



ENTRANCES

ENergy TRAnSitions from Coal and carbon: Effects on Societies

D4.1 Brindisi Region Case Study Report



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Abbreviations

CCT	Coal and Carbon Territory
ENTRANCES	ENergy TRAnsitions from Coal and carbon: Effects on Societies
LMA	Labour Market Area
PAR	Political Administrative Region
SSH	Social Sciences and Humanities
WP	Work Package
ENTRANCES	ENergy TRAnsitions from Coal and carbon: Effects on Societies
EU	European Union
EC	European Commission
GDP	Gross Domestic Product
GVA	Gross Value Added
INE	National Statistics Institute of Spain
LMA	Labour Market Area
MITE	Ministry for the Ecological Transition

Executive Summary

This case study report presents first results of the ENTRANCES project (ENergy TRANSitions from Coal and carbon: Effects on Societies) for Brindisi. The multidimensional analytical framework comprises a socio-economic, socio-cultural, socio-psychological, socio-political and socio-ecological component of the clean energy transition in the region.

The socio-economic component analyses the development of important socio-economic indicators in the past. In the socio-cultural component, stress strains are identified with the help of focus groups. A survey conducted for the socio-psychological component analysed place attachment and the general perception of the clean energy transition in the region. Further, text analysis for the socio-political component identifies different narratives and conflicts associated with the coal phase-out in the area. In the end, the socio-ecological component relies on interviews to determine the transformative capacity of the region.

The establishment of the two coal power plants and the chemical plants was dictated by the central government over 30 years ago to support the development of the southern Italian area. Thanks to the many national interventions, the territory experiences a period of economic growth than ended in the 90s. However, these projects have pushed the industrial and economic development of the area in specific directions, away from an agricultural and tourism-based development and towards an industrial development without taking into consideration the local plans and desired directions. This has created strong tensions which are still present due to lack of involvement of the local territory on the decision process. The closure of Brindisi power plant, at the end of 2012, and the phase-out of Brindisi south coal plant, planned by 2025, has and will have a strong ripple effect on the workers of the plant and the activities linked to it as well as on all port activities. The coal energetic sector and all activities linked are sources of income and employment in the region. Its closure will create a vacuum in the economic sphere of the region, which will be difficult to fill with alternative projects. The loss of jobs and income in the region has started to affect the standard of living in the region. Harbour activities and ancillary businesses are closing due to falling demand. The lack of new opportunity jobs has accelerated the emigration of young people and brain drain from the region, which in turn has accelerated the ageing process, affecting the socio-economic fabric of Brindisi and the surrounding municipalities (in Brindisi and in Apulia, the GDP has grown less than the national and EU28 levels).

It also affected the **socio-cultural** configuration of the region. The organization of the Brindisi CCT is exposed for a long time to profound stress and strains, including all the forms of organizational stress, i.e. conflicts, impasses and dependence. The territorial organization is experiencing a deep ambivalence about what the territory is and what it should become next. Moreover, due to dependence on national decisions in the matter of energy and industrial development, the territory has weakened its capacity to exercise endogenous governance. This observation is mirrored by the lack of a clear alternative the current industrial development despite the desire to take other paths, as a re-launch of the region based on tourism. However, despite the presence of territorial stigma, the territory is endowed with a positive and motivating symbol for the territory as the harbour is perceived as an element of territorial rebirth and with a good degree of optimism among its inhabitants. Finally, the territory is still endowed with a strong capacity to control its ideal borders and nurture its distinctive elements.

Uncertainty about the future has also affected the **socio-psychological** well-being of the population in the region. The socio-psychological component finds a low level of life satisfaction, which is correlated with a low level of place attachment. The survey also indicates high results for the indicators of Decarbonisation Impacts. For the inhabitants of Brindisi, it seems that there is a dominant positive idea about the prospect of the territory under decarbonisation correlates to a low level of Resistance and Protest and to a high of Support. Moreover, there is a high level of resilience and optimism.

The decarbonisation process also affects the **socio-political** configuration of the region. In Italy, the decarbonisation process is a **top-down process**. All major decisions regarding the closure of large carbon-intensive industrial units, the distribution of EU funds, compensation for workers and companies are taken by the central government. Local government has no competence in this area. The energy transition is mainly linked to positive opinions due to sustainable processes to a green energy system. Indeed, the energy transition is generally accepted by locals but there is great concern about how it will happen. Alongside the thrust linked to the effects on the environment and health, there is concern about the future of industry and port activities. The emerging narratives about the energy transition in Brindisi could be identified in three main discourses: The transition is needed for health and environment; The future of the industry; The future of the port. The defining of two constituencies and the analysis of the narratives allowed us to identify three regularization strategies developed by the design constituency in the process of technological regularization: Centralisation, Differential incorporation and Marginalization. The Contersignification is the identified factor characterizing the technological adjustment process developed by the impact constituency. In contrast, the Antisignification strategy is not developed in the Technological Reconstitution.

The **socio-ecological and socio-technical component** shows that stakeholders from different sectors perceive the transformative capacity differently. A common criticism regarding social needs was that the energy transition process is not able to safeguard and relocate employees from large energy production plants and to offer programs, projects and investments alternative to fossil fuels. The priority of social needs should derive from a concerted action between the central and peripheral levels and not decided by big industrial groups and institutional organizations. Moreover, the general public is not being actively engaged in CET deliberations. This absence is a significant problem which could have grave consequences. According to most stakeholders, the assessment shows that the Apulia region is actively working towards the energy transition. However, some interviewees (namely civil society representatives) think that energy transformation alone is not enough. They believe that a broader social change is necessary and this could be obtained only by fully involving citizens in the change processes.

This extensive research on the different aspects of the energy transition helped us in identifying the various **challenges** and **coping strategies** that have emerged over the last decade. These challenges include: Diversifying local economy; Promoting tourism and nautical sector; Saving the energetic sector; Land remediation and use; Bridging the infrastructural divide and human capital formation.

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.

The overall goals are to develop 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 to formulate 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 sense, the project views 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 to trigger its 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 Brindisi which was developed by ENEA. This case study is representative of “carbon territory” in Italy in terms of the ENTRANCES point of view.

One third of electricity capacity generated by coal-fired power plants in Italy is concentrated in Apulia where the energy mix from fossil fuels is made by: Coal 55%, Gas 33% and Oil 12% (2015). Apulia produces 14% of the total power generation capacity in Italy (Tot 282 TWh) (GSE, 2016). In 2015, Apulia emitted 32 Mton of CO₂ (6.4 Mton/year from ILVA, the most important Italian steel company based in Taranto) which is equal to 24% of Italian total emissions (136 Mton/year) (ISPRA, 2021). Apulia produces an excess of electricity equal to 210% of its own domestic consumption. The two main coal-fired power plants are the “Costa Morena” Brindisi EST (4x320 MW) managed by A2A, and the Federico II/ Brindisi SOUTH (4x660 MW) managed by ENEL (Figure 1). Uncovered storage of carbon in the plants is one of the major sources of pollution and diseases in Apulia (Brindisi report, 2019). In fact, local authorities are asking the government to secure the 2025 target for Apulia's carbon power plants phase-out (Bauleo et al., 2017).

Another carbon intensive industry in the Apulia territory – the Arcelor Mittal Group, ex-ILVA steelworks - which is located in the Municipality of Taranto (Taranto Province NUTS 3), produces the Europe's largest steel output. There are many controversies in this area due to the impact on health and environment.

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

At the same time, Apulia is the second Italian Region in term of capacity derived from installed Renewable Energy Sources (RES) with 5.5 GW in 2018, second only to Lombardy (8.85 GW). From 2010 to 2018 RE derived power raised from 1.9 GW to 5.5 GW. The largest power RE plant is in the Province of Foggia with a total of 2,459 MW, followed by Lecce, Bari and Barletta-Andria-Trani and finally Brindisi. In Apulia 100% of the Municipalities host at least one RE plant on their territory. The Apulian territory counts 43,000 RE plants, generating almost 10,000 GWh/year satisfying the energy needs of around 3,700,000 families.

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 [Name of the region] has been operationalised in different interrelated units of analysis. Chapter 3 is focused on **the analysis of the Brindisi 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 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 Brindisi case study report.

CHAPTER 2

CONCEPTUAL AND METHODOLOGICAL FRAMEWORK

2 Conceptual and methodological framework

2.1 Case study objectives and organisation

2.1.1 The case study objectives

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 *deterritorialisation* 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?

These three questions 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/reterritorialization process (RQ2), and identify a set of *policies* for fostering the re-territorialization of the regions (RQ3).

The main aim of the regional case studies is to answer the first research question (RQ1) of the project in all the regions involved in the project, thus also in Brindisi. 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-territorialization processes (RQ2) and the set of policies needed to activate re-territorialization (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 Brindisi

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

To address 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 Brindisi, 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 the territories that are more exposed to the decarbonisation process. To this aim, the concept of Coal and Carbon Territory (CCT) was developed. CCTs are the territories in which the “coal and carbon” features are represented as a distinctive part of the local identity or are a key 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 in which a bulk 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 that are 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.

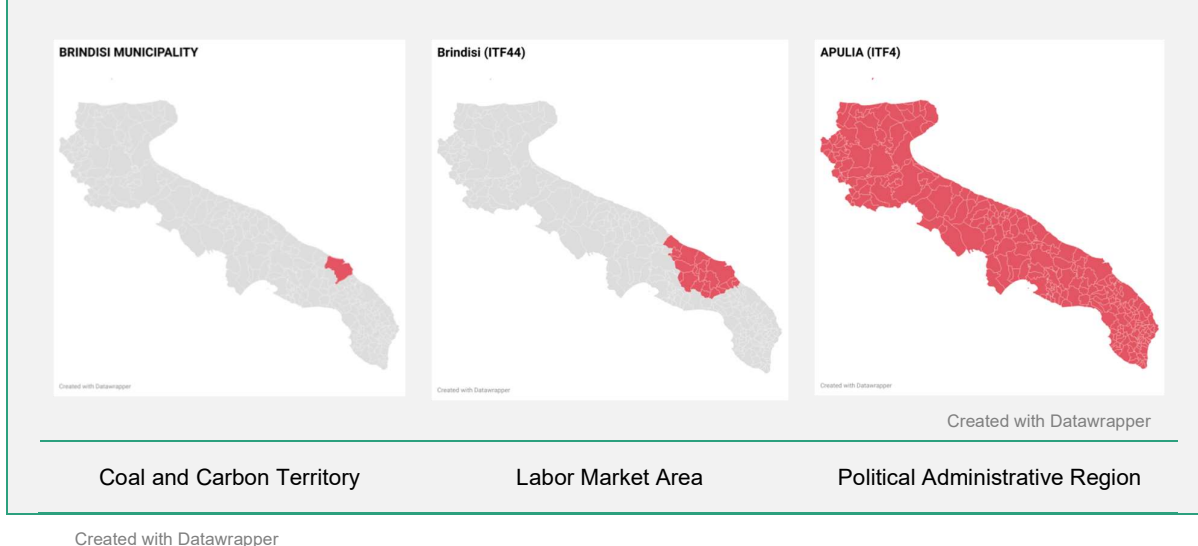
These three research foci and related units of analysis, at least to some extent, overlap with each other. Despite that, they offer different and complementary perspectives in the study of coal and carbon-intensive regions in transition. They jointly contribute to understanding the de/re-territorialisation 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 Brindisi case as shown in Figure 1.

