposed into labour productivity growth ($d(Y/L)/(Y/L)$) and labour growth (dL/L). The growth contribution by each sector (i) is the initial share of the sector (Y_i/Y) in the year 2000 times the sectoral growth rate between 2000 and 2018 (dY_i/Y_i). Abbreviations for the sectors are provided in Figure 8 and tabulated in Table 11.

Source: National Institute of Statistics.

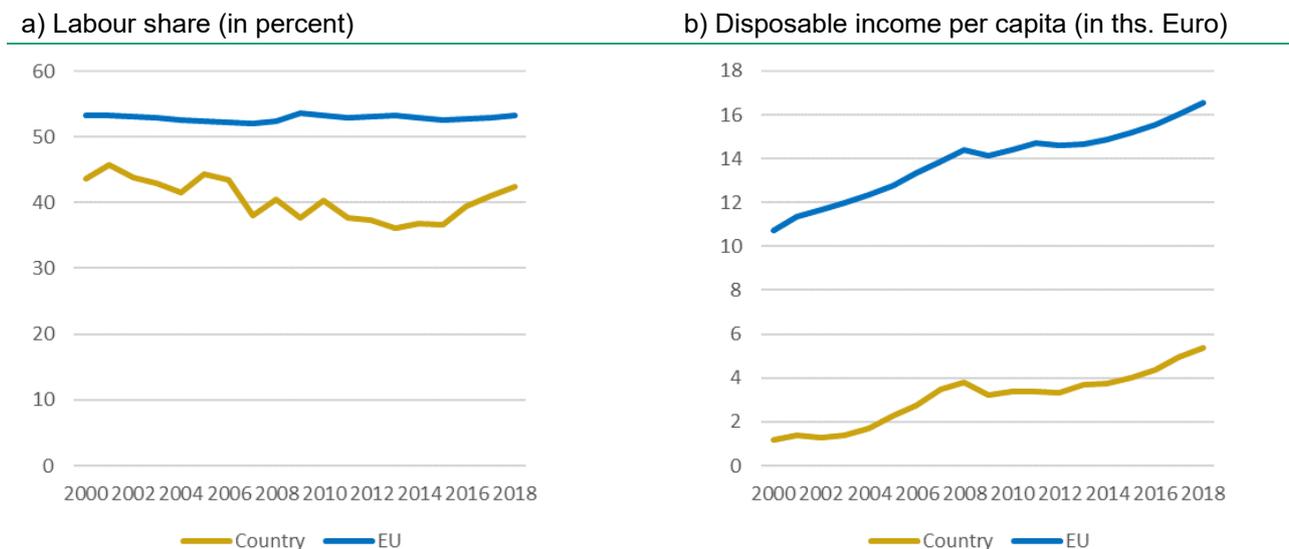
4.4 Income distribution

On the sub-national level, harmonized data for income distribution on a household or individual level is not available for all European case studies. However, it is possible to analyze the development of the functional income distribution in the region. The income approach states that GDP in a region is the compensation of employees (labour income), the gross operating surplus, mixed-income (e.g., compensation of owners), taxes on production and imports minus subsidies on production.⁷ Figure 10a depicts the labour share defined as labour income divided by total gross value added as a key economic indicator for income distribution (between labour income and capital income).

The labour share of the country has been below the EU28 since 2000, showing a decline in 2006 and a slight increase since 2016 (Figure 10a). As no CCT, PAR, and LMA data was available, only the country data was presented.

The disposable income per capita has constantly increased since the year 2000. Even so, compared to the EU28 level, the disposable income per capita remains at one-fourth of its level (Figure 10b).

Figure 10 – Income Distribution



Note: Labour share is the labour income divided by total gross value added.

Source: National Institute of Statistics.

4.5 Gender dimension

From the demographic point of view, the proportion of the two genders was approximately equal in the 2000 – 2020 period, not showing any disproportion and without significant changes across the years. Changes can be noted regarding the employment opportunities of men and women. The traditional gender roles within the miners' families during the last decades of the communist regime were almost completely polarized, with men employed in the mining industry and earning high wages that covered all household expenses and women as housewives. The progressive decline of the mining exploitation and sector in the Jiu Valley brought high rates of unemployment for men and the pressure on women to become financial providers. In this new gender egalitarian scenario, both men

⁷ https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Glossary:Income_approach.

and women are exposed to the socio-economic risks associated to the under-developed status of the region.

4.6 Conclusion

Our timeframe of analysis (i.e., from 2000 to 2018) is temporally situated after the first massive wave of layoffs from the Jiu Valley mining industry in 1997. Consistent with the past observations of the demographic effects of these layoffs, our findings show that the Jiu Valley CCT showed a higher percentage of population loss since 2000 compared to the other regions (LMA, PAR, the country and the EU), representing about 28 % of the local population, while the employment structure in the CCT in coal and mining activities showed a significant decrease. Moreover, the socio-economic data across this interval indicates that while labour productivity in the Jiu Valley CCT showed a slight increase since 2008, it remained significantly below the EU average, and the share of employed individuals in this region is lower by 10 % than the country's level. Relatedly, Gross Value Added of the mining and activities sector in the Jiu Valley CCT decreased, as well as the ratio of sectoral output to the employed person in the CCT, LMA, and PAR compared to the country level. We also found a sizeable negative discrepancy in the CCT gross value added compared to the EU28 (i.e., placed at one-fifth of the EU28 level across the analysis timeframe). Most of these observations converge on indicating a significant lag in the socio-economic development of the Jiu Valley region.

CHAPTER 5

ANALYSIS OF THE ENERGY TRANSITION IN THE POLITICAL ADMINISTRATIVE REGION

5 Analysis of the energy transition in the political administrative region

5.1 Overview on the energy transition policies

5.1.1 Political system and context

Jiu Valley is a micro-region in the South-Eastern part of Hunedoara County. From the administrative standpoint, it comprises seven localities in which coal mining has represented a key employment opportunity. Hunedoara County is the Political Administrative Region (PAR) directly in charge of managing the transition in the Jiu Valley CCT region. Hunedoara county council and the local councils of the six territorial administrative units that form the Jiu Valley CCT are the main actors that execute the decarbonization process, transposing into the local area the governmental decisions.

Each administrative unit is independent and can make its own decisions regarding what is included in its territory. Also, the county authority can make decisions regarding the county property. Local and county leadership is elected once every four years through a direct vote by the citizens. A mayor and the local council lead each locality (urban or rural). The county is led by a prefect and the county council. Each municipality has its own tax collection system. Local taxes on income and property (and other sources of local income) are later included in the local budget and used in infrastructure development and social projects.

The funding system is, as such, shared between the local municipalities, the county and the government. Governmental funding can be offered for larger (involving more than one county) or more critical projects. The mining system is, however, state-owned. Given that Hunedoara Energy Holding manages the still-operating mines and thermal power plants, a state-owned company, all the funding and the financial decisions related to the mining process are made at the governmental level.

5.1.2 Decarbonisation process

In 1990 there were 17 coal mining perimeters exploited in the Jiu Valley region. After the fall of communism (i.e., from 1990s), the increase in the cost of energy production from coal and the decrease of energy needs of the Romanian economy created strong pressures towards restricting the coal mining industry in the region. Consequently, since 1997 the Romanian government has implemented programs of labor contract buyouts, which resulted in the closure of several mines. There were 7 coal mines still operational in 2012 when another mines closure program was financed through state aid approved by the European Commission, which resulted in the closure of other three mines. Hunedoara Energy Holding manages the remaining four active mines (CEH), together with the two coal-fueled power stations in the area (one of them, the Mintia power plant, was put in conservation in 2021, as its emissions exceed the EU limits for sulphur dioxide (SO₂) and dust (PM)). During these years of gradual phase-out of the Jiu Valley mining industry, strategies offering post-mining communities alternative employment and career development paths were not developed. Together with the strong commitment of the local workforce to the identity, way of life and privileges of working in the coal mining industry in the last decades of the communist regime, this fueled strong and sometimes violent protests against mine closing plans foreseen by the government.

Moreover, the companies that have managed the Jiu Valley mining industry during the last 20 years of transition have repeatedly proven themselves unable to subsist without consistent and permanent financial state aid, their repeated insolvencies being frequently blamed on improper management and corruption. The high costs of coal extraction and the high price of the Jiu Valley coal in comparison to its alternatives on the current market further contribute to the low economic competitiveness of Hunedoara Energy Holding. Nevertheless, there are salient and consistent deterrents delaying the completion of the phasing out process of coal mining in Jiu Valley. There is still a lack of viable employment alternatives for the thousands of people currently employed in this industry and, consequently, the risk of solid social tensions that would arise if the complete closure of mining were decided upon. In this respect, there have been repeated incidents of miners blocking themselves in the shaft as a protest against payment delays and future intentions to close Jiu Valley mines due to economic inefficiency, while threats of violent protests have also been made by representatives of the local labour unions, remembering the violent and socially traumatic events of the '90.

5.1.3 Public participation

Besides the government, few stakeholders are involved in the decision-making process regarding decarbonization. The local and county authorities are the ones responsible for implementing the government's decisions in the area. In 2019, The Memorandum of Understanding between the six administrative units of the Jiu Valley for the establishment of the "Jiu Valley Partnership for Just Transition" was signed by the mayors. Also, there have been environmental NGOs that have opposed the development of two hydroelectric power plants in the region. However, public involvement in the process is reduced especially because civil society and the local businesses have deficient levels of power in this process.

5.1.4 Clean energy transition (CET)

A major strategic framework and driver of the current clean energy transition in the Jiu Valley is the Platform for Coal Regions in Transition created by the European Union in 2017, which has a particular focus on fostering the alternative socio-economic development of the Jiu Valley mining communities. The Romanian Ministry of European Investments & Projects coordinated the development of a regional development strategy for the Jiu Valley that defines the specific manners in which the EU Platform for Coal Regions in Transition investment possibilities are to be applied in this region. This strategic plan (entitled „The strategy of economic, social and environmental development of the Jiu Valley (2021-2030)”) presents the strategic outline to be implemented until 2030 for the transition from coal of the Jiu Valley. It assumes the complete termination of mining in the region, in accordance to official governmental decisions that were adopted (since 2016), to a large degree, as a result of the negotiations with the European Union. This document represents the main deliverable of a project financed by the European Commission through the Directorate-General for Structural Reform Support (DG REFORM), and it was developed by PricewaterhouseCoopers Management Consultants SRL („PwC”).

The Jiu Valley strategic outline presented in this document (and approved by the Romanian government in July 2022) includes four main dimensions of development: (1) improving quality of life and creating a healthy and sustainable environment; (2) accessibility, mobility and connectivity; (3) economic diversification, innovation and entrepreneurial and (4) sustainable valorizing of the local

specificities. Among others, this strategy proposes studies on the potential for renewable resources in the area, investments in renewable energy production facilities in accordance with the results of these studies (e.g., wind or solar power plants), replacing hard coal with another fuel to be fired in the local power station (Paroşeni), such as natural gas or hydrogen and developing sustainable technological solutions for the extraction or production of these alternative energy sources. Concerning the issue of creating a job market and business alternatives to the mining industry, the strategy puts forth as main options „development of tourism (by valorizing the local natural and cultural resources) and creative industries, and supporting local producers and manufacturers”. The Romanian Ministry of European Investments & Projects is responsible for the national coordination of the implementation of this strategy, while the development projects to be supported within this approach are to be financed through the Integrated Territorial Investment (ITI) financing tool used in the current European Structural and Investment Funds (ESIF) programming period. The Romanian Management Authorities for the Operational Programme 2021-2027, coordinating local project financing, will prioritize projects targeting sustainable development of the Jiu Valley communities in the foreseen competitive calls. Many of the objectives of this new strategy have been included in previous national plans, generally aiming to increase the economic performance of the remaining mining industry and to align it with the EU sustainability and environmental targets, as well as to create alternative economic development pathways for the mining communities, such as governmental Mining Industry Strategy for 2004-2010, and the Mining Strategy of Romania 2017-2035.

Nevertheless, most of these locally-oriented paths of development in this new strategy have been proposed and attempted over the last decades in the Jiu Valley, with little success, mainly because they were not supported by actual strategic decisions or legal regulations necessary for their success (for instance, for accessing EU funds provisioned for the development of this type of regions). As our data from the socio-political research indicate, one of the frequent narratives in the public discussions on the status of the region concerns the inability of the local authorities precisely to effectively use the resources that have been at their disposal to generate valid economic alternatives to mining, which has led to an „unjust transition” in the Jiu Valley.

Moreover, the governmental decision-makers themselves seem to display little trust in the efficiency of this type of strategic outline, as they have continued to negotiate with the European Union the postponement of the closure of the last functional mines in the Jiu Valley. In this respect, although the official decision made in 2016 was to close all the remaining mines over the next years (those „non-viable” mines, with no prospect of economic efficiency, by 2018), in 2021 the closure of the latter was postponed to 2024, while in the case of the other two mining exploitations (Vulcan and Livezeni) no closure date was set.

Another indicator of the governmental ambivalence on the issue of decarbonization is the focus on hard coal as the only type of coal to be phased out from 2030 as part of the Romanian Recovery and Resilience Plan (to be followed by operations aiming at securing and greening the mines until 2032). Although the official plan mentions “phaseout of coal-fired electricity generation from the energy mix by 2032”, subsequent discussions revealed that lignite is excluded from these phase-out plans.

At the national level, clean energy transition is addressed in several legal frameworks that have been adopted over the past 10 years, such as:

- The National Energy Efficiency Action Plans (NEEAP): Two such plans have been adopted by the Romanian government, one in 2015 (for the 2014-2020 period), and its updated version (NEEAP IV) in 2019 (for 2017-2020). The first includes the commitment to reduce energy consumption in the sectors covered by the Energy Services Directive (Directive 2006/32/EC) by 1.5 % per annum in comparison to the 2001-2005 average, while the second aimed to promote the use of renewable energy sources and to increase energy efficiency through high-efficiency cogeneration plants, energy efficiency in households, public buildings and public lighting.
- The National Strategy for Sustainable Development 2016-2020-2030, aiming to support the attainment of the EU energy intensity and efficiency targets, in accordance with the EU legislative package on climate change and renewable energy.
- the Integrated National Plan for Energy and Climate Change 2021-2030. Romania's objectives in regards to energy consumption and efficiency, as delineated in this document, include reducing emissions by 43.9% compared to 2005, having at least 27.9% of the total energy consumption to be provided by renewable energy, and at least 37.5% increase in energy efficiency by 2030. Yet, the NGO Bankwatch România described (in 2020) the renewable energy targets assumed by the government in this Strategic National Plan as falling below the recommendations of the European Commission, while the energy produced from fossil fuels is still dominating the national energy mix, thus limiting Romania's further opportunities regarding energy transition.

Policy agendas relevant for clean energy transition have also been developed at the regional level. They include:

- The Plan for Regional Development of the Western Region 2014-2020, which, among others, aimed to promote sustainable growth through transitioning to a green economy and develop a low-carbon economy by supplementing conventional energy sources through renewable energy.
- The Plan for Regional Development 2014-2020 – Hunedoara County, which aimed to promote modern technologies to increase the quality of the environment and combat the effects of climate change and the use of alternative energy sources.
- The Local Development Strategy for the Jiu Valley Micro-Region was collaboratively developed by representatives of the local community in 2007. It included the objective of environmental protection through reducing VOC (Volatile Organic Compounds) emissions from industrial activities and ecological rehabilitation of areas affected by intense economic activities.

Several dimensions relevant to energy efficiency and saving (for instance, in public and residential buildings) and clean energy transition (especially through the exploitation of alternative energy resources) are also targeted by strategies and/or development plans developed by communities in the Jiu Valley, such as The Strategic Plan for the Socio-Economic Development of the City of Petrita. The Local Development Plan of Petroșani Municipality during 2014-2020, The Development Strategy of Vulcan Municipality 2014-2020 - updated in 2015, The Development Strategy of Lupeni Municipality during 2014-2020, The Strategic Development Plan of the City of Uricani during 2015-2020.

A notable initiative relevant to the clean energy transition is a professional reconversion project currently by the Romanian Wind Energy Association (RWEA). The project is addressed to the former

mining workforce and aims to develop their work skills in line with the requirements of the renewables sector jobs to absorb the mining workforce and other people of regions in the region.

5.2 Socio-political component

5.2.1 Summary of results

Issues, statements and conflicts

The most important issue in the realm of the Jiu Valley decarbonization debates and political and practical decisions has been the actual decarbonisation itself, in terms of closing the remaining coal mines in the areas and proposing alternative development pathways, or, alternatively, postponing this decision and procrastinating the phasing out process.

On the official layer, the latest regulatory document that describes the strategy for the transition from coal of the Jiu Valley assumes the complete termination of mining in Jiu Valley, in accordance with official governmental decisions that were adopted (since 2016), to a large degree, as a result of the negotiations with the European Union. This document, entitled „The strategy of economic, social and environmental development of the Jiu Valley (2021-2030)” and issued in 2021, represents the main deliverable of a project financed by the European Commission through the Directorate-General for Structural Reform Support (DG REFORM), and it was developed by PricewaterhouseCoopers Management Consultants SRL („PwC”). The project itself („Strategy for the transition from coal of the Jiu Valley”) is being coordinated at the national level by the Romanian Ministry of European Investments & Projects within the European platform Coal Regions in Transition. The document presenting the strategy of economic, social and environmental development of the Jiu Valley, according to PwC, represents the output of extensive consultations with representatives of the local community and with local stakeholders held in 2020 and 2021 and presents the strategic outline to be implemented until 2030.

The Jiu Valley strategic outline presented in this document (and assumed by the government and by the EU) includes four main dimensions of development: (1) improving quality of life and creating a healthy and sustainable environment; (2) accessibility, mobility and connectivity; (3) economic diversification, innovation and entrepreneurship and (4) sustainable valorizing of the local specificities. Concerning the last two dimensions, more relevant to the economic issue of creating job market and business alternatives to the mining industry, the documents put forth as main options „development of tourism (by valorizing the local natural and cultural resources) and creative industries, and supporting local producers and manufacturers”.

Yet, with little success, most of these locally-oriented development paths have been proposed and attempted over the last decades in the Jiu Valley. One of the narratives commented concerns precisely the inability of the local authorities to effectively use the resources at their disposal to generate valid economic alternatives to mining, which has led to an „unjust transition” in the Jiu Valley.

Moreover, the governmental decision-makers themselves seem to display little trust in the efficiency of this type of strategic outline, as they have continued to negotiate with the European Union the postponement of the closure of the last functional mines in the Jiu Valley. In this respect, although the official decision made in 2016 was to close all the remaining mines over the following years (those „non-viable” mines, with no prospect of economic efficiency, by 2018), in 2021 the closure of

the latter was postponed to 2024, while in the case of the other two mining exploitations (Vulcan and Livezeni) no closure date was set. These decisions, negotiated with the EU, run contrary to the official strategic plans for the CET, such as the one described above, and are at least partly the result of certain „resisting” narratives (outlined in one of the next sections), which contest the narrow schedule of decarbonization in the Jiu Valley and are strongly expressed at the local level and by some influential political representatives. At the same time, these procrastination efforts parallel the debates surrounding the chronic inability of Hunedoara Energy Holding to become economically viable, its repeated insolvencies being frequently blamed on improper management and corruption.

Relatedly, another conflicting issue is the high price of coal extraction, which contributes to the low economic competitiveness of Hunedoara Energy Holding and which furthermore renders unjustified the state's continuous financial support to the mining industry. As such, the critical position towards subsidies to the Jiu Valley mining industry has been expressed at the political level. The same message has been issued by representatives of NGOs such as Bankwatch România, who, in 2020, characterized the coal mining industry in Jiu Valley as very expensive and polluting, labelling the continuous governmental support of mining as „madness”.

The „artificial life support” of the Jiu Valley mining industry is a highly relevant issue in the debates, and its proponents have frequently justified it through narratives that highlight precisely the lack of viable employment alternatives for the thousands of people currently employed in this industry, and, consequently, by the risk of strong social tensions that would arise if the complete closure of mining would be decided upon. In this respect, there have been repeated incidents of miners blocking themselves in the shaft as a protest against payment delays and future intentions to close Jiu Valley mines due to economic inefficiency, while threats of violent protests have also been made by representatives of the local labour unions, remembering the violent and socially traumatic events of the '90s. In this perspective adopted by the mining community and its political supporters, the governmental subsidies represent an undeniable right, and the protesters are „heros”, as characterized by a representative of the local labor union after such an incident in 2020.

The social conflict created by the intention to complete the phasing out process of the mining in Jiu Valley is also accompanied by a parallel conflict at the political level, where the right-wing decision makers, in favor of mine closure, have been opposed by the left-wing supporters of postponing this process, who frequently try to capitalize on the social conflict generated by decarbonization. For instance, the leader of the main left-wing party (which dominated the Romanian political scene for many years in the last decades) explained the intention of the party in charge to close the Jiu Valley mines as stemming from the fact that „they hate the miners”.

There are also internal conflicts in the PAR, primarily due to the fact that one of the two power stations in the area (Mintia) is responsible for the heating of one of the largest cities in the PAR (Deva). The power station's functioning depends on the coal extracted from the Jiu Valley mines, and there have been several winter periods over the last years when the low coal supplies led to the outage of the city heating system. This has fueled conflicts between the city administration and the authorities who made the decisions responsible for the coal insufficiency, mainly the managers of Hunedoara Energy Holding (for diverting the Jiu Valley coal to the other power station) and or the government officials (for refusing to direct other national coal resources to Mintia). Overall, this is an instance of the more general issues in the PAR communities created by the dependency on the coal industry, affecting far more residents than those employed in this industry.

The socio-economic costs of decarbonization that have been incurred by the Jiu Valley communities and, more importantly, that are to be incurred over the following years represent significant and frequent issues of debate. While, as highlighted above, postponing the phasing out of the coal industry and maintaining the status quo is an option frequently invoked, other alternatives have been discussed as well. One of them is to replace coal with gas as a transitory solution, at least for the next 30 years. This option is being supported by the inclusion of gas investments in the list of initiatives that are eligible for financing through the EU Just Transition Fund. As a political figure describing the gas alternative stated, this solution would offer regions dependent on coal a „more realistic and tender transition, with a lower socio-economic impact”. For the Jiu Valley, this would imply a lower pressure towards structural changes of its local economy and job market in order to prevent the increase of the already high unemployment rates, as the replacement of coal with gas would entail the re-technologization of the power plants in order to adapt them to the new fuel.

Other potential solutions that have been discussed as employment and economical alternatives to mining are tourism (most frequently), services and renewable energies. Yet, as noted above, many of these development pathways already have a long history of being publicly proposed by local or national authorities, but without being supported by actual strategic decisions or legal regulations necessary for their success (for instance, for accessing EU funds provisioned for the development of this type of regions). Consequently, the touristic development projects have been only sporadically implemented and mainly at the individual scale, with no general outlook at the community level. Concerning renewable energies, the NGO Bankwatch Romania described (in 2020) the renewable energy targets assumed by the government in the Strategic National Plan concerning Energy and Climatic Changes as falling below the recommendations of the European Commission, while the energy produced from fossil fuels is still dominating the national energy mix, thus limiting Romania’s further opportunities regarding energy transition.

Defining constituencies

Constituency 1: Technological Regularisation (IMPOSE)

- The European Union, through its platforms, agencies and programs, such as EU Just Transition Fund, European platform Coal Regions in Transition
- Romanian governmental bodies, especially the Ministry of European Investments & Projects
- Central and local media

The technological regularization (or imposing) constituency in the Jiu Valley case is dominated by EU decisions and plans within the decarbonization perspective and implemented through platforms and investment plans such as the EU Just Transition Fund and Coal Regions in Transition. Generally, this constituency is centred on the importance of reaching the Green Deal goals and offering a more sustainable future to the Jiu Valley communities by supporting their recovery from the long-term socio-economic stress generated by the downfall of the coal industry. The overall aims of these plans are adopted at the national level by the Romanian government, while their specific objectives are negotiated and implemented by certain governmental bodies, especially the Ministry of European Investments & Projects, which distributes the EU funding to local communities. The set of developmental targets for the region has been formulated in several strategic documents after negotiations with the EU; the latest strategic outline, The strategy of economic, social and

environmental development of the Jiu Valley (2021-2030), is commented in a previous section of this report.

A frequent narrative included in the discourse of local and national authorities and media that falls within the scope of these general aims is the mobilization of the local community in order to endure its involvement in the social and economic recovery plans that officials have elaborated.

Constituency 2: Technological Adjustment (COPY)

- Hunedoara County Council
- Municipalities (Aninoasa, Lupeni, Petrița, Uricani, Vulcan and Petroșani)
- The University of Petroșani

Although, as noticed above, several strategies that have been officially launched in order to assist the Jiu Valley community in coping with the socio-economic costs of decarbonization have been introduced inappropriately and with little success so far, the local authorities and the University of Petroșani are still attempting to provide support in the implementation of current strategic plans. They also act as agents of nurturing positive change in the region and mobilizing the community (through the corresponding narrative). At the same time, they openly admit that all future development of the Jiu Valley is highly dependent on European support, as their public discourse frequently invokes the narrative of the dependence on European Union funding. On the practical layer, no major businesses have yet to fill in the void of the phasing-out coal industry in the region. This relative failure of the strategic outlines that have been set for decades in order to support the socio-economic recovery of Jiu Valley (and, consequently, the failure of technological adjustment) is frequently explained through the narrative of Corruption as the cause of the inability of the Jiu Valley to cope with decarbonization.

Nevertheless, development alternatives are frequently discussed, both at the local and national levels. One of the prevailing alternatives over the last period is replacing coal with gas as a transitory solution, which would include the current coal-dependent energy holding in the PAR and maintain its dominating status on the local economic and labour market.

Constituency 3: Technological Reconstitution (RESIST)

- Hunedoara Energy Holding
- Labor Unions
- Politicians

Hunedoara Energy Holding and part of the labor unions representatives have frequently opposed the continuation of the phasing out process of the local coal-dependent industry. They invoke the narrative of The necessity of maintaining the status quo to highlight the social and objective costs of decarbonization, and they highlight the socio-economic downfall of the Jiu Valley that this process has generated so far (through the relevant narrative of the unjust transition). Their opposition towards decarbonization also includes the accusation that it is an unjustified radical change that the Romanian government has only adopted as a result of the top-down and foreign pressures (specifically from the EU). They also claim that no further advances in decarbonization are necessary, as the current mining exploitations and power stations should be preserved in light of

their national strategic importance. From the economic standpoint, they attribute and explain the chronic inability of Hunedoara Energy Holding to become financially viable through the narrative of insufficient governmental support for the maintenance of the local energy industry.

Key aspects of this opposing position are also transferred at the political level, with some of the political agents not only publicly expressing similar views but also re-opening (in light of these views and also due to the bottom-up pressures from those accusing the high social costs of decarbonization) negotiations with the EU on the issue of the timeline of mine closing in the Jiu Valley. Despite the public acknowledgement of the state's continuous financial support to the mining industry as unjustified, such negotiations have recently postponed the closure of the last four operational coal mines in the region.

Constituencies, the local field of power and outcomes

The Romanian government manages the coal phase-out process in the Jiu Valley within the frameworks designed by the EU. On the one hand, the general objectives set by the European agenda regarding decarbonization through the progressive closure of the mines and the re-technologization of the power plants are transposed at the local level in dedicated policies and plans by the relevant ministerial bodies. On the other hand, implementing these plans is highly dependent on the financing allocated by the EU within its dedicated platforms (i.e., the Just Transition Funds, and the Platform for Coal Regions in Transition).

Yet, past experiences have shown that the repeated attempts to develop the region through national and/or European funding within the strategic frameworks that have been designed for the region have had a disappointing efficiency, prolonging the massive dependency of the Jiu Valley community on the coal industry as well as the social and economic disadvantaged situation created by gradual reduction of mining activities. This situation is capitalized upon by several narratives that oppose the ones focused on the benefits and necessity of decarbonization and the alternative solutions to the coal-dependent economy that could be implemented in the area, included in the public discourse of the entities listed in the Technological Reconstitution delineated above. These resisting narratives claim the necessity of substantial state aid to maintain the current functioning of the coal industry and of mining in the remaining coal mines in the Jiu Valley, while contesting the appropriateness of decarbonization for this specific region. Consequently, the new strategies outlined by the government within the EU framework are also paralleled by the continuous subsidizing of the coal mining industry in the area, specifically the energy holding that manages the coal mines and the two power plants. Moreover, the awareness of the current impoverishment of the local communities and the failure of past investment programs to alleviate this state of affairs, and the threats of intense outbursts of social conflict (reminiscing past violent incidents in which miners were incensed by the prospect of mine closures and took their protest to Bucharest) have led to renewed negotiations initiated by the government with the EU decision-makers to postpone the deadlines for the closure of the remaining mines in the Jiu Valley. As a result, two mines that were foreseen to have been closed were granted a postponement until 2024, while no closure date was set in the case of the other two. This delay in decarbonization runs in parallel with the design and further implementation of the latest strategic outline of the economic, social and environmental development of the Jiu Valley, financed by the European Commission, which is based on the assumption of the complete phasing out of the coal industry in this region.

5.2.2 Interpretation

The manners in which the decarbonization process in the Jiu Valley has been managed over the recent years by the authorities in charge (i.e., the government) have been the output of two opposing pressures: (a) a top-down from the European Union that set the environmental and social targets within this process and has allocated the funding in order to support the adaptation of the mining regions to decarbonization, and (b) a bottom-up pressure from the local entities opposing this process (particularly the representatives of the energy holding managing the coal industry in the area and the labor unions), as well as by certain political forces that have undertaken their message to the public arena. As the results of the analyses presented in this report indicate, the public discourse frames on the decarbonization process in the Jiu Valley revolve around several contradictory issues and include several opposing narratives assumed by representatives of the three categories of constituencies identified, most of these narratives corresponding to one of the two types of pressure delineated above.