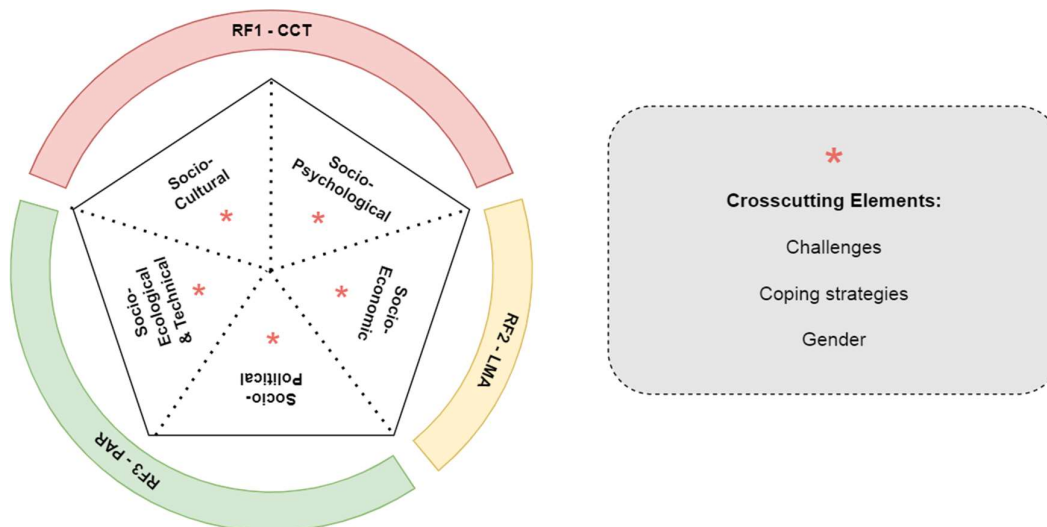
Figure 1 – Case delineation



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 and 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: research foci, components and crosscutting elements



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 stress-strain analysis 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

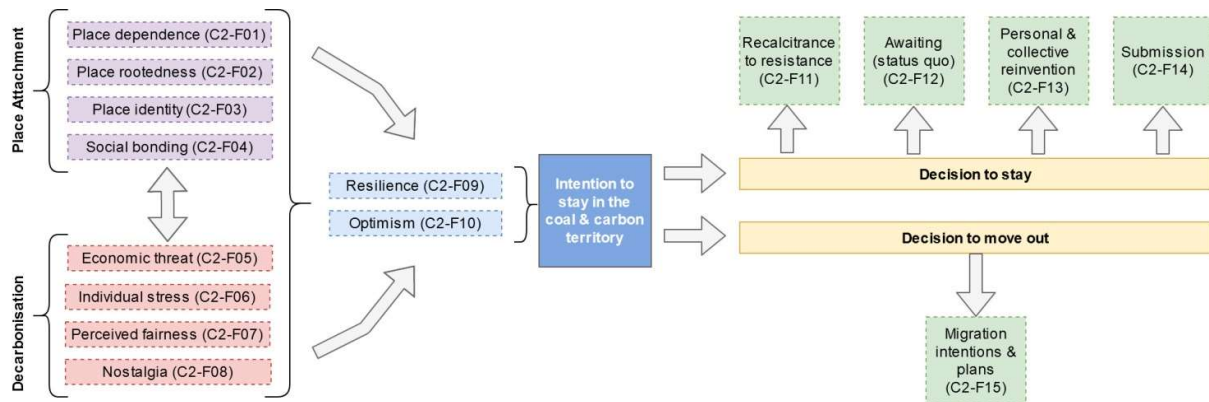
The socio-psychological component studies the socio-psychological impacts of the closure of coal mines and carbon-intensive industrial units, i.e., the decarbonisation process, on the lives of individuals living in the CCT. The component moves under the assumption that the economic, social, and political 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, and 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 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 deterritorialization 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 above-mentioned model). Most of these items and latent constructs are taken from other studies, where different 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 anti signification 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 level of the PAR and was 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 For full elaboration of transformative capacity and its components, please refer to Wolfram (2016, 2018, 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.

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 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 results of the desk research have been collected in a State of the Art Report.

2.3.2 Focus groups (socio-cultural component)

Focus group supports 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 analysis was based on “Mapping globalisation induced stress in Brindisi”, which was implemented on the 4th of February 2022 in Brindisi (Italy). The focus group was organised by the case study team, composed by ENEA researchers and with the support of DITNE. The research

team integrated the data collected with the focus group with additional sources retrieved on the internet.

The participants of focus group were selected through the following steps. Firstly, a list of desired profiles for the candidates was drafted based on the key informant' types in the methodology, i.e., community leaders, knowledge keepers, and memory keepers. This list of desired profiles described the ideal candidates in terms of types of stakeholders to be involved, based on their profession, role in the local community etc. Secondly, some local “contact points” were interviewed to ask who can make a good candidate based on the desired list drafted. Thirdly, the candidates were approached to ask their willingness to participate. Moreover, in a snowball sample technique, the contacted participants were asked to provide further names which could fit the desired profiles. Fourthly, some names fitting with the desired profiles were searched on the internet and subsequently contacted. This further strategy aimed at differentiating the participants, both in terms of subareas of reference within the CCT and ensuring that the participants did not belong all to the same social circle (which can be a risk adopting a snowball process) and ensuring that every social circle has a representative person. Fifthly, a monitoring room was established to check the progress of the organisation and ensure the selection of the right mix for the group was established

The focus group was composed of 8 people (5 of them attended in person, while 3 of them attended remotely). Among the 8 participants, 1 was a woman and 7 were men (Table 2).

Table 2: - List and features of focus group participants

Code	Profile	Com Leader	Knowl Keep	Memory Keep	Gender
P01	Industry historian (University of Bari)			X	M
P02	Local business association		X		M
P03	Local business association	X			M
P04	Port operator Civil society		X		M
P05	Doctor			X	M
P06	Trade union leader	X	X	X	M
P07	Local environmental association		X		M
P08	Coal & Carbon Industry		X		F

It is finally worth mentioning that most of the participants live and work in the Brindisi area.

After the focus group, the data collected were analysed and elaborated by the research team. The processing included the following operations:

- Full transcript of the focus group recordings
- Cleaning of the list of outliers (strain situations). The initial list of strain situations has been rationalised, through merging similar strain situations, re-classifying some “strain situations” as “impacts” and vice versa.

- Integration of further information from additional sources. This was proven necessary when the focus group information didn't provide information sufficient for describing the strain situation for an external reader.
- Re-classification of the strain situation types, and related factors based on homogeneous criteria
- Describing the strain situation following the reporting template
- Elaborating and synthesising the information collected in the territorial anamnesis (across phases and milestones) and the territorial interpretation (describing stigma, nostalgia, emerging visions, and territorial symbols)

2.3.3 Survey data collection process (socio-psychological component)

The survey was conducted with the help of a structured questionnaire with 17 indicators and 90 items. Most of these indicators are taken from other studies, where different researchers have applied and tested them in different contexts.

In the case of Brindisi, we adopt the following survey design:

1. Definition of purpose of the survey
2. Type of survey: survey sampling
3. Choice of the type of survey: we select non-probabilistic sample. Thus, we randomly select a sample of visitors to website inviting them to take part in the survey.

Sample size for each case study in ENTRANCES is 50 respondents, however, in Brindisi the sample size will be 127 respondents.

Respondents were contacted through many channels:

- an awareness campaign on local media websites, through press releases and articles containing the url in order to fill in the questionnaire;
- word-to-mouth contacts initiated through the local collaborators of the ENTRANCES project;
- ENEL, the owner of the Federico II power plant, sent the survey to the employees of the Power Plant, with request of filling the survey and sharing it with their household members;
- the civil society organizations located in the municipality were contacted with a request of filling the survey and disseminating it to their contacts.

2.3.4 Socio-economic data (socio-economic component)

Socio-economic data has been collected from Eurostat, Italian national Institute of Statistics (ISTAT), IEA, and private companies.

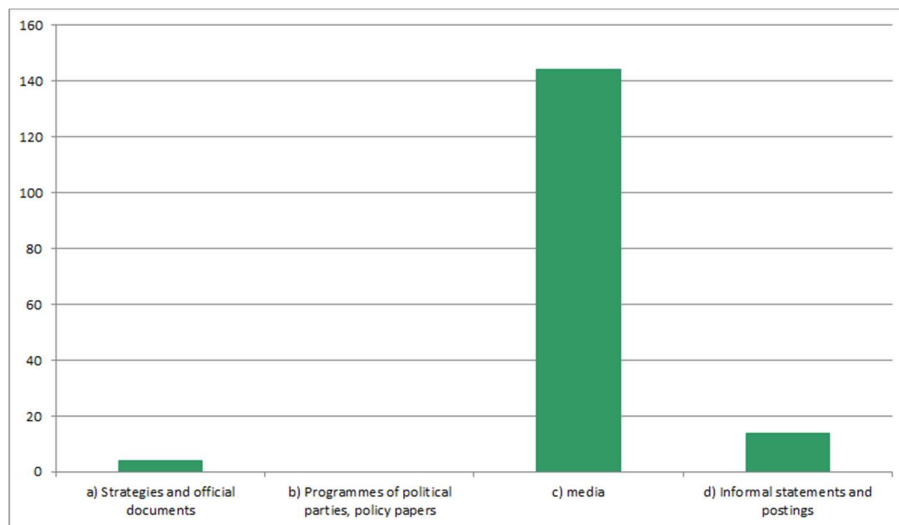
The data collection covered the period from 1991 to 2021, and was focused on: (i) Territorial features; (ii) Environment and Energy; (iii) Population and Households; (iv) National Accounts; (v) Labour and wages. The data were collected at CCT, PAR, and LMA levels as well as for upper levels (NUTS2 region), Country and European levels.