In terms of issues, we identified two parallel discourses and courses of subsequent action: on the one hand, the EU financed strategies of transition from coal of the Jiu Valley and of alternative development pathways; on the other, the pressure towards postponing the closing the remaining coal mines (by putting forth the narrative of “Decarbonization as a top-down and foreign pressure” and that of “The insufficient governmental support”), and the effort of the government to renegotiate with the EU the timeline of these closures. The low economic competitiveness of the Hunedoara Energy Holding and the necessity of large and continuous state aids in order to maintain its current functioning is a highly relevant issue in this debate. A frequent narrative attributes this state of affairs and generally the inability of the Jiu Valley to cope with decarbonization to corruption, subsequently highlighting the imperative of the drastic restructuring of the coal – dependent industry.

At the same time, while the proposals and the implementation of alternative developmental pathways are accompanied by optimistic and mobilizing narratives, the public trust in their success is undermined by the past failures of similar attempts to reconstruct the socio-economic fabric of the Jiu Valley and to create effective ways in which local communities could cope with the effects of decarbonization. This “unjust transition” that has characterized Jiu Valley is a common narrative in the public discourse, together with the accusation that the state has so far managed the decarbonization process in a disastrous fashion and has failed to offer the amount of financial support needed for the optimal functioning of the coal-dependent local economic system. The lack of reliable employment and economic alternatives of the region has been used as a justification not only for the reticence towards future similar attempts to replace the Jiu Valley coal industry, but also for the narratives claiming the conservation of the state subsidies that it has received, in order to preserve the social and economic status-quo already deteriorated by the past stages of decarbonization.

The result of this double and opposing pressure, and of the political disputes that have integrated the various narratives and perspectives on these issues, is the hesitant way in which national authorities have approached and managed decarbonization over the past years. On the one hand, they have transferred EU policies at the local level and participated in the design of novel strategies of supporting the social and economic development of the region, while acknowledging the absolute dependency of these efforts on European funding (observed in our results through the narrative of “The dependence on European Union funding”). On the other, they have adapted to the inefficiency

of the previous similar strategies and to the bottom-up pressures by renegotiating the timeline of the closure of the remaining active mines in the Jiu Valley. (See more details in the Appendix).

5.2.3 Gender dimension

There is a great deal of imbalance in the gender distribution in the local field of power, as no women were identified as key stakeholders, with the exception of some representatives of local NGOs. On the more general level of the relevant governmental bodies and agencies, industry and policies design, women were similarly underrepresented, although the methodological designed of our text research could not provide an exact statistic on this matter. On the other hand, a high proportion of the local media documents included in our analysis were written by female journalists.

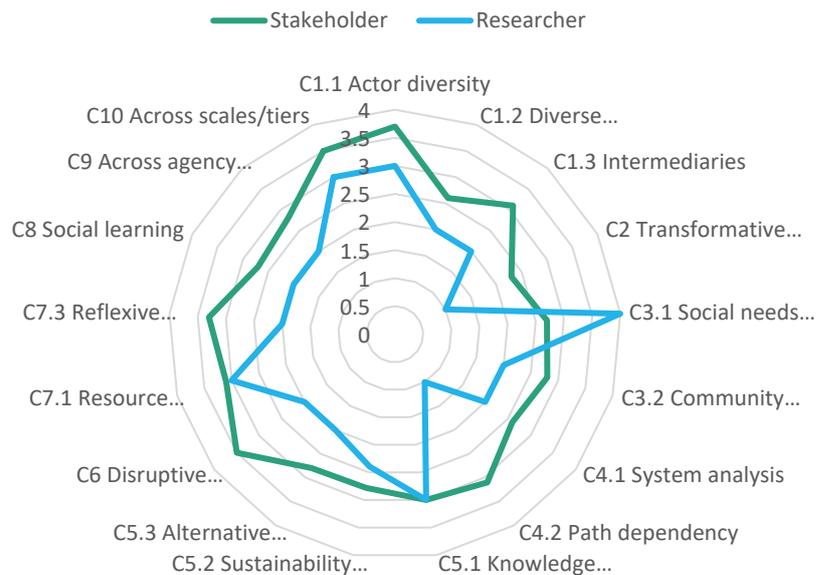
5.3 Socio-ecological and technical component

5.3.1 Summary of results

Overall assessment

The below chart summarises respondents' assessments of components of transformative capacity in the region. Due to the wide range of responses, all measures of central tendency are included.⁸

Figure 11 – Stakeholder assessment of transformative capacity



Source: Based on ENTRANCES interviews conducted for the case study.

As it can be observed in the above figure, most of the components discussed and evaluated in the interviews were assessed by respondents around the middle of the response scale (i.e., 3 – neither agree nor disagree). Higher response means (of at least 3.5) can be noted in relation to actor

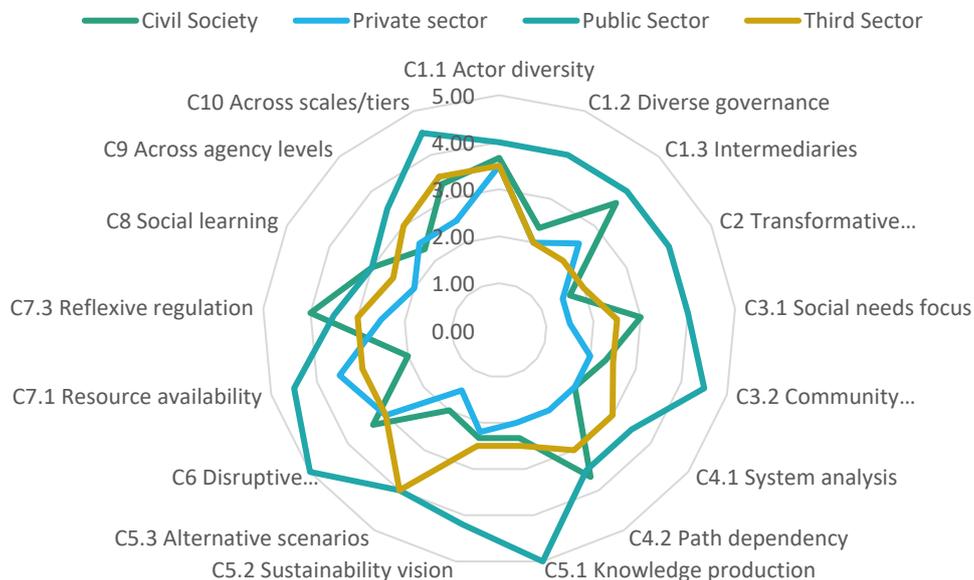
⁸ Some respondents answered Likert-scale questions with half units, e.g., “between 3 and 4”. While means are unaffected by this, to produce accurate representations of the modes and medians, it was necessary to adjust these figures, with all results lower than 3 rounded down and all results higher than 3 rounded up, to indicate the direction of the respondent’s estimation. This permits the data to be used as intended, for illustrative purposes (and as a visual stimulus and boundary object) rather than for statistical purposes.

diversity, disruptive experimentation and coordination across scales/tiers. On the opposite end, components that received negative evaluations through somewhat disagreement with the related questions (i.e., those with response means below 2.5) were diverse governance, system(s) analysis (awareness among stakeholders of the importance of (systemic) interdependencies), and transformative leadership. Researchers were more critical in their appraisal of most transformative capacity components in the Jiu Valley. The most remarkable differences in perception between researchers and participants (i.e., of more than one point on the response scale) emerged about disruptive experimentation, path dependency, intermediaries, reflexive regulation and transformative leadership; researchers, in comparison to respondents, more negatively evaluated the development of all these components. Conversely, social needs focus was perceived by researchers as more intense or developed than by participants. There were also two components on which there was an almost complete agreement between the two groups, i.e., knowledge production and resource availability.

Differences between stakeholders

Respondents were categorized into four groups following the stakeholder attributes grid employed in this research, defined in relation to their professional status, namely: civil society (environmental and social NGOs, comprising three participants), private sector (two representatives of SMEs in the region), public sector (two representatives of public institutions, one of a regional and one of a local scale), and third sector (higher education, technical research in relation to the transition, comprising of three participants). The mean assessments of each component of transformative capacity in the Jiu Valley of these four groups of respondents are presented in the figure below.

Figure 12 – Transformative capacity by stakeholder type



Source: Based on ENTRANCES interviews conducted for the case study.

As shown in the above figure, respondents employed in the public sector expressed the most positive evaluations of most of the transformative capacity in the Jiu Valley, two of them (disruptive experimentation and knowledge production) receiving maximum (i.e., fully agree) responses from

these participants. This pattern of positive appraisals probably reflects their membership in institutions that have played a particular part in governing the clean energy transition in the area and perhaps even a more in-depth knowledge of the efforts that public bodies have invested in managing this transition.

Overall, significant differences are noticeable between the responses of the public sector representatives and the respondents in the other three categories, between which there is a high degree of consensus on many of the components. In this respect, diverse governance, coordination across agency levels, sustainability vision and transformative leadership were evaluated negatively by participants in these three groups, while actor diversity was perceived more positively.

There were also specific appraisal patterns of representatives of each category. Civil society representatives responded with more agreement in comparison to the other two groups to the questions pertaining to the inclusion of intermediaries and the social need focus of the clean energy transition in the Jiu Valley in two other cases (reflexive regulation and path dependency) their responses expressing stronger agreement than those of public sector representatives. These specificities are probably related to the experience of the representatives of these NGOs (social and environmental, respectively) of involvement in the complex multi-institutional dialogues on the topic of clean energy transition and their efforts to mobilize diverse social actors in these dialogues. On the opposite end, respondents from civil society expressed a stronger disagreement than the other participants concerning the resources availability component.

Most of the answers given by the public sector representatives conveyed disagreement with the interview questions and negative appraisals concerning the transformative capacity in the Jiu Valley, except for resource availability and actor diversity. Social learning, knowledge production, path dependency, social need focus, system analysis and community empowerment are the components on which private sector representatives expressed a distinctively strong negative outlook. This pattern of negative appraisals suggests that these respondents perceive the private sector as being “left out”, and ignored from the strategies and decisions that have been implemented along the region's clean energy transition by the political actors in charge.

The third sector representatives gave many answers around the mean of the response scale; critical notes can be observed concerning transformative leadership, intermediaries and diverse governance, and a somewhat positive evaluation was expressed concerning alternative scenarios.

5.3.2 Interpretation

Governance and agency

C1. Inclusive and multiform governance

Stakeholders' patterns of assessments on this factor, which concern the breadth of stakeholder involvement, diversity of formal and informal interactions, and the effectiveness of intermediation, tend to vary across the three questions that address it. While evaluating actor diversity and the involvement of intermediaries, assessments were relatively homogeneous and positive (slightly above the mean of the response scale (i.e., 3)), and the diverse governance component evaluations were lower. This pattern of quantitative responses, together with the comments that participants made when explaining them, suggests that the general perception of the degree of inclusive and multiform governance of the Jiu Valley clean energy transition is that several types of actors (such

as private initiatives and NGOs, besides public institutions) have involved in the interactions and consultations designed to create a vision of this transition. Several respondents also note that regular citizens have been less part of these efforts and have been left with minimal power in making personal choices towards clean energy transition because of their lack of information and/or necessary resources to be invested in such choices. Nevertheless, while public consultations have been made, and intermediaries have played some role in this process, important decisions are always made top-down by governmental authorities and, to a lesser degree, by local authorities. Although the representatives of the public sector in our sample disagree with this apprehension, the participants from the other three categories accused the lack of real influence that has been reserved to them by the Romanian state on decisions and policies regarding decarbonization and clean energy transition in the area. However, their inclusion in these decision-making processes may have brought more appropriate strategies and more involvement of the civil society.

C2. Transformative leadership

This factor asks about public, private, and civil society individuals who lead through articulating shared visions, motivating engagement, and shaping collaborative processes. The representatives of the public sector gave positive evaluations of this factor and invoked in support of their choices arguments highlighting, as above, the consistent public consultations that have been organized in the region by state agencies on issues related to clean energy transition and the regional policies that have been implemented in order to support the socio-economic recovery of the area while adapting to the decarbonization scenario. Oppositely, the representatives of the other three categories expressed several critical views of the leadership characteristics that have been implemented in this respect. First, they highlight the strong diffusion of the leadership of the clean energy transition, fragmented between several central government bodies and regional actors, with no clearly defined and specific responsibilities and, consequently, with no coherent strategy to drive this transition. Then, the lack of transparency of the dynamics behind political decisions influencing the transition was also accused, especially since it ambiguates individual responsibilities and the real interests behind these decisions. The disregard towards civil society and regular citizens who should be involved collaboratively in relevant decisions and who have paid the actual price of the mismanaged clean energy transition was another critical argument invoked. This also undermines the ability of those leading the transition in this top-down and non-transparent manner to motivate citizens to engage in practical actions towards transitioning towards clean energy.

C3. Empowered and autonomous communities of practice

This factor identifies how far resources and conditions of autonomy are provided for communities of practice to meet social needs as part of the CET. Regarding the first factor of this component, i.e., social needs focus, most participants highlight that past and current policies addressing clean energy transition have had the merit of targeting the high pollution levels in the area, which the mining industry had generated. Yet, critical social needs have remained unaddressed, especially the high unemployment rate in the region determined by mine closures. In this respect, the professional reconversion programs that have been implemented were characterized as ineffective, not only due to their inappropriateness concerning the local workforce and the real economic opportunities in the region but also because of the reticence of many former miners to redefine their professional identity. The apathy of local and regional authorities in investing the required efforts to attract potential investors was also accused by some respondents, together with the incoherence of the state-driven

decarbonization policies that have not been preoccupied with offering local inhabitants an economic alternative to the decaying mining industry.

Concerning the second factor, addressing the support that actors and communities have to act autonomously for the energy transition, there was again disagreement between public sector representatives, who invoked specific state aids that have been offered in support of individual and community energy-efficiency measures, and the other participants. The latter accused these state initiatives of being too inconsistent and hard to access by citizens due to the complex bureaucratic processes involved and state authorities' inability to communicate these opportunities to the public effectively.

Capacity development processes

C4. System(s) awareness and memory

This factor investigates if and how systems analysis is used to understand change dynamics and path dependencies in relation to the clean energy transition. Most participants perceived the two dimensions of this factor (system analysis and awareness of path dependency) as medium to low. First, the governmental bodies that decided on the first waves of decarbonization in the Jiu Valley (in 1997 and the 2000s) were characterized as being focused in their decision only on the lack of economic competitiveness of the mining industry, with little consideration towards the social or ecological dimensions of the transition, and even without having a clear image about the direction of this transition. Later on, decarbonization decisions were adopted by the Romanian government as a result of the EU pressures. This passive role also entailed the investment of insufficient efforts by national and local authorities to implement the policies targeting the socio-economic consequences of the gradual closure of the mining industry, although such policies were formally adopted as part of the EU-driven strategy of the clean energy transition.

The representatives of the private sector characterized the current state of affairs as being heavily marked by a similar lack of initiative and involvement of those leading the transition, especially of local authorities, who are unable or unwilling to properly manage its social and ecological aspects, especially those associated to mine closures. Contradictions and conflicts between regional actors on issues relevant to this transition were also highlighted, such as the opposition of local environmental associations to building hydroelectric power plants in the area. This technical solution would provide a cleaner energy source and compensate to some degree for the loss of energy resources determined by decarbonization.

C5. Sustainability foresight

This factor examines the role played by sustainability foresight, i.e., participatory visioning and alternative scenario designs, in the target region. Regarding the co-production of relevant knowledge, public sector representatives again highlighted the effort of local authorities to involve all type of actors in consultations meant to offer a common vision of the region's development. Yet, the representatives of the third sector, especially those associated to the local university, expressed a critical view on this issue, describing these discussions as having only a formal character, without the intention to include the perspectives of the local experts in the actual decisions that were made.

Concerning the sustainability vision behind the clean energy transition, most respondents agree that the long-term objective of this vision is only formulated in abstract terms, with no clear set of actions that would move the region towards this "clean energy". Some of them also remarked that some of

the energy sources alternative to coal are not available in the area, due to geographical characteristics (the inter-mountain depression of the Jiu Valley is unfit for installing wind turbines to generate electricity) or ecological concerns (such as the hydroelectric power plants mentioned above). Under these circumstances, the region's path towards clean energy becomes even more blurry, and local authorities have been unable to propose clear and specific measures that could be adopted by the civil society or the private sector. A similar discourse emerged when discussing the use of future scenarios with alternative development options. Several participants criticized the past implementation of clean energy transition policies as being solely focused on the phase-out of coal mining, without consistently proposing alternative development pathways. On the other hand, representatives of the local university remarked that at least some hypothetical alternative scenarios had been developed within the collaborations that the local university has been engaged in, although, as noted before, these ideas were not further integrated into actual regional development policies.

Furthermore, representatives of the local NGOs also remarked that there have been efforts to develop strategies of future development of the region, in several cases supported by national or regional authorities, and that some of them included alternative scenarios relevant for clean energy transition. Yet, as in the case of actual policies addressing the socio-economic recovery post-decarbonization, the actual implementation of these strategies was, to a large degree, inefficient because of the insufficient funding to support these scenarios, of the lack of managing efforts from local and regional authorities, or even of disputes that emerged between Jiu Valley municipalities.

C6. Disruptive experimentation

This factor examines practical experimentation of communities with novel solutions. Many of respondents perceived this factor neutrally, invoking some initiatives (most of them still in the projection phase) discussed by national authorities (and also included in the last strategy for the development of the Jiu Valley region) to technologically restructure the local power plant in order to replace coal with gas or to invest in hydrogen storage and use facilities in the area. At the same time, the inconsistent character and lack of predictability of this state-driven initiatives were also remarked. Moreover, some participants expressed their lack of trust in the future investments in such alternatives in light of the past inability of regional authorities to tackle issues that were presumably easier to solve, such as the proper environmental management of the closed mines perimeters.

Representatives of the public sector strongly argued in favour of the thesis that national and regional authorities have experimented with various ways of addressing the effects of decarbonization and of managing the clean energy transition by noting the socially – oriented programs that have been implemented in the area or the efforts to create an efficient legislative framework encouraging clean energy production and use.

C7. Innovation embedding and coupling

This factor asks about embedding of effective sustainability innovations, e.g., through resource provision or reflexive regulations. Most interviewees expressed neutral viewpoints on the two dimensions of this factor (resource availability and reflexive regulation), resulting from two opposite sets of arguments invoked. On the positive side, they highlight that consistent resources to be invested in clean energy transition have been made available to the region by the European Union, which also pressures the national authorities towards the creation of an appropriate regulatory framework.

On the negative side, several deficiencies in the regional and national management of these resources were noted, such as the lack of public dissemination of necessary information, the lack of involvement of local authorities in assisting the private sector in their initiative to access funding, the insufficient coordination between the state authorities involved in the process of distributing these resources, the high costs and difficulties of recruiting professionals that would collaborate in these clean energy transition initiatives. Moreover, some participants also accused the lag in implementing the required legislative modifications in the national regulations, further deters local initiatives. This issue was highlighted as a facet of the disinterest manifested by the state authorities towards the private and the nongovernmental sectors in general and towards private actors interested in involving in the transition, while, at the same time, tolerating the long-lasting mismanagement of the energy company managing the coal mining industry in the Jiu Valley.

Relational factors

This section covers relational dimensions of transformative capacity, i.e., whether the scale levels (from local to global) and agency levels (individual, household, organization, association) needed for system change are suitably involved.

C8. Reflexivity and social learning

Social learning is required to feed outcomes of learning processes back into the articulation of governance, leadership, and community empowerment, e.g., through monitoring system change and collective reflexivity. Most participants expressed critical appraisals of these factors, and supported their evaluations by highlighting the relative mismanagement by local and national authorities of the clean energy transition in the area. They also invoked the low number of functional initiatives of producing clean energy in the area as a result of the lack of authorities' social learning, by proving their inability to adapt regulations and to increase their involvement in communicating the necessary information on the available programs and opportunities, and in assisting the interested parties in implementing their initiatives.

C9. Cooperation across human agency levels

This factor refers to how respondents elucidated their answers to describe whether “capacity development (C1-8) addresses multiple levels of agency in the public, private and civil society sectors, including individuals, households, social groups, organizations, networks (of individuals, groups, etc.) and society”. Respondents generally gave low assessments of this factor and mentioned again the lack of preoccupation of those designing, in a top-down manner, the relevant strategies and policies to include other actors, such as the private sector, experts, NGO's or the civil society. Even the public sector representatives remarked that local and regional authorities have a minor role in the decision-making processes that set the rhythm of decarbonization in the region and generate policies addressing clean energy transition.

C10. Cooperation across political-administrative levels

Most participants converge in their assessments towards a somewhat positive view of this factor. The constant attention that the region has received over the last decade from national authorities, under the impulse of the EU clean transition policies, was noted. The inclusion of Jiu Valley in the EU Platform for Coal Regions in Transition was also remarked, together with the future opportunities of local development that it may offer, and with the presumed interest of national authorities to manage the actual implementation of this EU-driven program properly.

5.3.3 Gender dimension

None of the participant's answers to the interview questions directly mentioned any gender-relevant issue. Nevertheless, it is vital to notice the severe underrepresentation of women in the political administration of the region, as all the mayors of the Jiu Valley municipalities are men.

Another gender-relevant observation concerns the current regional development strategy for the Jiu Valley, which defines the specific manners in which the general approach and investment possibilities of the EU Platform for Coal Regions in Transition are to be applied in this region („The strategy of economic, social and environmental development of the Jiu Valley (2021-2030)”). One of this plan's strategic directions is increasing employability by developing local human resources' potential. In this direction, the strategy explicitly proposes to increase the share of employed women through dedicated professional development programs and events promoting entrepreneurship.

5.4 Conclusion

In our analysis of the energy transition in the Political Administrative Region, the research on the socio-political component highlighted several resisting narratives that claim the necessity of substantial state aid to maintain the current functioning of the coal industry and of mining in the remaining coal mines in the Jiu Valley, while contesting the appropriateness of decarbonization for this specific region. They convey opposite messages to the narratives emphasizing the benefits and necessity of decarbonization, and the alternative solutions to the coal-dependent economy that could be implemented in the area. These two opposing discourses reflect the tension between the position anchored in the EU - driven strategies of transition from coal of the Jiu Valley and that of pressuring towards postponing the closing the remaining coal mines, which is further related to the effort of the government to renegotiate with the EU the timeline of these closures.

Another narrative attributes the inability of the Jiu Valley to cope with decarbonization to corruption and emphasizes the importance of drastically restructuring the local coal-dependent industry. Oppositely, the state administration is highlighted as the main cause of the past failure to reconstruct the socio-economic fabric of the Jiu Valley during decarbonization in another narrative, focused on the “unjust transition” that has characterized the region and on the disappointing results of the past programs aiming to foster its socio-economic recovery. In this perspective, the government was responsible but failed to properly support the optimal functioning of the coal-dependent local economic system. The associated narrative claims the conservation of the state subsidies for the coal industry in order to avoid an even more dramatic deterioration of the current state of affairs.

Our research on the socio-ecological and technical component was performed on a sample of respondent from four groups, i.e., civil society, private sector, public sector, and third sector. Respondents from public sector expressed the most positive evaluations of most of the transformative capacity in the Jiu Valley, while respondents in the other three categories expressed critical views on several factors under scrutiny, i.e., diverse governance, coordination across agency levels, sustainability vision and transformative leadership.

We found that the degree of inclusive and multiform governance of the Jiu Valley clean energy transition was mostly positively perceived, but responses also indicate that regular citizens have been less involved by authorities, being left with minimal power in making personal choices this transition. Moreover, important decisions are always made in a top-down manner by governmental

authorities, while local and regional authorities have a minor role in the decision-making processes that set the rhythm of decarbonization in the region and generate policies addressing clean energy transition.

Several critical views were expressed on the leadership of the clean energy transition, highlighting its strong diffusion and fragmentation with no clearly defined responsibilities or coherent strategy to drive this transition, as well as the lack of transparency of the dynamics behind relevant political decisions and a disregard towards civil society and regular citizens who should be involved collaboratively. Similarly, although most participants highlight that policies addressing clean energy transition have had the merit of targeting the high levels of pollution in the area, they also noted that important social needs have remained unaddressed, especially the high rate of unemployment in the region determined by mine closures, as well as the apathy of authorities in attracting potential investors and in offering local communities an economic alternative to the decaying mining industry.

Regarding the support that actors and communities have to act autonomously for the energy transition, the state aids supporting individual and community energy-efficiency measures were accused to be too inconsistent and difficult to access by citizens, while state authorities were also unable to effectively communicate these opportunities. Participants also highlighted that insufficient efforts have been made by national and local authorities to implement the policies targeting the socio-economic consequences of the gradual closure of the mining industry, although such policies were formally adopted as part of the EU-driven strategy of clean energy transition, as well as contradictions and conflicts between regional actors on issues relevant for this transition.

Concerning the sustainability vision behind the clean energy transition, most respondents agree on the blurry character of the actual path towards clean energy in the region, without clear and feasible alternatives to coal mining. Although some programs stimulating the adoption of energy-saving measures have been implemented, while other gas and hydrogen initiatives have been put forth as hypotheses by national authorities, the inconsistent character and lack of predictability of these state-driven initiatives was also remarked. The lag in implementing the required legislative modifications in the national regulations was also accused, together with authorities' disinterest or inability to assist the interested parties in implementing their initiatives towards clean energy transition.

On the other hand, the constant attention that the region has received over the last decade from national authorities, under the impulse of the EU clean transition policies, was also remarked, together with the inclusion of Jiu Valley in the EU Platform for Coal Regions in Transition as a potentially important booster of future development.

CHAPTER 6

CHALLENGES, COPING STRATEGIES & GENDER

6 Challenges, coping strategies & gender

6.1 Challenge 1: Economic underdevelopment

6.1.1 Challenge description

Current situation

Jiu Valley communities have suffered a significant economic decline since the beginning of the decarbonization process in the region. The regional company managing the remaining coal extraction activities and power stations is still a large employer in the territory, while the private sector is still underdeveloped. There is also a severe scarcity of consistent external investments in the region.

Desired outcome

The development of the private sector in the territory.

6.1.2 Coping strategies

Coping strategy 1: Top-down driven socio-economic development

The reconstruction of the socio-economic fabric of the region has been the major target of several past development strategies proposed and implemented by the national and regional authorities over the last years. This coping strategy, if efficient, would address several challenges that the territory confronts. Yet, the success of these strategies has been limited, at least partly due to the inconsistencies in the actual implementation. The latest strategy, i.e., „The strategy of economic, social and environmental development of the Jiu Valley (2021-2030), to be implemented until 2030 for the transition from coal of the Jiu Valley within the EU Platform for Coal Regions in Transition, proposes as economic alternatives to the mining industry the development of local tourism and creative industries and supporting local producers and manufacturers.

Coping strategy 1.2: Attracting external investments

Although several regional strategies have aimed to attract external investments in the Jiu Valley, their success is limited. The deficiencies of the remaining workforce and its lack of specialization in the new technologies contribute to the lack of attractiveness of the territory for new investments. Nevertheless, more consistent financial and logistic support for the local companies to be developed by external investments could increase the efficiency of this strategy, together with a stronger commitment of the regional authorities towards capitalizing on the local resources.

6.1.3 Gender dimension

Both men and women are affected by the current economic underdevelopment of the region; yet, future development on this dimension may provide more employment opportunities to women in comparison to the mining industry, thus reducing the long-lasting gender imbalance on the job market of the territory.

6.1.4 Discussion

The ability of the territory to cope with the decay of the mining industry and the consequent unemployment issues have been undermined by the mismanagement of the past transition from coal in the region. In particular, regional and national governance has failed to support the economic

development of the territory in order to absorb the former mining workforce, and to engage it in re-professionalization training that would have increased its real employment opportunities on the existing job market. This has perpetuated the high rate of unemployment and stimulated out-migration and depopulation. Recently, the EU Platform for Coal Regions in Transition has brought a new impetus for socio-economic development of the region, within a strategic plan with several feasible targets. Yet, past experiences (highlighted by the results of our research on the socio-political and socio-technical component) suggest that this strategy needs a more coherent implementation and a stronger involvement of local authorities in comparison to past initiatives in order to actually succeed.

6.2 Challenge 2: Ageing and depopulation

6.2.1 Challenge description

Current situation

Jiu Valley municipalities have been confronted with a massive out-migration over the last two decades, among the youth as well as among the former miners and their families. Consequently, the percentage of population loss since 2000 is about 28 %.

Desired outcome

The desired outcome in this respect is the repopulation of the territory.

6.2.2 Coping strategies

Coping strategy 1: Socio-economic development

The socio-economic development of the area, either through successful implementation of a top-down strategy or through external investments, would provide employment opportunities that would limit out-migration from the territory.

Coping strategy 2: The development of the local university

The University of Petroșani has attracted students across the country, and its future development may partly compensate for the current ageing and depopulation problems of the territory. The success of this strategy would be amplified by the eventual economic development of the Jiu Valley municipalities, which would provide more employment opportunities for future graduates.

Coping strategy 3: Ensuring a reasonable quality of life for the elderly

Another strategy that could be adopted to cope with ageing within the territory is that of supporting the development of community facilities that would provide a reasonable quality of life to the increasingly large proportion of elderly in the Jiu Valley communities.

6.2.3 Gender dimension

This challenge has a similar effect on men and women, and gender differences are not relevant to the coping strategies highlighted above.

6.2.4 Discussion

The chronic ageing and depopulation issues of the territory are closely related to its socio-economic development, which both caused and is currently limited by this challenge, as and depopulation create significant shortages in regards to the workforce available for present and future economic

enterprises. Ageing also generates a substantial burden on the regional healthcare and social security systems. There are local resources that may contribute to the future efforts to cope with these issues; nevertheless, they need to be supplemented with consistent efforts to develop the private economic sector within the region in order to render Jiu Valley attractive for the youth.

6.3 Challenge 3: Inconsistency of the decarbonization policy

6.3.1 Challenge description

Current situation

The decarbonization – related decisions that have been made by the government over the past 25 years have been inconsistent, with plans that have been subsequently abandoned or drastically changed depending on the vision or interests of the political forces in power. At present, it is unclear whether there is a real commitment towards the completion of the phase-out of the mining industry in the Jiu Valley, as the governmental representatives have continued to negotiate with the European Union the postponement of the closure of the last functional mines in the Jiu Valley that had been set to close in the near future.