2.3.5 Text analysis (socio-political component)

Several ***sources for the text analysis*** have been investigated, covering the **period** from 1 January 2013 to 15 October 2021 in Apulia Region and in particular in Brindisi's Municipality.

An ENEA platform (ENEA-AC) available for Agency staff was used to identify textual data (articles). This period was chosen because it was characterized by a progressive intensification of attention to decarbonisation issues also due to the phase out of the first plant in Brindisi. Two keywords "Brindisi" and "Carbone" were chosen because they can better frame the reference scenario. 460 articles were found, related to 98 Newspaper and 46 Broadcasting. Moreover, we also analysed, 4 Strategies and official documents, 4 Statements of interest organisations NGOs and trade unions and 10 Informal statements.

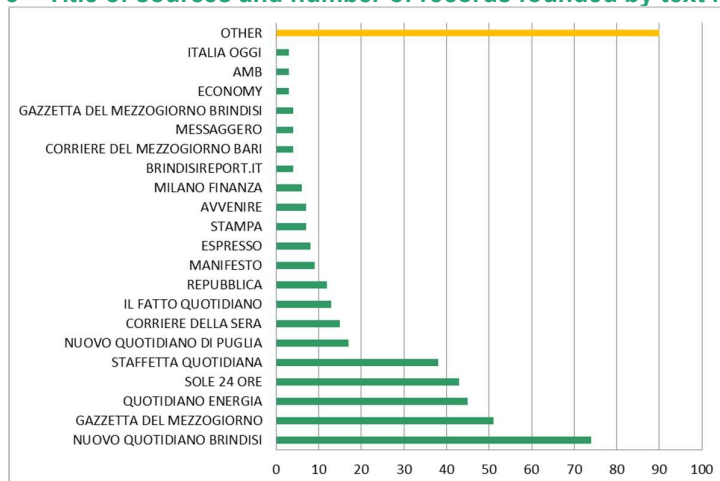
Figure 4 – Types of sources for text analysis



Source: own representation

The number of articles used to analyse local discourse, narratives and field of power is shown for each source type. 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) The media. The Figure 5 shows the newspapers and broadcasting extracted by press review and the number of articles found (460 articles were analysed).

Figure 5 – Title of sources and number of records founded by text research



They also include both National and Local press with a prevalence of the national ones (70% vs 30%), but the first two newspapers in terms of the number of articles are local. The main newspapers in which the theme was found are provided in Table 3.

Table 3: The main newspaper dealt with decarbonisation issues with level of interest and number of articles

Newspaper	Level of interest	n. article
NUOVO QUOTIDIANO BRINDISI	local	74
GAZZETTA DEL MEZZOGIORNO	national	51
QUOTIDIANO ENERGIA	national	45
SOLE 24 ORE	national	43
STAFFETTA QUOTIDIANA	national	38
NUOVO QUOTIDIANO DI PUGLIA	national	17
CORRIERE DELLA SERA	national	15
IL FATTO QUOTIDIANO	national	13
MANIFESTO	national	9
ESPRESSO	national	8
STAMPA	national	7
REPUBBLICA	national	7
AVVENIRE	national	7
MILANO FINANZA	national	6
REPUBBLICA BARI	local	5
BRINDISIREPORT.IT	local	4
CORRIERE DEL MEZZOGIORNO BARI	local	4
GAZZETTA DEL MEZZOGIORNO BRINDISI	local	4
MESSAGGERO	national	4
ITALIA OGGI	national	3
AMB	national	3
ECONOMY	national	3

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 from February to May 2022. The aim was to obtain and contrast differential stakeholder assessments of transformative capacities. In total, 12 stakeholders were interviewed, representing public, private, trade unions, higher education, science, non-governmental organisations, research institutions and civil society actors. Respondents were asked to assess statements corresponding to each measure of transformative capacity.⁴ The interviews were made in person, whilst the questionnaire was filled on-line. All interviews were conducted in the local language (Italian).

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

Table 4: Stakeholders interviewed by sector and type

Sector	Stakeholder	Respondents
Public Sector	Higher of Further Education	2
Public Sector	Actors representing different scales (local, regional, national/EU, if relevant)	1
Private Sector	Key industry facing decarbonisation / other big players	2
Private Sector	SMEs and their representations, e.g., chambers of commerce, skilled crafts	3
Private Sector	Other important local stakeholders	1
Private Sector	Scientific and research, social and/or technical in relation to the transition	1
Civil Society	NGOs, energy and environment (national/international)	1
Civil Society	Trade Unions	1

The results of our analysis showed that regarding Apulia' transformative capacity, the findings are mixed. Moreover, the interviewees' evaluations of the different aspects questioned were heterogeneous. Indeed, although there appears to be a significant amount of political will from the Apulia Government to drive the CET forward, a great social consensus and a strong collective sensitivity for the energy transition process, there is still a lot of work required in multiple key strategic areas where gaps currently exist. Most notably, major deficits in social learning, resources availability, disruptive experimentation and alternative scenarios have been identified. It is important to highlight that, in all areas of deficit, the Apulia Government has capacity to intervene. The areas that were identified by the stakeholders as being most advanced in terms of transformative capacity were, social needs, community empowerment and reflexive regulation. However, stakeholders identified considerable room for improvement in these areas too.

A common criticism regarding social needs was that the energy transition process is not able to safeguard and relocate employees from large energy production plants and to offer programs, projects and investments alternative to fossil fuels. The priority of social needs should derive from a concerted action between the central and peripheral levels and not decided by big industrial groups and institutional organizations. Moreover, the general public is not being actively engaged in CET deliberations. This absence is a significant problem which could have grave consequences.

According to most stakeholders, the assessment shows that the Apulia region is actively working towards the energy transition. However, some interviewees (namely civil society representatives) think that energy transformation alone is not enough. They believe that a broader social change is necessary and this could be obtained only by fully involving citizens in the change processes.

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 to make 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

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.

The extensive set of research activities carried out for the development of the case study involved extensive reporting activity. The reporting activity is summarised in the [Table 5](#), which reports the main results in terms of data processed within the case study.

Table 5: Data reporting in the Brindisi case study

Name	Type	Description	Size	Delivery date
State-of-the-art report	Internal Report	Results of the desk research	39 pg.	14/01/2022
Socio-Economic data	Data File	Results of the socio-economic data collection	NA	
Stakeholder Grid	Data File	Results of the desk research	NA	
Socio-Psychological Short Report	Internal Report	The procedure applied and the overall results of the online survey are described there		
Survey data	Data File	Includes the survey data	NA	
Socio-Political Short Report	Internal report	Includes a description of the procedure and of the results of the text research	41 pg.	28.02.2022
Socio-Cultural Short Report	Internal report	Includes the processed data collected with the focus group	23 pg.	08.07.2022
Socio-Ecological and Technical Report	Internal report	Includes a description of the procedure and of the results of the semi-structured interviews	39 pg.	
Trasformative capacity Dataset	Data File	Includes the quantitative results of the semi-structured interviews	NA	

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 Coal and carbon features of the territory

In the Brindisi case, the CCT has been delineated as the territory of the Brindisi Municipality, selected because the coal plants for energy production and the related activities (e.g. the harbour) fall into and affect the administrative territory of the Municipality.

For almost thirty years, the two coal fired plants – Brindisi EST and Brindisi SOUTH- and all related industries have shaped the economy of Brindisi by creating new occupational opportunities and characterizing the socio-cultural and socio-economic landscape of the CCT area. With the case study, we refer specifically to the following activities:

- **Power Generation from coal.** Key actor: ENEL is the national energy company that is the owner of the coal-fired Federico II Brindisi SOUTH. The Brindisi EST A2A carbon plant (640 MWe) was fuelled by coal since 1979 and hasn't been working from 2013 owned by A2A.
- **All the satellite activities** are connected with the previous point. In particular, the Brindisi harbour plays a central role in the connections and trade with Eastern Europe, in particular the Balkan countries, Greece and Turkey with activities closely related to the thermal power plant.

Figure 6: The Coal and Carbon Territory (CCT)



3.1.2 Historical development

The territorial anamnesis identified six historical phases in the life of the territory within the period analysed in the focus group (1934-2022). Such phases are synthetically described below:

- 1st phase: pre- and post-war period – From 1934 to 1960. Foundation of the SACA aeronautical company specializing in seaplanes, development of mechanical industry.
- 2nd phase: The development of the petrochemical industry - From 1960 to 1977 the Brindisi area is involved in a phase of economic expansion and growth with the reorganization of the economy following the Second World War and the start of extraordinary national state intervention policies to support the development of the southern Italian areas. In the Brindisi area, Montecatini built a large petrochemical industry, that is added to the existing mechanical and naval companies, guaranteeing job opportunities for technicians from the territory and from the neighbouring provinces. The extensive petrochemical plant is one of the largest in Europe and produced up to 700,000 tons of plastic materials per year and in particular isotactic polypropylene, marketed under the Moplen brand. With the start of the petrochemical plant,

Brindisi becomes an industrial city. In 1964 the first coal-fired thermoelectric power station was built and put into operation in Brindisi (also called Brindisi Est), which supplies electricity to the nearby chemical industrial area. The plant was fuelled by fuel oil and was composed of two 320 MWe groups connected to the electricity grid and subsequently expanded with two other groups of equal size. This phase of economic growth ends in the 1970s with the oil crisis.