Desired outcome

A clear and consistent plan for the remaining coal industry in the Jiu Valley.

6.3.2 Coping strategies

Coping strategy 1: The generation of such a plan within an EU-driven framework

In this respect, the latest strategy for the economic, social and environmental development of the Jiu Valley mentioned above assumes the complete phasing-out of coal mining in the region. This type of drastic and clear decision is the result of the adherence of the past governmental decision-makers to the energy and decarbonization policies of the European Union. Yet, the actual implementation of this particular aspect of this strategy is still questionable in light of the regional pressures towards postponing further decarbonization initiatives and the current energy crisis.

6.3.3 Gender dimension

This challenge has a similar effect on men and women, and gender differences are not relevant to the coping strategies highlighted above.

6.3.4 Discussion

The national governance of the Jiu Valley decarbonization and of the clean energy transition, in general, has been inconsistent, marked by variable political interests, by the chronic inability of the authorities to support alternative developmental and employment pathways for the region, and by the resistance against decarbonization stemming from the local mining industry (as highlighted in our socio-political analysis). The current energy crisis, fueled by the near war in Ukraine, further increases the uncertainty on the issue of the future Romanian energy policy and, subsequently, of the future reliance on the Jiu Valley mining. The commitment towards the complete phase-out of the mining industry in the territory greatly depends on the future commitment of the EU agenda towards clean energy transition.

6.4 Conclusions

This chapter identified three main challenges faced by the Jiu Valley territory. The chronic economic underdevelopment generated by the mismanagement of the past decarbonization measures has also produced massive out-migration and, consequently, depopulation and a high proportion of aged inhabitants. This, in turn, limits the potential of the region to recover its socio-economic fabric. Several coping strategies addressing these challenges have also been identified, although their past implementation has had little efficiency. The current and future strategies and efforts towards the aim of reducing these challenges need a more substantial involvement and support of local and national authorities. The inconsistency of the decarbonization policy that has been implemented so far in the region is the third challenge. In this respect, the coal industry in the Jiu Valley and its phase-out process need more coherent and stable policies.

CHAPTER 7

CONCLUSIONS

7 Conclusions

Since the first decade after the fall of the Romanian communist regime, Jiu Valley has become a region perceived as dramatically affected by social and economic problems generated by the gradual closing of several coal mines and the consequent partial phasing out of the mining industry. Our research employed a multidimensional analytical framework in order to explore in-depth the current state of affairs of the Jiu Valley communities on each of the components of this model, i.e., from the socio-economic, socio-cultural, socio-psychological, socio-political and socio-ecological perspective, while also focusing on the clean energy transition in the region.

Our timeframe of analysis on the socio-economic component (i.e., from 2000 to 2018) is temporally situated after the first massive wave of layoffs from the Jiu Valley mining industry in 1997. In line with past observations of the demographic effects of these layoffs, our findings show that the Jiu Valley CCT showed a higher percentage of population loss since 2000 compared to the other regions (LMA, PAR, the country and the EU), representing about 28 % of the local population. They also highlight a significant lag in the socio-economic development of this region, indicated by the fact that the share of employed individuals in this region is lower by 10 % than the country's level, as well as by the large negative discrepancy in the Gross Value Added of the Jiu Valley compared to the EU28 mean (i.e., placed at one-fifth of the EU28 level across the timeframe of the analysis).

As the support for the coal mining industry and its local workforce or, alternatively, the plans for its phasing out have always been decided at the central governmental level, Jiu Valley miners have also been involved in national political struggles in the attempt to protect their interests. This created the premises for several violent large-scale incidents in the 1990s that created a long-lasting stigma on the region and its inhabitants, which also emerged in the results of our focus-group research on the socio-cultural component. This research also highlighted four stress vectors affecting the territory, i.e., the dependence of the region on political interests, the rapid disintegration of the mono-industrial economy, the dissolution of the Jiu Valley administrative cohesiveness, and the reluctance towards new alternatives and inertia. These vectors further cause more than twenty strain situations in the territory, such as incertitude and reticence in potential investors, a constant tendency of the national media to convey stereotypical and offensive images of the Jiu Valley, lack of collaboration between administrative units, massive out-migration from the region, a severe scarcity of the workforce specialized in the new technologies, lack of trust in the digital technologies, and local nostalgia focused on the "golden age" of mining in the Jiu Valley. Nostalgia further fosters cultural and behavioural inertia and a local ideological background for populist messages that attempt to capitalize on the social tensions generated by the high socio-economic costs incurred by the local communities during the partial decarbonization process that they have undergone.

Results of the study on the socio-psychological component suggest that in comparison to the other case studies from ENTRANCES, Jiu Valley participants have higher place attachment, optimism and resilience, more intense nostalgia and perceived unfairness regarding decarbonization and its impacts, as well as less economic optimism. They also emerged as more engaged than many of the other participants surveyed in this ENTRANCES research in three coping strategies, i.e., personal reinvention, intention to relocate, and resistance and protest. In regard to the negative impacts of decarbonization, perceived stress was found to be negatively related with social bonding, resilience and optimism, while perceived economic hardship was positively associated with perceived stress

and nostalgia and negatively correlated with optimism and life satisfaction. The findings of our research on the socio-political component suggest that the most debated issue in regard to the Jiu Valley clean energy transition has been the actual decarbonisation itself. There are two opposing discourses in the local and national debates, which reflect the tension between the position anchored in the EU - driven strategies of transition from coal of the Jiu Valley and that of pressuring towards postponing the closing of the remaining coal mines, which is further related to the effort of the government to renegotiate with the EU the timeline of these closures. Each of these discourses is articulated in several narratives. The first position mainly attributes the inability of the Jiu Valley to cope with decarbonization to corruption and emphasizes the importance of drastically restructuring the local coal-dependent industry. The second opposes decarbonization through resisting narratives focused on the “unjust transition” that has characterized the region and on the disappointing results of the past programs aiming to foster its socio-economic recovery while claiming the conservation of the state subsidizes the coal industry in order to avoid an even more dramatic deterioration of the current state of affairs of the local communities.

Our research on the socio-ecological and technical component revealed a rather negative evaluation of the transformative capacity of the region, as important decisions within the governance of the Jiu Valley clean energy transition are perceived as made in a top-down manner by governmental authorities, while local and regional authorities have a minor role. The leadership of this transition was also negatively perceived, as being strongly diffused and fragmented, with no clearly defined responsibilities or coherent strategy and leaving important social needs unaddressed. This creates significant uncertainties regarding the actual path towards clean energy in the region, with no clear and feasible alternatives to coal mining in sight. The state aids supporting individual and community energy-efficiency measures were also accused to be too inconsistent and difficult to access by citizens.

We also identified three main challenges faced by the Jiu Valley territory: the inconsistency of the decarbonization policy that has been implemented so far in the region, its chronic economic underdevelopment, depopulation and population ageing, respectively. These issues further limit the potential of the region to recover its socio-economic fabric. The current and future strategies and efforts towards the aim of reducing these challenges need a more substantial involvement of and support from local and national authorities. Moreover, the future of the region greatly depends on the capacity of the national and regional administrators to create local frameworks in which the EU financing available (within the Platform for Coal Regions in Transition, for instance) would be directed towards consistent and appropriate investments for its future development. This would also create more employment opportunities for the inhabitants and could also alleviate the currently severe demographic issues of the region. Another essential factor that will shape the future of the region is the determination of the governmental decision-makers towards completing the phasing-out of the mining remaining exploitations and industry in Jiu Valley. Also important in this respect is the capacity to implement appropriate technological solutions that could support, at least in part, the shift of this industry towards other fuels in order to ensure the energetic needs currently covered for by coal and to provide employment to the specialized workforce in this area.

8 References

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APPENDIX

9 Appendix

Regional Delineation

Table 8 – Case Delineation

CCT		LMA		PAR	
87175	Vulcan	RO421	Arad	RO423	Hunedoara
87059	Lupeni	RO422	Caraş-Severin		
86990	Petroşani	RO423	Hunedoara		
87077	Petrila	RO424	Timiș		
87139	Uricani				
87139	Aninoasa				
87246	Bănița				

Source: own delineation.

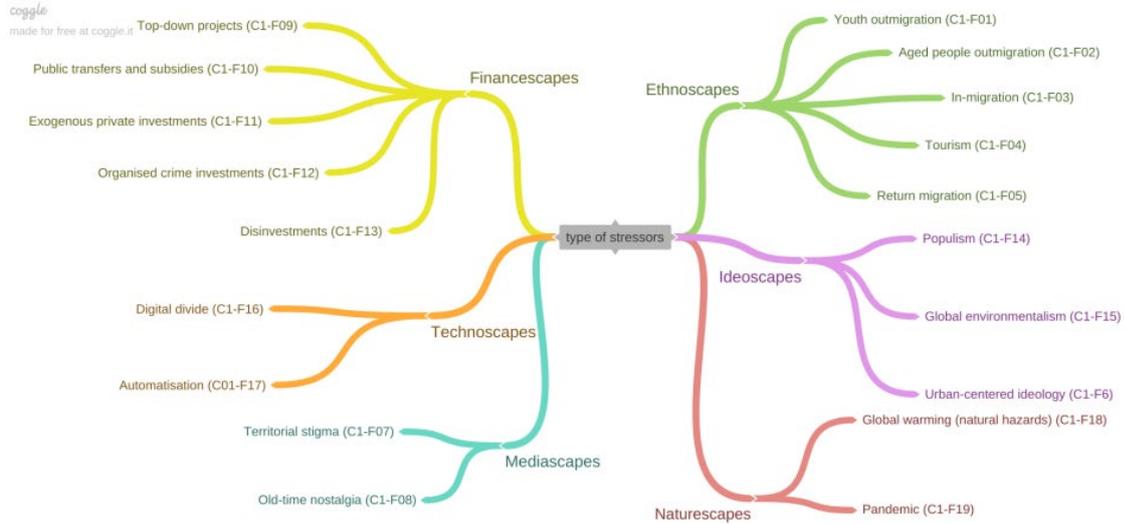
Table 9 – Municipalities in CCT

Community	National Identifier	Area in km ²	Population
Vulcan	87175	12.81	27677
Lupeni	87059	10.8	2577
Petroşani	86990	9.3	40989
Petrila	87077	7.75	24017
Uricani	87139	11.09	9330
Aninoasa	87219	3.77	4511
Bănița	87246	n/a	1207

Sources: National Institute of Statistics and own calculations. As Bănița is a commune, some data was not available in the national database.

Appendix Socio-cultural component

Figure 13 – Socio-cultural factors



Source: Deliverable 1.2. of ENTRANCES project.

Description of the strain situations

Strain situations related to financescapes

☞01: The massive layoffs in the mining industry

- **Type:** Exogenous Conflict
- **Rationale:** The decision to close the first set of mines in the Jiu Valley and consequently to lay off a large percentage of the employees.
- **Description:** The first decision to close coal mines in the Jiu Valley was made in 1997 by the Romanian government, on the basis of an analysis that concluded that it was no longer worthy to exploit Romania's natural resources generally. All types of mining activities across the whole country were affected, but in Jiu Valley mining was the most prevalent economic branch, and consequently this region paid the highest socio-economic costs stemming from this decision in comparison to the rest of the country. Miners were enticed to agree to terminate their contract with large severance packages besides the regular unemployment benefit. But their lack of financial education made these lump sums to be quickly spent, and over the next few years many former miners and their families became unable to pay utilities. As a result, many of them moved to other regions of the country, and the region became characterized by social and financial insecurity, and by an increased trend of youth emigration towards Western countries among the youth (many after high school). These effects are relevant to this day, alongside others (commented in the next section).
- **Factor(s):** F13: Disinvestments
- **Geo-position:** all municipalities in the Jiu Valley.
- **Time-position:** from 1997.
- **Sources:** Focus Group;

☞02: The “mineriads” in 1990

- **Type:** Exogenous Conflict
- **Rationale:** The three violent interventions of the Jiu Valley miners in Bucharest changed completely the ways in which they were publicly and politically perceived.
- **Description:** In 1990 the post-communist regime manipulated the mining community to intervene in the national political debates. Among the three violent protests of the Jiu Valley miners, the events of 13-15 June 1990 were the most prominent, with 10.000 miners were brought to Bucharest to neutralize a long-lasting and peaceful anti-governmental protest. The crowd of miners took the role of paramilitaries, attacking protesters, opposition party headquarters and media institutions, which led to a significant number of casualties. This dramatically changed the dominantly positive cultural perception of the miners so far, anchored in their strong work ethic and self-sacrifice, into one portraying them as aggressive, irresponsible and simpletons, thus rendering them as a serious social liability for future governance. In turn, this motivated, at least partly, the political decisions to close down mining activities in the Jiu Valley, in order to dissipate this substantial mass with high conflictual potential.
- **Factor(s):** F13: Disinvestments

- **Geo-position:** Bucharest.
- **Time-position:** 1990.
- **Sources:** Focus Group;

03: The trolley line between Jiu Valley municipalities

- **Type:** Endogenous Conflict
- **Rationale:** The trolley line between Jiu Valley municipalities, that has been discussed and designed over the past few years, has raised lots of conflicts between representatives of these municipalities.
- **Description:** The concept of this line was introduced in the public sphere as an efficient and environmentally – friendly connection between the Jiu Valley municipalities, which would enhance residents’ mobility in the region and would have the potential to contribute to its economic development. Yet, the road from concept to actual implementation has been strewn with conflicts between municipalities, between the companies that may manage the investment, between regional politicians and so on), on the final routing of the trolley line and on the logistics associated to this project.
- **Factor(s):** F9 Top-down exogenous development projects
- **Geo-position:** all municipalities in the Jiu Valley.
- **Time-position:** 2020.
- **Sources:** Focus Group;

05: The conflicts on the Coroiești ponds

- **Type:** Endogenous Conflict
- **Rationale:** The projects of future exploitation and closing of these ponds has raised conflicts between the companies managing these operations and local authorities.
- **Description:** The Coroiești ponds are a site of former coal preparation. As many other former mining sites, it is exposed to environmental degradation, while still having the potential of some technological exploitation. Some private initiatives have proposed interventions to further exploit these ponds and/or close them by neutralizing the environmental damage that they incur, but the actual design and implementation of these projects has led to various conflicts with local authorities in the Jiu Valley.
- **Factor(s):** F11: Exogenous private investments
- **Geo-position:** Coroiești, Petroșani.
- **Time-position:** 2021.
- **Sources:** Focus Group;

06: The incertitude and reticence of investors

- **Type:** Dependence
- **Rationale:** Companies that might have had the interest to invest in the Jiu Valley were held back by their reticence following the '90 mineriads.
- **Description:** The violent events during the “mineriads” not only changed the public and political perceptions on the miners for the worst, but also those of the potential investors in the Jiu Valley emerging post-communist economy. They generated incertitude and reticence

towards the Jiu Valley communities among the decision-makers within the foreign companies that invested in other areas of Romania over the following years.

- **Factor(s):** F11: Exogenous private investments
- **Geo-position:** all municipalities in the Jiu Valley.
- **Time-position:** from 1990.
- **Sources:** Focus Group;

08: The inability of local authorities to attract investments

- **Type:** Impasse
- **Rationale:** Local authorities administering the Jiu Valley municipalities and post-communist economic operations were unable to attract investments, mostly due to their rigid perspective on the industrial specificity of the region.
- **Description:** The workforce employed in the Jiu Valley mining industry has had a high level of technological education and training, due to the high technological standards of the companies in this industry located in the area, as well as to the substantial training that most miners receive at their beginning of their career. This renders the coal miners workforce as properly or even over-qualified for many technological requirements that alternative industries might have had. Yet, local managers of the post-communist Jiu Valley administrations adopted a rigid perspective on the type of industry appropriate for the region, according to which there can be only mining in Jiu Valley. This rigid approach, together with their disinterest in finding potential investors and alongside other factors that have made Jiu Valley less desirable as investment region in comparison to other areas of Romania (such as insufficient road connectedness, lack of space due to the geographical particularities of the area) have contributed to the current bleak economic situation of the Jiu Valley.
- **Factor(s):** F13: Disinvestments
- **Geo-position:** all municipalities in the Jiu Valley.
- **Time-position:** from 1990.
- **Sources:** Focus Group;

09: Fragmentation and poor collaboration between Jiu Valley municipalities

- **Type:** Impasse
- **Rationale:** Local authorities administering the Jiu Valley municipalities have had heterogeneous positions on various issues important for the development of the region and have been unable to effectively collaborate.
- **Description:** The chronic lack of collaboration between representatives and public administrators of the municipalities across Jiu Valley was highlighted as a factor that hinders effective negotiations with investors interested in developing their business on a large scale in the region. Moreover, from the administrative standpoint, Jiu Valley is too fragmented to be eligible for funding under the regular programs of the European Commission, further emphasizing the need to agree on a common perspective for the development of the region and on a unique representative body. This administrative fragmentation and heterogeneity in interests and position has a correspondent in what regards the Jiu Valley civil society, equally multivocal.
- **Factor(s):** F13: Disinvestments

- **Geo-position:** all municipalities in the Jiu Valley.
- **Time-position:** not applicable.
- **Sources:** Focus Group;

Strain situations related to technoscapes

⚡10: Scarce workforce specialized in the new technologies

- **Type:** Impasse
- **Rationale:** The workforce specialized in the new technologies is scarce in the Jiu Valley.
- **Description:** Partly due to the educational paradigm culturally prominent in the region, orienting youth towards traditional industrial training and jobs, and partly because of the scarcity of new tech / digital companies present in Jiu Valley, there are few employees trained in these new work areas. On the other hand, this scarcity of workforce specialized in the new technologies was also highlighted as only a component of the general lack of specialized workforce (in any domain apart from mining) in Jiu Valley.
- **Factor(s):** F16: Digital divide; F17: Automation
- **Geo-position:** all municipalities in the Jiu Valley.
- **Time-position:** not applicable.
- **Sources:** Focus Group;

⚡11: Lack of trust in the digital technologies

- **Type:** Impasse
- **Rationale:** Regular residents and, more importantly, businesses manifest a lack of trust in the digital technologies.
- **Description:** Lack of experience and practice with the new technology has generated reticence towards them among the relatively high aged population of the Jiu Valley. Moreover, many businesses also prefer traditional ways of managing their operations (including in tourism), which creates difficulties of adapting to or compete with the internet-mediated contemporary business models.
- **Factor(s):** F16: Digital divide; F17: Automation
- **Geo-position:** all municipalities in the Jiu Valley.
- **Time-position:** not applicable.
- **Sources:** Focus Group;

⚡12: Age-based digital divide

- **Type:** Impasse
- **Rationale:** Elder residents have significant problems in using necessary digitally – mediated procedures.
- **Description:** The elderly face access and knowledge inequality regarding the use of the new technologies, particularly in accessing public services and information through digitally – mediated procedures that have become everyday practices for the younger generations. This has become a significant issue since some of the public administrative services in the Jiu Valley have developed digital interfaces.
- **Factor(s):** F16: Digital divide

- **Geo-position:** all municipalities in the Jiu Valley.
- **Time-position:** more significant from 2021.
- **Sources:** Focus Group;

⚡13: Insufficient digitalization of public services

- **Type:** Impasse
- **Rationale:** The level of digitalization of public services in the Jiu Valley municipalities is still low.
- **Description:** There is an insufficient digitalization of public services, which creates strains and difficulties for both SMEs and regular citizens. All administrations in the area display a lack of flexibility in adapting their bureaucratic procedures to the new technologies.
- **Factor(s):** F17: Automation
- **Geo-position:** all municipalities in the Jiu Valley.
- **Time-position:** not applicable.
- **Sources:** Focus Group;

Strain situations related to mediascapes

⚡14: Old-time nostalgia in the local media

- **Type:** Exogenous Conflict
- **Rationale:** The local media has conveyed nostalgia focused on the “golden age” of mining in the Jiu Valley.
- **Description:** Starting a few years after the first massive layoffs in the coal mining industry in 1997, the initial optimism about the prosperity of the local ex-mining population began to fall. Reflecting the increasingly frequent social downfall of previously prosper local communities, the media in the Jiu Valley began to accuse national decision makers for the negative effects of mines closure, such as the loss of social position and the destroy of the stable way of life of the miners. The label “Valley of the tears” was coined by the local media to portray this desperate state of affairs and to emphasize the responsibility of the national government to offer support in order to alleviate the dramatic effects of their political decision against coal mining.
- **Factor(s):** F08: Old-time Nostalgia
- **Geo-position:** all municipalities in the Jiu Valley.
- **Time-position:** from 2000.
- **Sources:** Focus Group;

⚡15: The negative image of the socio-economic state of Jiu Valley conveyed by the national media

- **Type:** Dependence
- **Rationale:** The national media has mostly conveyed an exaggerated negative image of the socio-economic state of the Jiu Valley communities.
- **Description:** The national media has focused only on the extreme negative elements of the socio-economic state of the region, for instance by selecting and thoroughly displaying only the poorest communities in the Jiu Valley. This state of extreme deprivation and

backwardness has frequently been displayed as being generally characteristic for the whole region. Moreover, recent developments and civil society initiatives in the area have been intentionally ignored in their reports. In comparison, foreign journalists who have covered Jiu Valley have conveyed a more complex and appropriate image than the national media.

- **Factor(s):** F07: Territorial stigma
- **Geo-position:** Bucharest.
- **Time-position:** from 2000.
- **Sources:** Focus Group;

⚡16: The stereotypical and offensive portrait of the Jiu Valley residents conveyed by the national media

- **Type:** Dependence
- **Rationale:** The national media has mostly conveyed a stereotypical and offensive image of the Jiu Valley residents.
- **Description:** Fueled by the social tensions following the “mineriads”, the national media has selected the stereotype of the miner participating in these events (as aggressive, rudimentary, prone to violence) as a psychological symbol for all the residents of the Jiu Valley, and has perpetrated this negative stereotype since these events that happened more than 30 years ago. This image has also paralleled the implicit (and false) idea that coal mining as a job does not require intellectual abilities, but only physical force and endurance.
- **Factor(s):** F07: Territorial stigma
- **Geo-position:** Bucharest.
- **Time-position:** from 2000.
- **Sources:** Focus Group;

Strain situations related to ethnoscapes

⚡17: In-migration of mining workforce

- **Type:** Endogenous Conflict
- **Rationale:** The massive in-migration of mining workforce in the initial stages of the development of coal mining spurred social conflict.
- **Description:** Jiu Valley was an important area of work migration from other regions of the Austro-Hungarian Empire in the first phase of its development; an 1939 census concluded that residents in the area spoke 16 languages and had 12 religious confessions. The need for this massive in-flow of workforce was due to the fact that local indigenous people were reluctant to take on the new opportunities in the mining industry, and preferred to remain in their traditional agriculture occupations and rural societies. Consequently, in the initial stages of the development of coal mining in Jiu Valley, this great social heterogeneity mostly involved the division between the indigenous residents and the newcomers, irrespective of their origin or religious affiliation, as the former became less and less inclined to give up their territorial possessions for the expansion of the new mining industrial sites and communities under development, and expressed their frustration when being pressured to agree to such transactions. This fueled social conflict between the two groups during that time, especially as the indigenous groups felt excluded from the new urban space built to accommodate the

mining industry and its employees. This initial social division is relevant even now, as the indigenous population resides mostly in the rural settlements surrounding the Jiu Valley cities, and keep their ancestral traditions and cultural specificities.

- **Factor(s):** F03: In-migration
- **Geo-position:** Jiu Valley.
- **Time-position:** 1840-1918.
- **Sources:** Focus Group;

18: Youth out-migration

- **Type:** Impasse
- **Rationale:** There is a continuous youth out-migration because of the negative employment prospects in the region.
- **Description:** The process of youth out-migration in search for employment opportunities began in the Jiu Valley later than in many other parts of Romania, i.e., after the first wave of mine closure in 1997. Many members of the local youth population out-migrate immediately after high-school, either to continue their education in major cities surrounding the area or to work in Western countries. This process is still ongoing at a similar rate.
- **Factor(s):** F01: Youth out-migration
- **Geo-position:** all Jiu Valley municipalities.
- **Time-position:** from 1997.
- **Sources:** Focus Group;

19: Aged people out-migration

- **Type:** Impasse
- **Rationale:** There was a massive wave of out-migration in the first years after 1997 among the retired miners.
- **Description:** A substantive proportion of the miners who retired in 1997, during the first wave of mines closure, and who benefited from the consistent severance financial packages offered by the state, decided to out-migrate from the Jiu Valley. Most of them had in-migrate to work in the coal mines, and now returned to their places of origin, thus contributing to the massive depopulation of the region.
- **Factor(s):** F02: Aged people out-migration
- **Geo-position:** all Jiu Valley municipalities.
- **Time-position:** 1997.
- **Sources:** Focus Group;

20: Return migration

- **Type:** Impasse
- **Rationale:** The last few years have witnessed a flow of return migration in the region.
- **Description:** This flow of return migration is associated to the steady development of the civil society in the Jiu Valley municipalities, besides the effect of the COVID 19 pandemic over the last year. Most of those returning have been living in larger and more developed cities (across Romania or abroad), where they graduated from university. While positive effects of

this increased social heterogeneity were noted in the focus – group (especially in terms of social innovation potential), it was also characterized as a potential source of social tensions engaging the more conservative and traditional members of the local communities.

- **Factor(s):** F05: Return migration
- **Geo-position:** all Jiu Valley municipalities.
- **Time-position:** from 2019.
- **Sources:** Focus Group;

Strain situations related to ideoscapes

⚡22: Recrudescence of populist and nostalgic movements

- **Type:** Dependence
- **Rationale:** Over the last few years several national political leaders have tried, to some success, to resuscitate populist ideas in the Jiu Valley.
- **Description:** Political leaders of national parties, either explicitly associated to populist movements or representatives of the major party that has openly opposed decarbonization during the last decades, have visited Jiu Valley over the last years, claiming the necessity to reconstruct the coal mining industry in order both to ensure national energetic security and to regenerate Jiu Valley by bringing back its long-lost prosperity. In order to maximize the political gains brought by these visits, many of them were made during the incidents in which miners have blocked themselves in the shaft as protest against payment delays and future intentions to close the remaining Jiu Valley mines, in the attempt to capitalize on the social tensions associated to these events.
- **Factor(s):** F14: Populism
- **Geo-position:** all Jiu Valley municipalities.
- **Time-position:** from 2017.
- **Sources:** Focus Group;

Strain situations related to naturoscapes

⚡23: “Pandemic hysteria”

- **Type:** Impasse
- **Rationale:** During the COVID-19 pandemic, the media and authorities have exacerbated the fear of the new coronavirus among the elder population in the region.
- **Description:** From 2020, after the onset of the COVID-19 pandemic, national and local media, together with local and national authorities have induced high levels of fear, affecting the quality of life and psychological wellbeing of the elder population in the region, especially by determining them to cut most of their needed social contact.
- **Factor(s):** F19: Pandemic
- **Geo-position:** all Jiu Valley municipalities.
- **Time-position:** from 2020.
- **Sources:** Focus Group;

Strain situations related to multiple areas and other strain situations

⚡04: The hydroelectric power plants

- **Type:** Exogenous Conflict
- **Rationale:** The project to build hydroelectric power plants on the Jiu Valley was blocked by the intervention of environmental NGOs.
- **Description:** The project to build two hydroelectric power plants on the Jiu Valley began in 2004 and aimed to provide a new energy source to the Jiu Valley municipalities. After the onset of the construction works, the area in which the plants were planned to be built was declared as an environmentally protected area within the Natura 2000 network. Two international environmental NGOs legally attacked the project, which was then (in 2017) blocked by the justice court, in spite of the investment and development of the power plants being close to their end.
- **Factor(s):** F9 Top-down exogenous development projects; F15: Global environmentalism
- **Geo-position:** all municipalities in the Jiu Valley.
- **Time-position:** 2017.
- **Sources:** Focus Group;

⚡07: The road to Herculane

- **Type:** Exogenous Conflict
- **Rationale:** The project to build a road connecting Jiu Valley to the Western part of the country was blocked by environmental NGOs.
- **Description:** The road would connect Jiu Valley to the closest town across the mountains on the West of Jiu Valley to the closest town in the Western region of the country (Herculane). This would ease the access from Jiu Valley to Western Romania, an area much more economically developed. The road already exists, but it is only a sylvan pathway, inappropriate for regular vehicles. The project to transform it into a national road was decided in 1999 and began in 2002, and part of it has been already built, with the exception of an approx. 20 km section that crosses the Retezat mountains, through (or at a margin of) two natural reservations. In 2009, representatives of several environmental NGOs attacked and blocked the project in court; after 10 years of legal battles, the justice court approved the project, but in the meantime all investments have been lost, and no future investment in this project is foreseen.
- **Factor(s):** F9 Top-down exogenous development projects; F15: Global environmentalism
- **Geo-position:** all municipalities in the Jiu Valley.
- **Time-position:** 2009.
- **Sources:** Focus Group;

⚡21: The underdevelopment of the tourism industry

- **Type:** Impasse
- **Rationale:** There is a high touristic potential in the region that has been neglected by local authorities.