- 3rd phase: The development of the energy industry from - 1977 to 1995. In 1977 a serious accident occurred at the cracking plant of the Montedison petrochemical (ex-Montecatini) followed by years of problems with social crises due to layoffs and the precarious situation of the petrochemical sector. Montedison initiated a major process of industrial restructuring and gradual downsizing of its plants. The most immediate effect on the Brindisi area was a deep crisis triggering a campaign of collective dismissal of employees (hundreds) and supplementary funds. The risk of the exorbitant increase in unemployment prompted local authorities to call for a quick solution through intervention of the national state. The ENI company Versalis is then financed with public funds to build a steam cracking plant, one of the largest in Europe. At the same time, ENEL was financed and in 1982 built the Federico II Brindisi Sud coal-fired power plant, financed with the aim of absorbing the surplus of Montedison's petrochemical plant workers. In this phase, the port area of Brindisi has developed with activities related to coal logistics. In 1979, the Brindisi Est power plant was converted to coal, while maintaining the possibility of burning heavy fuel oil as a support or as an alternative to coal. Thanks to the many interventions, the territory experiences a period of rebirth that ends in the 90s.
- 4th phase: The globalisation period – from 1995 to 2012. Under the pressure of market globalisation, a significant process of deindustrialization started. The harbour sector starts its decline with a progressive decrease of the price of tenders. At the end of 2012, the Brindisi east coal plant was declared out of service and stopped its activity.
- 5th phase: In search for a solution to the crisis – From 2012 to 2020. This phase is characterized by the persistence of the crisis, but also by the search for new solutions for the territorial development model. In this phase chemical, aeronautical and pharmaceutical industries look for new strategies for the activities conversion to the green economy. In this phase, the traffic of goods related to the energy sector and all activities linked to the coal decrease progressively. This decrease impacted also the receptive structures (hotels) and all activities that uses to work with this sector.
- 6th phase: The coal phase-out and post-pandemic crisis - From 2020 up today. The phase out of the Brindisi South coal plant is planned by 2025. Enel recently asked for a gas-reconversion project authorisation, reducing the electric power to 1,68 MWe. The authorization process is still underway. The phase out of oh the coal plant will have a strong ripple effect on the workers of the plant and the activities linked to it as well as on all port activities. In this phase, the port is focusing on the development of tourism for relaunching territorial development, even if there is a severe lack of digital infrastructure in the Brindisi port, including those needed for managing port activities in relation to ferries and passengers. Another focus of regional and national programmatic strategies is the development of the renewable energy supply chain. The installation of the first utility-scale floating photovoltaic park in Italy by Eni New Energy covering an area of 15 hectares of water in the harbour area of Brindisi is expected. The Brindisi industrial area which hosts numerous chemical, aeronautical and energy industries of international level as well as numerous engineering, construction and industrial service companies supporting major companies is expected to benefit from the potential of the Special

Economic Zone SEZ to attract investments. The aeronautical sector is the sector that has been most affected by the effects of the pandemic with a drop in turnover as a result of lower traffic in people and goods.

3.1.3 Ecological and environmental situation

Descriptive epidemiological studies conducted in the Brindisi area, also in the framework of the national study SENTIERI (Zona A. et al., 2019), have shown an excess of mortality of residents due to some types of cancer and cardiovascular and respiratory diseases. The analytical cohort study in the territory of seven municipalities in Brindisi, examined the association between the pollution produced by industrial emissions from energy and petrochemical plants and mortality, hospital admissions and the incidence of cancer. Industrial emissions are associated with an increase in morbidity and mortality in the area under study: a relationship was found between past exposure levels (estimated at 1997) to PM10 and SO2 of industrial origin (thermoelectric power plants) and VOCs (petrochemical) and mortality from specific causes (tumors, cardiovascular and respiratory diseases) and incidence of some cancers (lung). The examination of hospital admissions in relation to the estimated environmental exposures for each year of the study shows an association between pollutants and cardiovascular and respiratory diseases (power plants) and congenital malformations (petrochemical). The association between emissions from thermoelectric power plants and hospitalizations for cardiovascular and respiratory diseases was examined for three time periods: 2000-2004, 2005-2009 and 2010-2013. As environmental exposures decreased (and the contrast between exposure levels in each period), a decrease in the strength of the association was observed, although a statistically significant relationship remained for the most recent period between pollutant emissions (PM10 and SO2) from power plants and cardiovascular and respiratory diseases. Given the reduction in exposure levels in the last period, it is likely that people living in the same areas that have had a higher exposure in the past will continue to show health effects due to previous exposures. The results of the study suggest the need to continue epidemiological observation and the implementation of all preventive measures aimed at protecting the health of the population, including the adoption of the best available techniques for the containment of industrial emissions (Bauleo et al., 2017). Due to the presence of the coal-fired plant in Brindisi and the iron and steel center in Taranto, in 2019 CO2 emissions from solid fuels and derived gases in Apulia accounted for 46% of the national emissions of the Emission Trading System (ETS). In particular, the emissions from the thermoelectric sector of Brindisi Province (LMA) were 7,1 Mt CO2eq which is higher than Rome 5.5 Mt CO2eq (ISPRA, 2020). The future is perceived by the population as very uncertain also due to the contamination of the land and the state of health (WWF, 2021). The reduction of pollution is therefore very important in the region. In Brindisi there is an area of national interest or "SIN". A SIN for reclamation is an area where human activities have caused such an alteration of the soil, subsoil and groundwater that it poses a risk to human health. The SIN of Brindisi was decreed by law 426/1998 and its area defined by the Ministry of the environment with DM 10th January 2000. The site covers a surface of 11,000 hectares, includes the industrial area as well as the whole port and a strip of 5,500 hectares of marine areas, and also contaminated areas in need of remediation. Reclamation must be accelerated to definitively close with the legacy of industrial pollution, restoring the quality of water and soil.

3.2 Socio-cultural component

3.2.1 Summary of results

A total of 18 strain situations were identified in the case study. Table 6 below provides a list of the strain situations and their characteristics. The table overviews the strain situation mapped, classifying each strain situation in relation to (a) type of the strain situation identified, i.e. conflicts and disputes, impasses or contradictions, or dependence and related uncertainties; (b) areas of change and related stress factors; (c) position in space; (d) position in time.

Table 6: Strain situations

	Name	Type	Area	Factors 1st 2nd		Geo	Time
1	Conflict on imposition of industrial development direction	Exo conflict	Finance-	F9	-	IH Brindisi	n.a.
2	Conflicts for the dependence on public investments of large companies	Dependence	Finance-	F10	F11	Brindisi	n.a.
3	Conflicts for transition to new job profiles in the large companies	Endo conflict	Finance-	F11	-	IH Brindisi	2019
4	Conflicts generated by the coal phase-out decision	Exo conflict	Finance-	F13	-	IH Brindisi	2020
5	Conflicts generated by the progressive decrease of the price of tenders	Impasse	Finance-	F13	-	IH Brindisi	1990s
6	Dependence on national and administrative policy on implementing the green energy transition	Dependence	Finance-	F10	-	IH Brindisi	2018
7	Conflict on land remediation and use of SIN area	Impasse	Finance-	F10	F11	SIN area	2000
8	Conflict on gas power plant	Exo conflict	Finance-	F10	F11	IH Brindisi	2019/2020
9	Conflict on floating photovoltaic park	Exo conflict	Finance-	F11	-	IH Brindisi	2019
10	Gap in digitisation of harbour services	Impasse	Techno-	F16	F17	IH Brindisi	n.a.
11	Dependence on external investments for digital infrastructures	Dependence	Techno	F16	-	Brindisi	n.a.
12	Conflicts related to outmigration flows	Endo conflict	Ethno-	F01	-	Brindisi	2014
13	Conflicts related to student outmigration flows	Endo conflict	Ethno-	F01	-	Brindisi	n.a.
14	Conflicts related to the neglect of port activities	Endo conflict	Ethno-	F01	-	Brindisi harbour	2017
15	Conflicts on harbour vision	Endo conflict	Ideo-	F15	-	Brindisi harbour	2017
16	Conflicts with populist movements	Endo conflict	Ideo-	F14	-	Brindisi	n.a.
17	Conflicts per delocalization and loss of orders	Exo conflict	Multiple	F13	F19	IH Brindisi	2017
18	Strain situations in the tourism sector	Dependence	Nature-	F19	-	Brindisi	2020

Note: IH Brindisi=Industrial and harbour area of Brindisi

Sources: Own elaboration with Focus Group

Table 3, below, shows the distribution of the strain situations across the different areas of change analysed during the focus group. Most of the strain situations mapped are related to stressors in the

area of change related to financescape. However, even though fewer in number, some very relevant strain situations were mapped in other areas, i.e. ethnoscape, ideoscape, technoscape, and naturescape. It is also worth mentioning that 1 strain situation was categorised in multiple areas of change, financescape and naturescape.

Table 7: Number of strain situations mapped in each area of change

Financescape	Technoscape	Ethnoscape	Ideoscape	Naturescape	Multiple
9	2	3	2	1	1

Source: Own elaboration with Focus Group

Strain situations of all four types have been mapped in Brindisi. It is worth mentioning that considering jointly the two conflict types, “conflicts” count nearly 61% of the strain situation mapped, while the other two categories sum up jointly to the other 39%. It is also worth remembering here, that the strain situations have been assigned to one type or the other with a criterion of prevalence, where some of them fit with two or more types.

Table 8: Strain situations across different types mapped in Brindisi

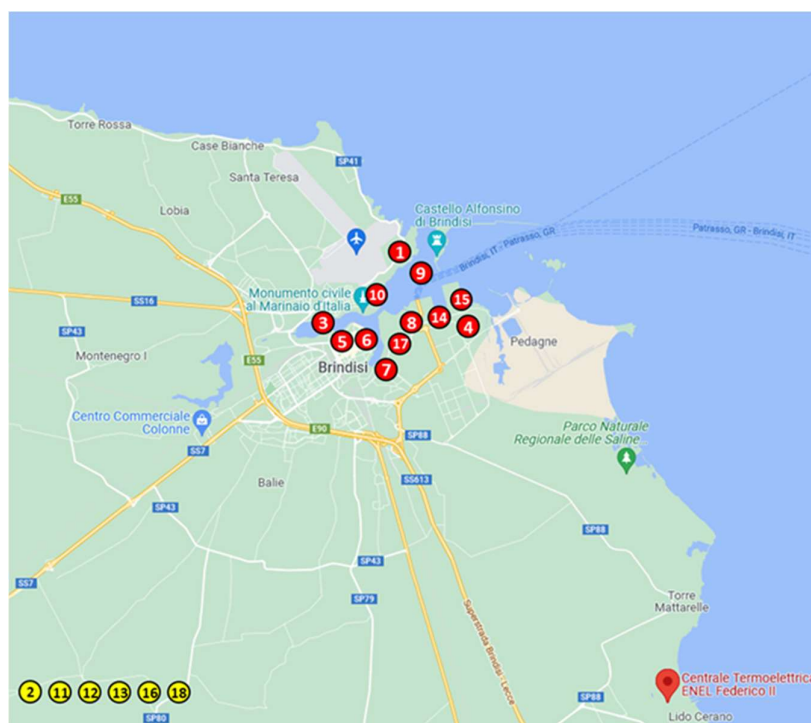
Type	Endogenous conflict	Exogenous conflict	Impasse/contradiction	Dependence/Uncertain.
N.	6	5	3	4
%	33,3	27,8	16,7	22,2

Source: Own elaboration with Focus Group

Distribution of the strain situation in the geographical map

Of the 18 strain situations mapped about 1/3 (6 out of 18) cannot be localised in a specific point of the map as they are related to the whole Brindisi area. These strain situations are represented in yellow in the map below (see Figure 7). The other strain situations are all in the industrial and harbour area of Brindisi. These “sited” strain situations are visualised in red on the map. It is worth noticing that the strain situations mapped mirror the knowledge of the key informants involved, selected as “local leaders/knowledge keepers/memory keepers” for the whole area. It is likely (if not sure) that further strain situations could be found for each place in the area with relevance for that specific community.

Figure 7 – Distribution of the strain situations in the geographical map



Distribution of the strain situations in the time map

Table 9 shows the starting year of the strain situations mapped, and the duration of the strain situation. The table shows that except for ≈2 (“Conflicts for the dependence on public investments of large companies”), all the strain situations started in phases 4, 5 and 6. All the strain situations are still present in the Brindisi carbon intensive region. Interestingly, the duration of the strain situation mapped is rather high, with some of them lasting more than 10, 20 or even 30 years.

Table 9 – List of strain situations

Years	Phase	Strain Situation	Duration (years)
1934-1959	1. Post-war period	No strain situation mapped started in this period	-
1959-1977	2. The development of the petrochemical industry	No strain situation mapped started in this period	
1970 - mid90s	3. The development of the energy industry	1 Conflicts on imposition of industrial development direction	
mid90s – 2012	4. <i>The globalisation period</i>	2 Conflicts for the dependence on public investments of large companies	
		5 Conflicts generated by the progressive decrease of the price of tenders	30
		7 Conflict on land remediation and use of SIN area	22
		13 Conflicts related to student outmigration flows	

2012 – 2019	5. In search for a solution to the crisis	4 Conflicts for transition to new job profiles in the large companies	7
		Conflict on land remediation and use of SIN area	7
		9 Conflict on a floating photovoltaic park	3
		10 Gap in the digitisation of harbour services	
		12 Conflicts related to outmigration flows	8
		13 Conflicts related to student outmigration flows	
		14 Conflicts related to the neglect of port activities	5
		15 Conflict on the harbour vision	5
		16 Conflicts with "populist" movements	
		17 Conflicts per delocalization and loss of orders	4
		6 Dependence on national and administrative policy on implementing the green energy transition	4
2020 – 2022	6. The coal phase-out and transition phase	3 Conflicts for transition to new job profiles in the large companies	2
		4 Conflicts generated by the coal phase out decision	2
		8 Conflict on gas power plant	2
		11 Dependence on external investments for digital infrastructures	2
		18 Strain situations in the tourism sector	2

Sources: ENTRANCES Focus Group Discussion.

3.2.2 Interpretation

Through analysing the strain situations mapped a set of specific stress vectors - i.e. actual change process producing stress in the territory – have been identified. 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). Each stress vector is shortly described and a reference to the strain situations related to the stressor is provided in bracket.

- **Exogenous private investments and Public transfer and subsidies.** Even though exogenous private investments are normally considered desirable, participatory mapping of stress vectors suggests that these financial flows are the most important causes of strain situations in Brindisi territory. Also the adoption of public transfer and subsidies adopted to improve the economic situation and mitigate the symptoms of social decline in Brindisi area has paradoxically proven to be among the source of stress in the territory. These two factors are sometimes different sides of the same strain situation. Different stress vectors have been identified. ↘01: A first stress vector concerns *investments and subsidies in big industries*. On one side, the provision of public funding has increased the competitiveness of the area and encouraged private investments from national and international companies. On the other side, this process has generated an excess of investments from big industries in the Brindisi area compared to other areas. Due to market laws, however, these big players struggle in being competitive and productive. In general, big industries have a 20-year cycle and after that time they need big investments and innovation to stay

competitive, otherwise they will lose their place on the market and create a local crisis. To avoid this scenario and loss of jobs in the area, intense negotiations between the companies and Regional Government resulted in the implementation of public economic measures to support the companies and ensure their innovation. As a consequence, the local economy is highly dependent on the public support causing dependence and uncertainty (≈02). The investments and public subsidies also produced impasses (≈7) regarding the lack of exploitation of SIN (site of national interest) area despite its potential high value and profitability in terms of land re-use. The inability to use the entire area creates severe tensions. The main issue is represented by the fact that any intervention in these areas would require in depth analysis and remediation with big investments and long timelines and this discourages investments from external companies. Although 95% of the areas has already been characterised, only 10% has undergone some remediation activity so far. A request to reassess the SIN coverage to be able to identify non contaminated areas and areas that can be easily reclaimed, has been submitted but is still pending, thus limiting new investments.

Participants also identified the transition to new job profiles in large companies as another example of the stress created through private investments. In response to the energy transition and the modernization of the industrial plants that is ongoing in the Brindisi area, companies operating in the sector of electricity and energy production require more skilled and differently skilled professional figures. In response to this they relocating people already employed in their industries. This impacts on the workers' career and professional development and is creating severe tensions between the workers and their employers (≈03).

✓02: Another stress vector is related to *investments in energy production*. The plan of developing a gas power plant to replace 4 carbon units with 2 gas powered units (≈08) generates conflicts because the project is seen as not progressive enough in line with the country decarbonisation objectives. Another reason that was brought forward was that the new plant would not be a shock to the regional energy system, as it already produces much more energy than it uses. Finally, it would not have either an economic impact on the territory or an advantage in terms of jobs (60-70 workers for the gas power plant). The investments also produced impasses (≈9) regarding the development of on a floating photovoltaic park aimed at development of renewable energy in the port of Brindisi. This impasse is, difficult to overcome, as now the project is stuck due to binding landscape constraints established by PPTR (Regional territorial landscape plan) of Puglia which cannot be changed for these applications.

✓03: A third stress vector concerns the *development projects on implementing the green energy transition* (≈06). Although there is a lot of discussion and plans around energy transition and coal phase-out, a clear project plan and related activities to involve both local and regional institutions as well as industrial companies, other stakeholders and more generally the local community are lacking. The local community feels excluded from decisions that heavily impact on their industrial assets and the life of their workers and companies. On the other hand, the local area has not offered any suitable technical proposals nor has demonstrated the ability of promoting industrial development in other areas. Therefore, all decisions will be made by the central government and creating tensions within the population wanting to determine their own future development.

- **Disinvestments.** This is one of the key factors causing stress in the CCT. The main vectors of change associated with this factor are: ✓04: Public and private *disinvestments in the coal sector*, due to the decision to phase out coal and the decommissioning of coal-fired power plants. This

includes a strong ripple effect on the workers of the plant and the activities linked to it (1000 units in total) as well as on all port activities, and consequently the inability of maintaining employment levels and the port infrastructure. (≈4). Moreover, a progressive decrease of the price of tenders by energy contractors has created increasing problems on all port-related activities that are heavily dependent on tenders of the energy hub and generated an impasse to the port companies, a situation that has worsened due to the reduction of coal-based activities in the area (≈5). The loss of jobs, the unavailability of new possibilities of employment for these groups of workers and the lack of a clear industrial politics for the whole territory has generated strong social tension and conflicts, with strikes and demonstrations from workers, trade unions and other groups. ✎05: *Another form of disinvestment is related to the plans of delocalization which have led to loss of competitively in the aeronautical sector and created a set of widespread conflicts within the territory(≈17).*

- **Top-down development projects.** ✎06: An important stress vector identified in the study is *the imposition of industrial development direction into the territory*. This conflict is mainly caused by the fact that the establishment of the two coal power plants and the chemical plants were dictated by the central government over 30 years ago and not decided by the local government. These projects have pushed the industrial and economic development of the area in specific directions, away from an agricultural and tourism-based development and towards an industrial development without taking into consideration the local plans and desired directions. This contrast has, therefore, created strong tensions which are still present due to lack of involvement of the local territory on the decision process and as a consequence the local area has not been adequately prepared to change (≈01).
- **Youth emigration.** ✎07: *The emigration of youth from the region* is also an important stress factor in Brindisi. This emigration is mainly associated with the employment crisis (≈12) and with the lack of trust of young people in the developmental model of their home area (≈13, ≈14) and lead to lack of generational change and brain drain, which in turn results in the loss of human capital.
- **Digital divide and Automation.** Two vectors may be identified related to digitalisation and automation processes in Brindisi. ✎08: There is *digital divide in the area*, mainly in suburban areas, with a lack of adequate communication infrastructures, which put the territory in a condition of fragility, of dependence on external investments and create inequalities (≈11). ✎09: *A severe lack of digital infrastructure and automation of harbour services* in the Brindisi port, including those needed for managing port activities in relation to ferries and passengers, creates a strain and impasse for harbour workers (≈10).
- **So-called populism.** ✎10: The trend to simplify and generalise social and environmental effects of energy transition raises conflicts with some ideologies populist movements which often do no seek any solution but spark strains in the local population (≈16).
- **Global environmentalism.** ✎11: In the CCT, this vector creates conflicts due the *harbour vision and development*. According to the harbour authority the development of the harbour should be

linked to the industrial development because the area is compromised beyond remedy whereas according to the municipality it should also be linked to tourism (≈15).

- **Pandemic.** ≈12: *The COVID 19 pandemic* also generates a lot of stress and uncertainty. The tourism sector has been hardly hit by the Covid19 pandemic and this has resulted in tensions and uncertainty between port workers and tourism-related companies (≈18). In addition, the number of flights and the orders related to the civil aviation sector have decreased generating a marked decline of the market and several companies have gone bankrupt with over 500 jobs and associated know-how lost. These tensions have caused several strikes and protests from the workers (≈17).

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. These conflicts can be classified as endogenous and exogenous conflicts. Some of the main endogenous conflicts (within the local community) are: disputes over the relocation of professional figures in large companies operating in the sector of energy production for the modernisation of the plants (≈3), the conflict over the harbour vision and development (≈15), the conflict over the outmigration flow (≈12) and mainly over student and young people outmigration flows (≈13, ≈14). The main exogenous conflicts (with the outer world) are: conflicts over the imposition of the industrial and economic development direction of the area (≈1), conflicts generated by the coal phase out decision (≈4), conflicts over the project of developing a gas power plant to replace coal unit (≈08) and conflicts over the delocalization of activities in the aeronautical sector and loss of orders of linked small industries (≈17).

Impasses and contradictions. Many of the impasses mapped in the research are related to the management, reuse and re-invention of industrial sites or lands. Some of the main impasses mapped are related to land remediation and use (≈07), to development of a floating photovoltaic park (≈09) and disputes between the harbour workers and the energy contractors on the progressive decrease of the price of tenders (≈05). Finally, impasse and contradiction are due to the difficulty of developing and implementing a digital infrastructure system in harbour services (≈10).