- **Description:** Jiu Valley is an area surrounding by mountains, with a high touristic potential. Besides, there is common perspective on tourism industry among its inhabitants (publicly expressed by the NGOs representatives) as a possible solution to the chronic socio-economic issues of the area, which would have a positive financial impact. Yet, local authorities have ignored this touristic potential and the only developments so far in this concern have been made solely under private initiatives and investments, all with an individualistic approach (small boarding houses) and disregarding the common space. This has led to a chaotic and unsustainable development of one of the major skiing areas. At the same time, the other skiing area, more traditional and representative for the region (due to its natural features), has been ignored even by private investors, and still remains undeveloped in terms of infrastructure and touristic facilities.
- **Factor(s):** F04: Tourism; F13: Disinvestment
- **Geo-position:** Jiu Valley.
- **Time-position:** from 2000.
- **Sources:** Focus Group;

Appendix socio-psychological component

Table 10 – Survey questionnaire used in the Jiu Valley case study

Factor	Item
Place Attachment	Jiu Valley means a lot to me.
	I am very attached to Jiu Valley.
	I identify strongly with Jiu Valley.
	I feel Jiu Valley is a part of me.
	No other place can compare to Jiu Valley.
	I would not substitute any other area for the activities I do in Jiu Valley.
	Doing my activities in Jiu Valley is more important to me than doing them in any other place.
	Jiu Valley is the best place for the activities I like to do.
	Moving from place to place is exciting and fun.
	I could not be happy living in Jiu Valley for the rest of my life.
	There is not much of a future for me in Jiu Valley.
	Living close to Jiu Valley (certain natural features such as the ocean or mountains) is very important to me.
	I am extremely satisfied with my present home in Jiu Valley.
	My family is very close-knit and I would be unhappy if I could not see them on a regular basis.
	I love to reminisce about the places I played when I was a child.
	I have several close, life-long friends that I never want to lose.
Belonging to volunteer groups in Jiu Valley is very important to me.	
The friendships developed by doing various community activities strongly connect me to Jiu Valley.	
Moderators	I can deal with whatever comes
	I try to see humorous side of problems.
	I tend to bounce back after illness or hardship.
	I can achieve goals despite obstacles.
	I am not easily discouraged by failure.
	I think of myself as strong person.
	I can handle unpleasant feelings
	I believe that I will achieve the main goals of my life.
	When I think about the future I am positive.
	I see every challenge as an opportunity for success.
	No matter how bad things turn out, I find positive aspects.
	I see the positive aspects of things.
I am confident in overcoming problems.	
I am confident in the future.	
Decarbonisation impacts	In the last month, how often have you been upset because of something that happened unexpectedly?
	In the last month, how often have you felt that you were unable to control the important things in your life?

	In the last month, how often have you felt nervous and “stressed”?
	In the last month, how often have you felt confident about your ability to handle your personal problems?
	In the last month, how often have you felt that things were going your way?
	In the last month, how often have you found that you could not cope with all the things that you had to do?
	In the last month, how often have you been able to control irritations in your life?
	In the last month, how often have you felt that you were on top of things?
	In the last month, how often have you been angered because of things that were outside of your control?
	In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?
	The environmental benefits of decarbonization are greater than the damage it produces to the people living in our region.
	Our region faces greater losses than gains as a result of decarbonization
	Judging its benefits and costs, decarbonization is a fair process for the people living in this region.
	People in my region pay the decarbonization price and others enjoy its gains.
	How uncertain do you feel?
	How much do you feel at risk?
	How much do you feel threatened?
	How much do you worry about it?
	How much do you think about it?
	People in my region will be better off financially a year from now on.
	In my region there will be less unemployment during the coming 12 months.
	I feel optimistic about the economic future of my region in the next 5 years.
	The degree of poverty will decrease in my region over the next 5 years.
	How nostalgic do you feel?
	To what extent do you feel sentimental for the past?
	How much do you feel a wistful affection for the past?
	To what extent do you feel a longing to return to a former time in your life?
Coping Strategies	I would accept a job which requires a change of residence in another region.
	It is likely that I will move from my region during the next 2 years.
	I actively search for information about new places to live and work in.
	I am always searching for new places to live and work in.
	I am now learning new skills in order to adapt the current decarbonization process in the region I live and work
	I have been learning new skills in order to change my profession
	I am taking school/course classes in order to learn a new profession
	I fully support the decarbonization process in the region I live and work
	I agree with the decarbonization process in the region I live and work
	I don't believe that my region should have undergone a decarbonization.
	I support those protesting against the decarbonization process for the region I work and live in.
	I don't like the decarbonization plan for the region where I live and work.

	I am actively involved in a union / organization that fights against decarbonization process in the region I live and work
	I would participate in a meeting/protest against the decarbonization process in the region I live and work.
	I feel that the organisations behind the decarbonisation process in my region are very strong.
	I believe that I cannot do anything to stop this process of decarbonisation in the region I live and work.
Socio-demographic Characteristics	Age
	Sex
	Education
	Occupation
	Are you currently employed in the coal/carbon industry?
	Have you been employed in this industry in the past?
	Marital Status
	Do you have dependent people (less than 16 or above 65) in your household?
	Nativity
	Time of stay in the region
Life Satisfaction	In most ways my life is close to ideal.
	The conditions of my life are excellent.
	I am satisfied with my life.
	So far, I have gotten the important things I want in life.
	If I could live my life over again, I would change almost nothing.

Source: ENTRANCES survey.

Appendix socio-economic component

Table 11 – NACE Rev. 2 Classification

NACE Rev. 2	Description
A	Agriculture, forestry and fishing
B	Mining and quarrying
C	Manufacturing
D	Electricity, gas, steam and air-conditioning supply
E	Water supply, sewerage, waste management and remediation
F	Construction
G	Wholesale and retail trade
H	Transportation and storage
I	Accommodation and food service activities
J	Information and communication
K	Financial and insurance activities
L	Real estate activities
M	Professional, scientific and technical activities
N	Administrative and support service activities
O	Public administration and defence; compulsory social security
P	Education
Q	Human health and social work activities
R	Arts, entertainment and recreation
S	Other service activities
T	Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use
U	Activities of extraterritorial organisations and bodies

Source: Eurostat, 2008, p.47.

Socio-economic data

Table 12 – Economic Data Overview

	CCT- NUTS 3	LMA	PAR	Romania	EU28
Labor Force Population					
total	236,800	1,143,700	236,800	9,018,800	256,181680
Unemployment Rate (%)^{a)}					
Total (ILO)	3	1.7	3	4.2	6.9
Employment Shares by Industries (%)					
Manufacturing	27.4	34.7	27.4	20.0	15.8
Services	47.9	47.6	47.9	45.7	71.3
Mining and utilities	9.1	4.2	9.1	3.1	1.9
Gross Value Added Total (Bn Euro real)				184	14,240
Gross Value Added Shares (%)					
Manufacturing	22.2	28.5	22.2	20.7	15.9
Services	56.9	50.2	56.9	64.0	73.7
Mining and utilities^{b)}	4.3	3.2	4.3	4.4	3.3
GDP per capita (Euro)					
in relation to country Ø	8,075	10,710	8,075	10,469	31,087
in relation to EU Ø	77.1		77.1	102.3	
in relation to EU Ø	26.0	24.5	26.0	33.7	
Disposable Income per capita (Euro)					17,818

Notes: Data refers to 2018 because data on the NUTS 3 level is only available until 2018. The regional statistics refer to a different data vintage than the national/ EU data, that already incorporate data several revisions. ^{a)} See above for differences between ILO and BA. ^{b)} sector covers NACE classification B, D, E (see Table 11).

Sources: National Institute of Statistics (FOM101A, SOM103A), Eurostat (nama_10_gdp, nama_10r_2hhinc, tps00203, lfsa_egan2, nama_10_a10) and own calculations.

Appendix socio-political component

Narratives and their proponents

1. The necessity of maintaining the status quo

One of the main narratives in the local and national discourse puts forth the imperative character of continuing the support of the mining industry and extraction in the Jiu Valley. This narrative opposes decarbonization by invoking Antisignification as the prevailing discursive factor in the ENTRANCES conceptual framework. It asserts the necessity of maintaining the status quo by downplaying the importance of decarbonization in comparison to other, more valuable interests that should prevail. There are two such interests that are more frequently evoked, detailed below.

1.a. maintaining the status quo for the interest of the people

This subnarrative is built on the idea that mining (and the industrial chain around it) represents the only employment available on the job market for those still working in this industry. Illustrative for this perspective is the labelling of the connection between the local community and the mining industry as „umbilical cord”, expressed by the manager (at that time, in 2020) of Hunedoara Energy Holding: „We have to take into account that there are no other places here where people would work, no other industries. For instance, my family: my parents, grandparents, grand-grandparents, they all have worked in the coal mines. The same story repeats in all families. We are linked to the mines with an umbilical cord”⁹.

Moreover, mine closure would affect not only this category of employees, but also others who are dependent on their regular income or working in related economic sectors. For instance, the leader of one of the miners labor unions framed this narrative in the direct negotiations with the IMF representative in defense of the proposal to postpone the declaration of insolvency of the Hunedoara Energy Holding (which could have accelerated mine closure): „I explained to the IMF representative that all economic activity in the Jiu Valley revolves around mining and that without mining not only the 6300 employees in the mining sector will suffer, but tens of thousands of people”¹⁰. Relatedly, similar requests to delay the decarbonization of the Jiu Valley have been repeatedly issued by local mining unions towards the Romanian government. At times, the threat of intense social conflicts in case that decarbonization plans would go ahead as initially formulated (with the still operational mines closing in the near future) has also been formulated. The strong reminiscence of the violent conflicts engaged by the Jiu Valley miners, especially in Bucharest, in the 1990’s probably fueled the persuasive impact of these messages in the political arena. Moreover, the social issue of decarbonization and the lack of employment alternatives within the Jiu Valley has been politically capitalized upon, as mentioned in the previous section of this report.

The continuous state subsidizing of the Jiu Valley coal-dependent energy industry over the past decades indicates that this narrative has had a substantial persuasive impact. At the same time, some governmental officials have admitted that the risk of intense social turmoil in the area and of

⁹ Original quote: “Trebuie să ținem cont că nu există alte locuri aici unde oamenii să meargă la muncă, nu există alte industrii. De exemplu, familia mea: părinții mei, bunicii mei, părinții bunicii mei, toți au lucrat în minele de cărbune.” – local newspaper *Gazeta de Cluj*.

¹⁰ Original quote: “I-am explicat reprezentantului FMI că toată activitatea economică din Valea Jiului se desfășoară în jurul mineritului și că fără activitate minieră nu vor suferi numai cei aproximativ 6.300 de salariați din sectorul minier, ci zeci de mii de oameni” (2016) - local newspaper *Gazeta de Dimineață*.

the subsequent public blaming of the government is an important reason for this financial support. For instance, a government representative framed this ongoing state aid in opposition to the obvious economic inadequacy of this decision, in light of the inability of the Jiu Valley energy company to become economically viable, thus highlighting “the bottomless pit” of subsidizing the Jiu Valley coal industry and the social pressure towards it: “We have pushed a few million euro only this year in the energy complex, without any profit. But if we didn’t do that, the miners would have trapped themselves in the mine, and all the press would have said that the miners die in the mine without knowing what’s there.”¹¹

1.b. maintaining the status quo for the technological chain of the coal industry

This subnarrative focuses on the need to provide further coal supplies to the two power plants that process the Jiu Valley coal, in order to maintain their functioning. For instance, the leader of one of the mining labor unions, in the defense of postponing the closure of the two mines that were initially set to close in 2028, stated that „continuing the coal extraction from the Lonea and Lupeni mines is imperative until the other two mines will manage to ensure all the coal production needed for the functioning of the Mintia and Paroseni power stations”¹². When the coal supplies are insufficient, the two power stations are forced to stop, which further creates issues within the PAR community (as detailed in the previous section). Even with the current four mines still operating, the reduced workforce employed in coal exploitation and the outdated technologies frequently lead to the extraction of insufficient coal for the requirements of the power stations. Consequently, the narrative focused on keeping the current mining activities in the Jiu Valley frequently invokes the whole industrial mining chain (including the power stations) in the argumentation. As one of the alternative ways of providing power plants with coal has been importing it when the Jiu Valley extraction fell below the minimum requirements (at a lower price than that of local production), this line of argumentation has also been politically exploited in a nationalistic frame. For instance, the Romanian prime minister (at that time, in 2017) described the need to preserve the Jiu Valley mining as a „national security imperative”: „We discussed about... recognizing mining and coal energy as an element of national security. We will try to stop closing mines, but instead to open mines, and Mintia and Paroseni (the two power stations) to become elements of safety in this energy system”¹³.

2. The insufficient governmental support

The second narrative we identified puts forth the accusation against the government of not offering the required level of support for the optimal maintenance of the local energy industry, highly dependent on the Jiu Valley coal. The ENTRANCES conceptual factor that is relevant to this narrative is Centralization: Higher regional dependence on the center, as it emphasizes the inability of the local industry to continue its functioning without state support.

¹¹ Original quote: “În complexul energetic am pompat, dacă vreți să fiu plastic, doar anul acesta, câteva milioane de euro, ca să ne înțelegem, fără ca să scoatem nimic. Dar dacă nu făceam asta se închideau minerii în mină și tot presa – nu dumneavoastră, dar erau știri pe toate posturile – spunea că minerii mor în mină, fără ca să știe ce e acolo” (2021) – Cristian Resmerita for local newspaper *Ziarul Văii Jiului*.

¹² Original quote: “rămânerea în activitate a minelor Lonea și Lupeni este "imperios necesară" până la momentul în care celelalte două exploatări de huiță din cadrul CEH, minele Livezeni și Vulcan, vor reuși să asigure integral producția de cărbune pentru funcționarea fără probleme a termocentralelor Mintia și Paroșeni”. – local newspaper *Hunedoara Liberă*.

¹³ Original quote: “Am discutat despre siguranța în exploatare, siguranța oamenilor, trecând prin recunoașterea mineritului și a energiei produse pe cărbune ca element de siguranță națională. Vom încerca să nu mai închidem mine, ci, dimpotrivă, să deschidem mine” – Mihai Tudose in the local newspaper *Gorjeanul*.

The support that has been expressively required by representatives of the mining industry is multi-faceted. First, it pertains to ensuring the continuity of the financial support towards the companies that have managed the coal extraction and energy production in the PAR (the current one is Hunedoara Energy Holding). The lack of economic rentability of coal extraction has repeatedly led these companies towards insolvency, and they have been repeatedly restructured in the attempt to increase their likelihood of economic adaptation. This has involved, among others, selling assets of the current company in order to recuperate some of the financial losses that had been incurred. At the same time, the representatives of these companies (and also some representatives of the local community) explain their economic difficulties as an effect of the insufficient financial state support, that would prevent insolvency and thus inappropriate restructuring decisions. Secondly, this narrative also invokes the insufficient state – controlled investments in the mining industry as a cause of its current bleak horizon and economic hardships, highlighting that no investments in technological updates have been made in the last 25 years in the Jiu Valley mining industry. Thirdly, another cause identified in this narrative is the renewable energy system, which lowers the cost of energy on the free market and thus accentuates the difficulty of selling the coal-based energy that the Jiu Valley power plants produce. As a representative of the Hunedoara Energy Holding stated in the attempt to explain the increasing overall financial losses of the company, there is a „natural handicap” of Hunedoara Energy Holding created by „using the most expensive fuel, while the selling price is lowered by the renewable energy sectors”¹⁴. Finally, another facet of this narrative focuses on the insufficient coal that is supplied by the state from other sources than the Jiu Valley coal exploitations (which fail to ensure the necessary supplies) in order to maintain the functioning of the coal-dependent power plants.

3. The dependence on European Union funding

This narrative acknowledges the inability of the local community, together with the state authorities, to cope with the consequences that decarbonization has brought so far in the Jiu Valley. This chronic failure to properly address the socio-economic effects of the mine closures is attributed to the insufficient funding that has been invested so far in the area, and EU funding is put forth in this perspective as the only hope for the recovery of the local economy. This narrative is another instance of the ENTRANCES Centralization factor, as it entails a higher regional dependence on the center – in this case of Brussels decisions and financial allocations.