Dependence and uncertainties. Through the analysis of strain situations, we have identified different forms of stresses by dependence and uncertainty. The main uncertainties are related to the economic future of the territory. During the last five decades, many factors have caused the feeling of uncertainty among the local population, such as the dependence on continuous public economic measures to support large companies (≈02) and on external investments (from central government or PNRR funds) to fill the gap in digital infrastructures as well as other infrastructures (≈11), the pandemic situation that has hardly hit the tourism sector (≈18). Moreover, the Coal and Carbon Territory is deeply dependent on national decisions on implementing the energy transition. This form of territorial dependence and vulnerability was made obvious by the decision to phase out coal, which was taken without a clear project plan to involve the local institutions and more generally local community (≈06).

Strategies for coping with territorial stress. Despite all the strain situations ongoing in the area, few, if any, initiatives and strategies have been found devoted to coping with the stress itself. The research has found the lack of appropriate participatory mechanisms devoted to defusing, reducing

or solving conflicts; a lack of attempt to introduce institutional changes aimed at overcoming impasses; the lack of mechanisms aimed at balancing power and reducing the dependency of the territory on national and regional policy-making and by other actors. All this is making the energy transition difficult and painful for many actors.

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 first element concerns the ambivalence in the vision of harbour. On one side it is seen as a gateway of the tourism, on the other side the development of the harbour should be linked to the industrial development. Interestingly enough, the research has registered how while the coal energy plants and all coal linked activities are seen as declining activities, a unified territorial vision has not yet emerged. On one hand, the territory is interpreted in continuity with the past and with its present as industrial area linked to the energy. This interpretation is reflected in the development plans aimed at transforming the energy industries, or at developing of renewable energetic sources. On the other hand, an emerging vision is connected with a territorial development based on social and environmental sustainability and on technological innovation. This vision is nurtured by the opportunity of the energy transition seen, mainly from young people, as an opportunity for the redemption of the territory and for the revaluation of its resources. This vision relies on the opportunity to change territorial vocation and re-orienting the territory toward new sectors, such as tourism. This ambivalence between continuity and rupture, in the interpretation of the Brindisi area, is also proved by the presence of both old-time nostalgia - often accompanied by the “anti-changing” attitude among the old people - and redemption of the territory attitudes among young people.

b. Territorial boundaries: between distinctiveness and alignment.

The CCT of Brindisi has maintained its distinctive feature of the reliance on coal and on coal power stations and own identity as an industrial town, dictated by the central government over 30 years ago, even though, through the intervention of support from the National and Regional governments. With the coal phase out, the region risks losing its identity as an industrial centre and energy generation. The efforts and the fights with the national and regional government for a development of the renewable energetic sources are examples of how the whole territory is involved in preserving territorial boundaries and benefits, rather than dissolving such benefits in the market. Nevertheless, similarly to what we have discussed in the paragraph above, the territory has also shown tiredness and a rejection of this reliance in industrial production and energy generation, and the desire to take other paths, as a re-launch of the region based on tourism, on maritime tourism, natural environment, cultural heritage, food, fisheries, etc. A sign of the existing ambivalence in this regard is that despite this desire a clear alternative to the current industrial feature has not been developed yet.

c. Territorial governance: between endogenous and exogenous.

An important dynamic of territorial identity is related to the decrease of the capacity to steer territorial development by the key actors of the territory. The territory, as bearers of key national

assets and strategic value, has always been directly exposed to and dependent on national and European decisions in the matter of energy and industrial development. The decarbonisation process in Italy is a top-down process, where the central government controls everything related to the transition and the Apulia region, which is currently the institutional level at an intermediate position between the state and the municipality, seems unable to ensure that all territorial views and the needs are properly taken into account. While the local community feels excluded from decisions that heavily impact on their industrial assets and the life of their workers and companies, new practices of territorial governance to create convergence among citizens on territorial directions and priorities have not been established yet.

d. Territorial symbols: between myth and stigma.

At the symbolic level, the research has documented the presence of Territorial Stigma. One feature of such territorial stigma is disorganisation. The territory of Brindisi is pictured as characterised by the bureaucratic slowness of the authorization processes by local institutions, and disorganisation. This bureaucratic slowness affects very negatively on the will of potential and possible investors regarding new investments and provides a negative image of Brindisi, as there is a tendency to say no to industrial investments. Also, environmental stigma affects the Brindisi territory. Brindisi, without a reason, is equated to Taranto from an environmental point of view. This association creates a negative image of Brindisi which is seen as a territory with irremediable pollution, including environmental and health damages. Despite these detrimental images, the research has also registered a positive and motivating symbol for the territory: the harbour is perceived as an element of territorial rebirth. The harbour identity is now assuming a new meaning, as the harbour is seen as a gateway to tourism. Thus, the harbour is no longer linked to coal and industrial activities but to tourism with all its high potential. This represents a symbolic inversion, where the stigma on “coal”, as a dirt and pollutant element, is transformed into something different.

3.2.3 Gender dimension

The focus group was composed of 8 people. Among the 8 participants, 1 was a woman and 7 were men. Unfortunately, despite the attempts made by the research group, they have not been able to involve more female participants. The woman participant was from Coal & Carbon Industry of the Brindisi. She has provided a very comprehensive insight into the socio-cultural aspects of this energy transition and have made a very valuable contribution to the focus group discussion regarding the gender aspects of the energy transition. As for what concerns gender, it is worth mentioning that the one woman in the focus group discussion has brought a positive vision of the energy transition, compared to the man, seen as an opportunity for all territory to work together for a territorial development based on social and environmental sustainability. She was also the youngest member of the focus group. Contrary to this, the other members of the focus group were more concerned in highlighting the problems connected to the changes requested from the energy transition.

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

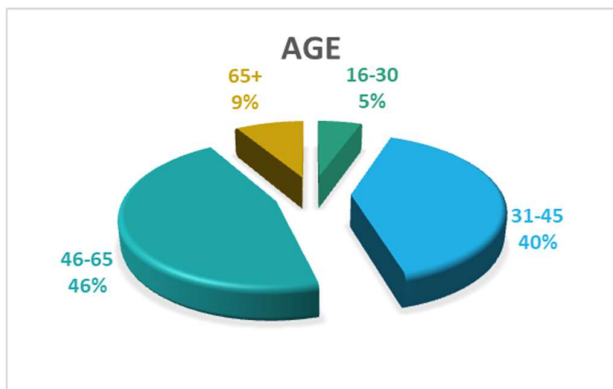
investors, helping them to make informed decisions on immediate and appropriate measures and actions to retain the population and maintain the demographic, social and economic configuration of these regions, while achieving a sufficient level of decarbonisation in the coming decades. Our main objective 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

In the case of Brindisi province, of the total of 127 respondents, 35.4% were women and 63.6% were men. In terms of age distribution 46% respondents belong to the 46-65 age group, followed 40% respondents from the 31-45 age group, 9% from the 65+ age group and the remaining 5% from the 18-30 age group (Figure 8).

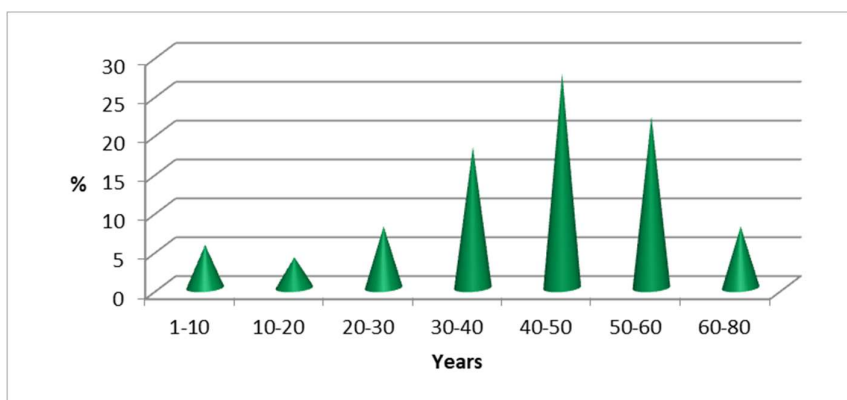
Figure 8 – Age distribution



Source: Own Elaboration

More than half (66.14%) of the total respondents were married and 20.47% were single, 11.2% are Divorced/separated and 2,4 were widowed. Education is an important characteristic affecting living standards and labour market position. Among the respondents, 39.4% had university degrees, 46.5% had completed secondary education, and 13.4% had a professional education. The 78.7% of respondents were born in the province of Brindisi followed by 20.5% were born in another region of Italy. More of 76% of respondents are in Brindisi province over 30 years.

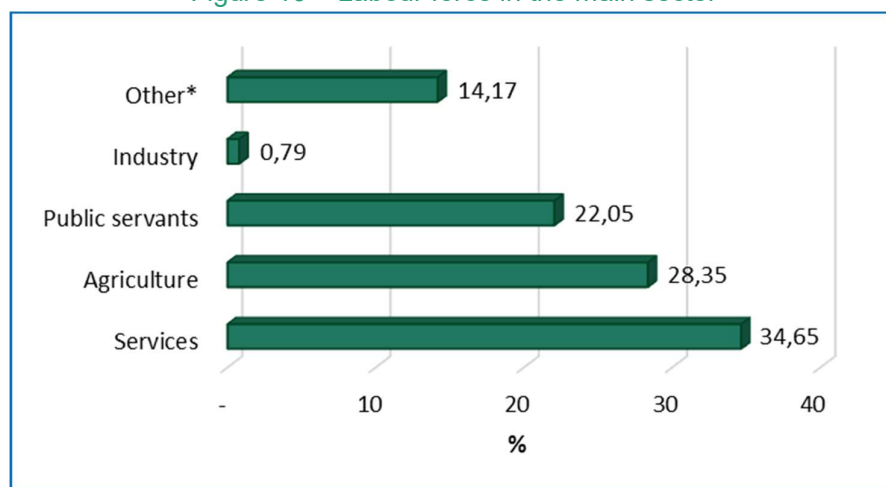
Figure 9 – Time of stay in the region



Source: Own Elaboration

As for the professional profile of the respondents, most of them worked in the service sector (34.65%), followed by agricultural sector (28.35%) and public servants (22.1%). 7.1% of respondents were unemployed or inactive and 7.1% are retired (Figure 10). Of the total number of respondents, 17.1% were currently working in carbon-intensive industrial units and 18.1% in the past.

Figure 10 – Labour force in the main sector



Source: Own Elaboration coming from ENTRANCES survey data.

Note: *Included: Unemployed; Retired; Inactive

3.3.2 Interpretation

Correlation among different factors related to socio-psychological component

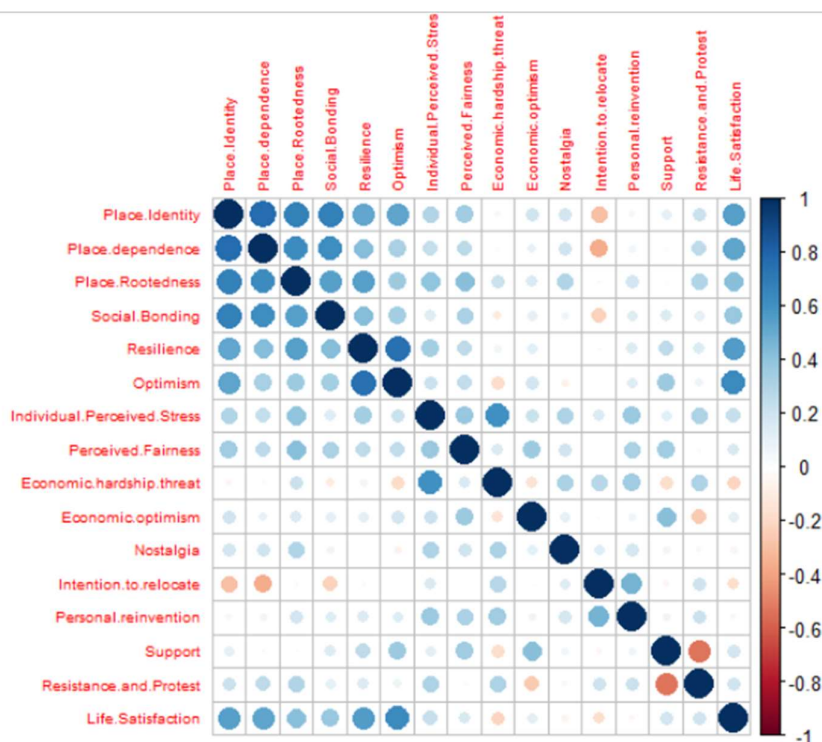
In the case study of Brindisi, about 127 respondents took part in the survey. All data were collected by CAWI and analysed from R software. The data were cleaned and prepared for further analysis and total and partial incomplete responses were removed from dataset's results. In total, 79 complete responses were used for multivariate analysis. In the survey, we collected data on several aspects related to the socio-psychological well-being of the inhabitants of the Brindisi region, which is facing the adverse impacts of decarbonisation policies. We collected information about the following indicator:

Table 10 – Composite Indicators

Composite Indicator	Indicator
Place Attachment	Place Identity
	Place dependence
	Place Rootedness
	Social Bonding
Moderators	Resilience
	Optimism
Decarbonisation impacts	Individual Perceived Stress
	Perceived Fairness
	Economic hardship / threat
	Economic optimism Adapted and revised
	Nostalgia
Coping Strategies	Intention to relocate
	Personal reinvention
	Support
	Resistance and Protest
	Submission
Life Satisfaction	Life Satisfaction

The demands/indicators of this questionnaire were synthesized through i-raker software (<https://i.ranker.istat.it/>) for the analysis results produced by rank methods to achieve a better ranking list given multiple responses and to produce composite indicators that were analysed through Correspondence Analysis. In Brindisi case study, we found a low positive correlation between Intention to relocate vs Place Identity, Place Dependence and Social bonding. A positive correlation, we found between the indicators linked to Place attachment, and between Life Satisfaction vs Optimism and Resilience. In terms of coping strategies, there is a strong positive correlation between the indicators Individual Perceived Stress and Economic hardship / threat. This is evident because if a person supports the decarbonization process, they are unlikely to engage in resistance and protest activities.

Figure 11 – Correlation among different factors related to socio-psychological component

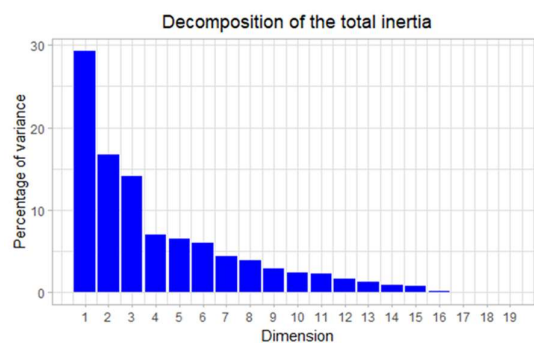


Source: Survey data 2021.

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.

The inertia of the first dimensions shows a strong relationship between variables and suggests the number of dimensions that should be studied. The first two dimensions of analyse express 46.07% of the total dataset inertia; this means that 46.07% of the rows (or columns) cloud total variability is explained by the plane. This is an intermediate percentage and the first plane represents a part of the data variability. This value is strongly greater than the reference value that equals 21.14%, the variability explained by this plane is thus highly. From these observations, it may be interesting to consider the next dimensions which also express a high percentage of the total inertia.

Figure 12 – Decomposition of the total inertia



Source: Own Eleboration

An estimation of the right number of axes to interpret suggests restricting the analysis to the description of the first 3 axis. These axes present an amount of inertia greater than those obtained by the 0.95-quantile of random distributions (60.12% against 29.98%). This observation suggests that only these axes are carrying a real information. As a consequence, the description will stand to these axes. The dimension 1 considers factors to the right of the graph, characterized by a strongly positive value on the axis and factors to the left of the graph, characterized by a strongly negative correlation on the axis.

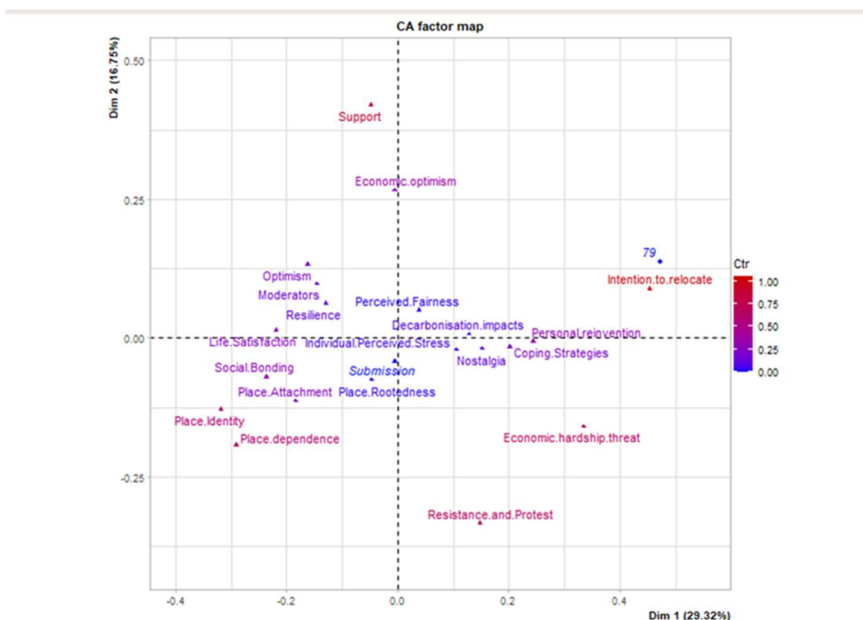
The group in which the factors are characterized by a positive value on the axis is sharing:

- High frequency for the factors intention to relocate, Coping strategies and Economic hardship/threat.
- Low frequency for the factors Place identity, Place dependence, Place attachment, Social bonding, Life satisfaction, Place rootedness, Moderators, Resilience and Optimism (factors are sorted from the rarest).
- The group in which the factors are characterized by a negative value on the axis is sharing:
- High frequency for the factors Resistance and protest, Place dependence, Place attachment, Place identity, Place rootedness and Life satisfaction.
- Low frequency for the factors Support and economic optimism.

The dimension 2 shows factors to the top of the graph, characterized by a strongly positive value on the axis and to factors to the bottom of the graph, characterized by a strongly negative value on the axis. The group in which the factors are characterized by a positive coordinate on the axis is sharing:

- High frequency for the factors Support, Economic optimism, Social bonding, Moderators, Optimism and Resilience
- Low frequency for the factors Resistance and protest, Coping strategies, Intention to relocate and Economic hardship/threat.
- The group in which the factors characterized by a negative coordinate on the axis is sharing:
- High frequency for the factors Resistance and protest, Place dependence, Place attachment, Place identity, Place rootedness and Life satisfaction (factors are sorted from the most common).
- Low frequency for the factors Support and economic optimism (factors are sorted from the rarest).

Figure 13 – Overlaid factor map (CA) - dim1 vs dim2



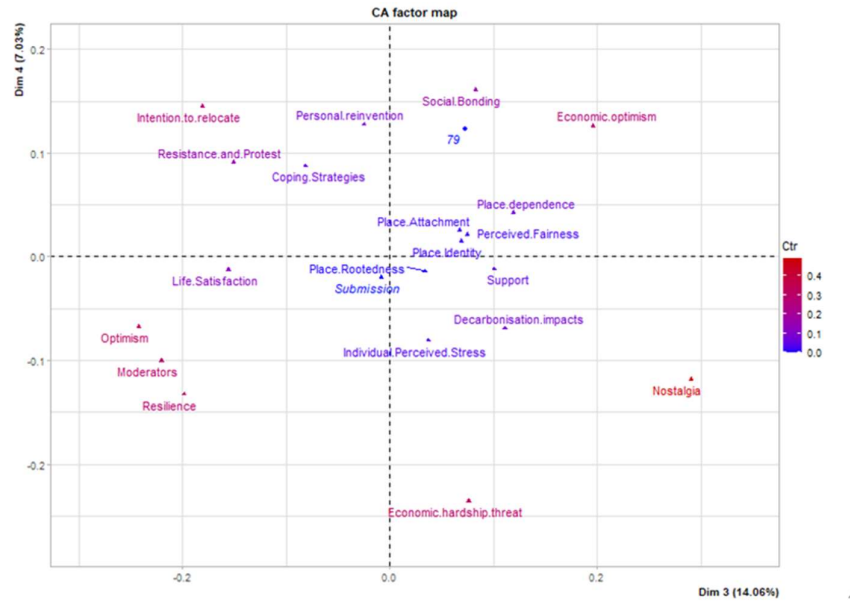
Source: Own Elaboration

The dimension 3 opposes factors to the right of the graph, characterized by a strongly positive coordinate on the axis and to factors to the left of the graph, characterized by a strongly negative coordinate on the axis. The group in which the factors characterized by a positive coordinate on the axis is sharing:

- High frequency for the factors Nostalgia and Decarbonisation impacts.
- The group in which the factors characterized by a negative coordinate on the axis is sharing:
- High frequency for the factors Intention to relocate, Moderators, Optimism, Resilience, Resistance and protest and Coping strategies.
- Low frequency for the factors Nostalgia, Decarbonisation impacts, Economic optimism, Place identity, Perceived fairness, Place attachment and Place dependence.