The European platform Coal Regions in Transition has been repeatedly highlighted over the recent past as the investment plan that would finally provide the chance of a „rebirth” of the Jiu Valley. The special character of this platform in comparison to the manners in which the EU has implemented decarbonization in the past stems from its larger social scope; it was described, for instance, by the Mayor of Petrosani in 2020 as the first human-focus approach on the coal regions: „They (the EU) have created this platform for the coal regions in transition and for the first time they put the human being and families in the center, not only economic profit or the environment”¹⁵ „. This EU platform has also been described by local representatives as the last chance for a successful

¹⁴ Original quote: “Handicapul natural pe care Complexul Energetic Hunedoara îl are ca urmare a faptului că utilizează cel mai scump combustibil este accentuat de sistemul concurențial de pe piața de energie, în care prețul de vânzare este coborât de către sectoarele energiei regenerabile” – local newspaper *Știrile Transilvaniei*.

¹⁵ Original quote: “Ceea ce se întâmplă la Bruxelles este important, au creat această platformă pentru regiunile de cărbune în tranziție și pentru prima dată au pus ființa umană și familiile în centru, nu numai profitul economic sau numai mediul înconjurător”, national press *G4Media*.

decarbonization; for instance the Lupeni City Mayor described it as „the last chance for the coherent development of the area and for the transition from mining to viable economic alternatives”¹⁶. The same narrative has also appeared in the discourses of EU officials, suggesting that this dependence of the Jiu Valley on EU funding is also acknowledged as such within EU decision makers. For instance, the Romanian Rapporteur of the European Parliament on Green Deal financing stated that „In Romania there are coal regions, such as Oltenia or the Jiu Valley, which would make the transition to a green economy only with consistent EU support. People want to live in green and unpolluted cities, but in which they would find jobs”¹⁷.

At least for some of the local representatives in the Jiu Valley, EU funding represents more than a financial aid directed towards European regions in need of support, but also a mandatory decision from the moral standpoint. Illustratively here, the Mayor of Petrosani stated in 2020: „The European Union has the moral duty to help the 41 regions in transition. For the past 200 years, they have been the engines of economic and social development”¹⁸.

4. Decarbonization as a top-down and foreign pressure

This narrative is also focused on the European Union, but instead of highlighting the potential support of the Jiu Valley offered by the EU, it frames decarbonization itself as a decision wrongfully adopted or implemented by the national government under top-down pressure from the EU. This Antisignification narrative (in terms of ENTRANCES grid of conceptual factors) focuses on the national authorities’ inaptitude in negotiating either the adoption of the mine closure plans or (more frequently) the implementation of the process, especially in regard to the timeline of mine closures. Essentially, this narrative claims that the government was too submissive in adopting EU proposals that entailed closing mines that would deserve to be still functioning in a unreasonably near future and without assessing the true cost-benefit balance of such decisions. The dramatic social consequences of these decisions have been paid by the local community and not by the decision makers themselves, who have been more interested in preserving their relationships with the EU than the sake of the Jiu Valley residents. This top-down nature of the decarbonization plans was openly expressed even by the Romanian prime minister, who stated: „Remember that the Green Deal is coming upon us, we will have to give up the production of electric energy from coal”.¹⁹

This narrative also has a nationalistic facet, which puts forth the argument that the closing of the Jiu Valley mines actually aims to make way to foreign energy sellers on the Romanian market. For instance, a representative of the Social Democrat Party (traditionally opposing the phasing out of the coal industry in the Jiu Valley) stated (in 2019) that: „They close down Jiu Valley and we import electricity from Hungary! Patriotic, isn’t it? And this has a significant impact on energetic security, as

¹⁶ Original quote: “Este ultima șansă pentru dezvoltarea coerentă a zonei și trecerea de la minerit la alternative economice viabile” – Lucian Resmerita for local newspaper *Cronica Văii Jiului*.

¹⁷ Original quote: „În România sunt regiuni carbonifere, precum Oltenia și Valea Jiului, care nu vor putea face trecerea la o economie verde decât cu sprijin UE consistent. Oamenii vor să locuiască în orașe verzi, nepoluante, dar în care să poată găsi și locuri de muncă”. – Siegfried Muresan for national press – *g4media*.

¹⁸ Original quote: “Uniunea Europeană are datoria morală să ajute cele 41 de zone în tranziție. Pentru ultimii 200 de ani, aceste regiuni au fost motoarele dezvoltării economice și sociale”, national press *G4Media*.

¹⁹ Original quote: “Gândiți-vă că vine Green Deal-ul peste noi, noi va trebui, clar, să renunțăm la producția energiei electrice pe cărbune” – Ludovic Orban for national press *Digi24*.

it will increase even more energy imports, particularly from Hungary”)²⁰. A similar note was adopted in a 2020 discourse of a representative of a labor union within the Hunedoara Energy Holding that frames decarbonization in a similar nationalistic fashion: „We are dealing with a sabotage from the Ministry of Economy. Practically, they don't want this energy producer to produce energy in Romania, making way for the producer from Hungary which begins its functioning in 2023. There is lobby from outside the country, we are engaged in lawsuits with Greenpeace”.²¹

5. Corruption as the cause of the inability of the Jiu Valley to cope with decarbonization

As stated above, the repeated attempts to restructure the Jiu Valley coal-dependent energy industry into an economically fit chain of production has been explained, especially by the representatives of the companies in charge with this industry, through narratives highlighting the insufficient state support that they have received or the precarious manner in which decarbonization has been implemented. The opposite narrative, prevalent among representatives of the local community and some of the political parties that have managed decarbonization policies in the area, highlights the endemic corruption of the management of the companies in charge with the local energy production industry, as well as that of some of the regional and national authorities who have managed relevant decisions and plans. For instance, a local leader (of the National Liberal Party, supporting decarbonization policies), described (in 2017) the repeated insolvencies of the Hunedoara Energy Holding as been generated by the „robbery” that took place in this company, which was „bankrupted in all knowledge”, and the perpetrators should be searched for „in Bucharest as well”.²² Similarly, the leader of one of the mining labor unions in the Jiu Valley stated (in 2016) that there is a „Mafia created around Hunedoara Energy Holding, consisting of parliamentarians, directors, business men and labor union leaders”, and that this „Mafia in the Jiu Valley prefers the closing of the mines to the baring of the illicit affairs that have been made for over 10 years”.²³

This endemic corruption has not only created economic hardships for the energy company in charge of managing the Jiu Valley mining, but, according to this narrative, it has also been responsible for the closure of many of the mines in the region. The argument here is that the power plants inside the Jiu Valley energy complex have repeatedly decided to buy coal from foreign companies, leaving the Jiu Valley mines with no outlet for the coal they produced. While those responsible for these decisions have received large illicit remittances from these contracts, the local mines gradually became economically unprofitable, three of them being actually closed in 2015-2017 (Paroşeni, Petrila and Uricani).

²⁰ Original quote: „Închid Valea Jiului și importăm curent din Ungaria! Patriotism, nu-i așa? Iar un impact la fel de semnificativ va fi asupra securității energetice, pentru că va crește și mai mult importul de energie, mai ales din Ungaria”. Mihai Tudose for national press *g4Media*.

²¹ Original quote: “Ne confruntăm cu un sabotaj al Ministerului Economiei. Practic, nu se mai dorește ca acest producător de energie să mai producă energie în România, făcând loc producătorului de la Pacs (Ungaria) care intră în funcțiune în 2023...Se face lobby din afara țării, avem procese cu cei de la Greenpeace”. Cristian Istoc in national press *Digi24*.

²² Original quote: “Președintele interimar al PNL Hunedoara, Florin Roman, susține pentru GDD, în urmă cu două zile, că la CEH a avut loc un “jaf la drumul mare”, societatea fiind “dusă în cap cu bună știință”, iar vinovații trebuie căutați și “prin București” – 2017 – local newspaper *Gazeta de Dimineață*.

²³ Original quote: „Președintele Sindicatului Muntele, Petre Nica, afirmă că mafia din Valea Jiului preferă mai degrabă închiderea mineritului și a energiei decât să fie scoase la iveală “matrapazlăcurile” făcute de mai bine de 10 ani - politicul și mafia creată în jurul CEH, mafie formată din parlamentari, directori, oameni de afaceri și lideri de sindicat” (2016) - local newspaper *Gazeta de Dimineață*.

6. The unjust transition

This narrative highlights the social and economic hardships brought by the gradual mine closing in the Jiu Valley, attributing this negative state of affairs to the state inability to manage the phasing out of the local mining industry. It reflects the ENTRANCES factor of Countersignification: claim for a just transition, as it portrays the various facets of the current socio-economic problems in the region and calls for more appropriate recovery plans. For instance, the Mayor of Petrosani listed (in 2020) several facets of the negative impact of decarbonization, such as depopulation, youth emigration, massive increase of the share of state-assisted residents, of unemployment and criminality, ending his discourse with the warning „I share all these with you not to cause shock, but to prevent such mistakes from happening in other regions in Europe”.²⁴

At the same time, the explanation that he invoked for this state of affairs is „the lack of coherent programs, which made the area unattractive for investors”. Another cause of the unjust character of the Jiu Valley transition from coal that has been frequently invoked is the drastic failure of the many professional retraining programs (implemented in the region from 1997 and most of them financed by the European Union) aiming to prepare former miners for new jobs. This risk that similar initiatives would have no actual contribution to the socio-economic recovery of the region is also acknowledged by EU representatives; for instance, a member of the European Parliament stated (in 2020) that „It’s extremely important on what this money (from the Just Transition Fund) will be spent. If it would become the second POSDRU, with millions of euro spent on professional retraining programs, the EU will not reach its Green Deal objectives”.²⁵

7. The mobilization of the local community

A narrative that frequently occurs in the public discourses of the local authorities is designed to infuse optimism in the Jiu Valley residents and too mobilize the community towards the common goal of social and economic recovery. For instance, the Mayor of Lupeni stated, in a 2020 discourse: „We have to valorize and exploit every man as appropriate because this is the only way to develop Jiu Valley. We have now a private employer that has around 300 employees in Lupeni, but we need to have some from every kind, including family business and groups of craftsmen”.²⁶ This narrative invokes the substantive human resources that have been educated within the Jiu Valley technological training programs. For instance, a member of the community trained as technician states „This know-how that I accumulated in the coal mine has helped me a lot to do my job here... You just have to be creative”.²⁷ The Petrosani University is the flagship of this educational resource that is portrayed as essential for the economic future of the region and as motivating the economic optimism that should mobilize the community. Its Rector stated in a 2020 interview: „I see Jiu Valley as the next Silicon Valley of Romania. The valley also has a future an Energy Valley, because we

²⁴ Original quote: „Împărtășesc toate acestea cu dumneavoastră nu să vă șochez, ci pentru a preveni ca aceste greșeli să se întâmple în alte regiuni din Europa”, national newspaper *g4Media*.

²⁵ Original quote: “Este extrem de important însă la ce vor fi folosiți acești bani. Dacă va fi un al doilea POSDRU, cu milioane de euro cheltuite pe programe de reconversie profesională, UE nu-și va atinge obiectivele din Green Deal.” – national independent press *g4media*.

²⁶ Original quote: “Trebuie să valorificăm și să exploatăm fiecare om așa cum se cuvine pentru că doar așa putem dezvolta Valea Jiului. . Și în momentul de față noi avem un angajator privat care are undeva la 300 de angajați în municipiul Lupeni dar trebuie din fiecare câte puțin. Aici vorbim și de IMM-uri de familie și inclusiv grupuri de oameni care fac mesuguri” – Lucian Resmerita for local newspaper *Cronica Văii Jiului*.

²⁷ Original quote: “Acest know-how pe care l-am acumulat în mina de cărbune m-a ajutat foarte mult să-mi fac treaba aici. Trebuie doar să fii creativ”. – national independent press *g4media*.

have the necessary potential, the abilities and the qualified workforce here. We can train the best experts in our university”.²⁸

²⁸ Original quote: “Văd Valea Jiului precum viitoarea Silicon Valley a României. Valea are și un viitor ca Energy Valley, pentru că avem potențialul necesar, avem abilitățile și forța de muncă calificată aici. Putem instrui cei mai buni experți în universitatea noastră.” – national independent press *g4media*.

Appendix socio-ecological and technological component

Table 13 – List of Socio-ecological and technical factors

T.C. Factor	Description	Corresponding Question	Question Text
C1.1	actor diversity	Q2	To what extent are diverse stakeholders, from citizens and civil society to businesses and their representatives, directly participating in governing the energy transition?
C1.2	diverse governance	Q5	How diverse are the governance approaches used for the energy transition, for instance, involving formal and informal, centralised and decentralised, top-down and bottom-up arrangements, political hierarchies, markets, networks and negotiations, etc.?
C1.3	intermediaries	Q6	How influential are intermediaries in governing the energy transition at present?
C2	transformative leadership	Q7	Does leadership for the energy transition (i) come from all sectors (public, private, civil society), (ii) offer motivating visions and (iii) drive collaboration between stakeholders?
C3.1	social needs focus	Q8	To what extent are these social needs identified and prioritised by stakeholders?
C3.2	community empowerment	Q9	What level of support do actors and communities have to act autonomously for the energy transition?
C4.1	system analysis	Q10	How would you assess the level of understanding of interdependencies across socio-economic, ecological, and technical aspects of the transition? [and institutional?]
C4.2	path dependency	Q11	How far do actors recognise these systemic interdependencies in institutions, regulations, infrastructures, social values, etc., as potential obstacles to change?
C5.1	knowledge production	Q12	“There is a broad diversity of knowledge produced from different sectors (e.g., technical science, social science, civil society, government, industry) informing the transition.”
C5.2	sustainability vision	Q13	“The transition vision for [region] is explicit, radical, collectively produced, and motivates and provides clear orientation for stakeholder actions.”
C5.2.1	– explicit	Q13.a	...explicit?
C5.2.2	– radical	Q13.b	...radical / far-reaching?
C5.2.3	– collective	Q13.c	...collectively produced?
C5.2.4	– motivating	Q13.d	...motivates action?
C5.2.5	– orienting	Q13.e	...provides clear orientation?
C5.3	alternative scenarios	Q14	“Transition planning/implementation makes use of future scenarios with alternative development options, based on stakeholder choices, uncertainties and interdependencies between socio-economic, technological, institutional, and ecological factors.”
C6	disruptive experimentation	Q15	“There is a diversity of actors involved in experiments intended to fundamentally alter present ways of doing things.”
C7.1	resource availability	Q16	How much support is provided for stakeholders [/ To what extent are stakeholders able to access resources] to enhance inclusion and participation, vision- and scenario-development, and experimentation?
C7.2	organisational adjustment	– n/a –	– n/a –

C7.3	reflexive regulation	Q17	To what extent have regulatory changes been implemented to support the transition and overcome obstacles?
C8	social learning	Q18	“There is the monitoring of and learning about the transition that feeds back into its implementation.”
C9	across agency levels	Q3	“Measures to move the energy transition forward actively involve a broad range (diversity) of social actors, including individuals and households, as well as groups, organisations, networks, and society.”
C10	across scales/tiers	Q4	“Measures in support of the transition involve strong dialogue and coordination across spatial scales, from local to regional to national, inter-/transnational and EU.”



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