The correspondent analysis of the survey data shows a strong contribute is due to coping strategies and in particular Support, Intention to relocate and Resistance and Protest. In term of decarbonisation impacts the Economic optimism and Economic hardship are significant. At the end we have some indicators related to Place Attachment: place dependence.

Figure 14 – Overlaid factor map (CA) - dim3 vs dim4

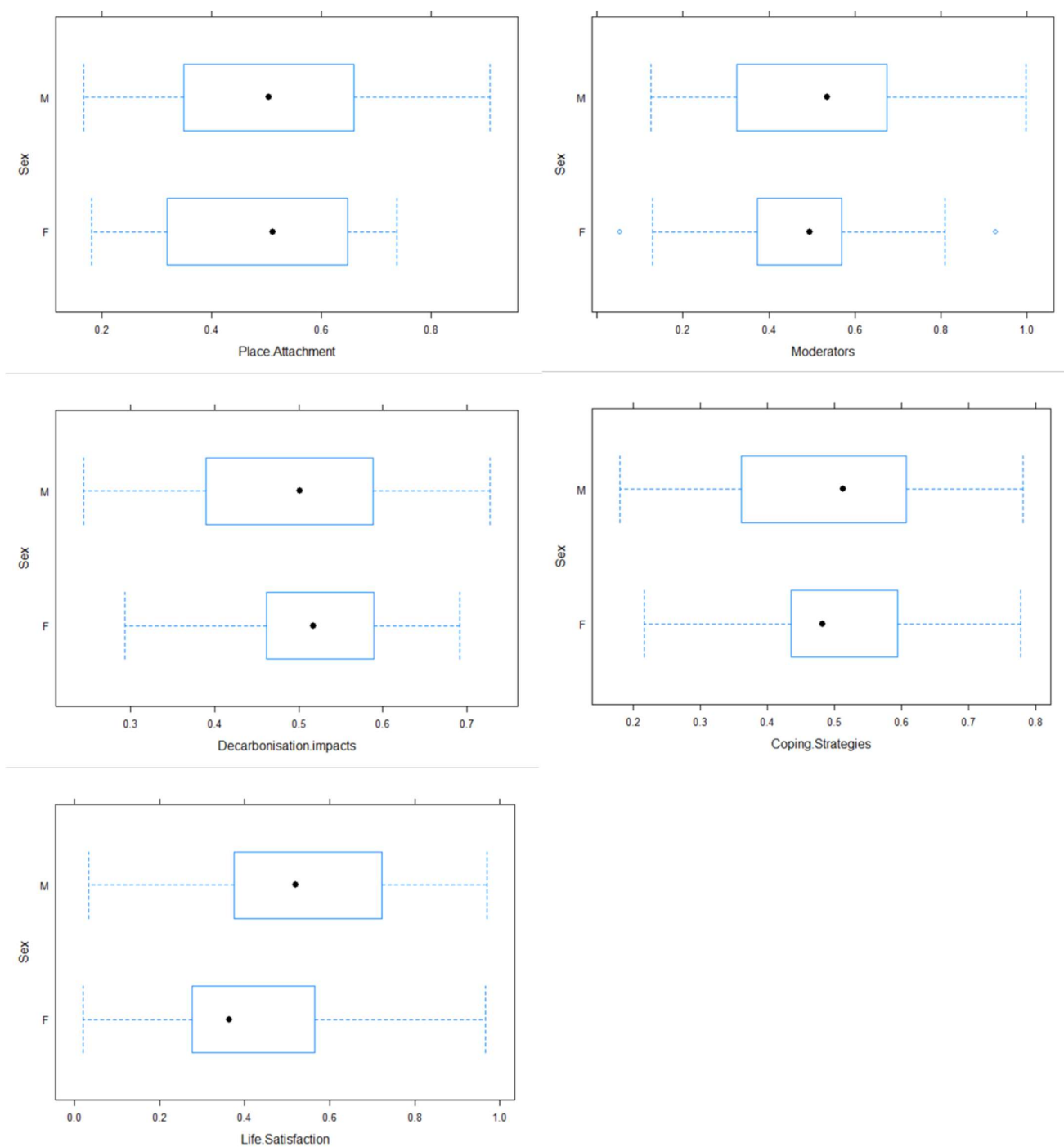


Source: Own Elaboration

3.4 Gender dimension

Gender is one of the important dimensions of our study. The result of the survey shows that there is not significant difference in term of gender dimension between the normalized average scores of men and women for every dimension (Figure 15). Figure 15 also shows that the women are more optimistic than men especially in terms of decarbonisation impacts and coping strategies. While the women are more pessimistic than men in term of life satisfaction.

Figure 15 – Bloc plot (main normalized indicators)



Source: Own Elaboration

3.5 Conclusion

The organization of the Brindisi CCT is exposed for a long time to profound stress and strains, including all the forms of organizational stress that we have considered, i.e. conflicts, impasses and dependence. The territorial organization is experiencing a deep ambivalence about what the territory is and what it should become next. Moreover, due to dependence on national decisions in the matter of energy and industrial development, the territory has weakened its capacity to exercise endogenous governance. This observation is mirrored by the lack of a clear alternative the current industrial development despite the desire to take other paths, as a re-launch of the region based on tourism. However, despite the presence of territorial stigma, the territory is endowed with a positive and motivating symbol for the territory as the harbour is perceived as an element of territorial rebirth and with a good degree of optimism among its inhabitants. Finally, the territory is still endowed with a strong capacity to control its ideal borders and nurture its distinctive elements.

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 above Section. 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. Gross fixed capital formation (GFCF) is only available for the PAR and country 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).

Figure 16 provides the main economic development indicators in Brindisi Municipality, Brindisi province and Apulia Region, including Italy and EU-28.

The labour productivity (Figure 16 a) in Brindisi Province and in the Apulia Region shows similar trend. The indicator of both the units of analysis has been lower than the national average for the whole period. The labour productivity in Italy, Apulia Region and Brindisi Province as a whole

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).

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.

decreased in the last two decades. While the national value has been above EU28 level, the regional delineations are slightly below the EU28 average.

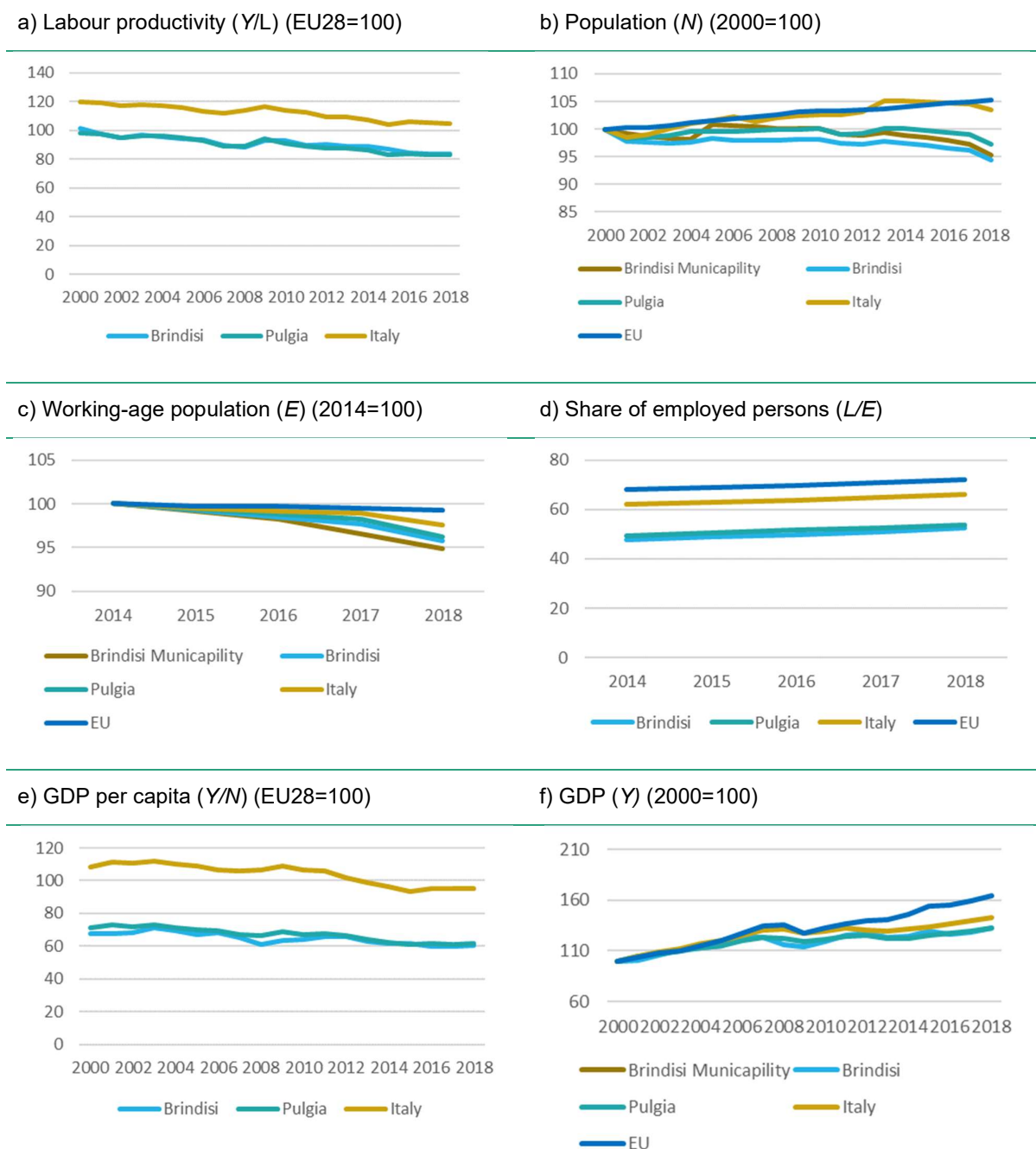
Around 400,000 people lived in the Brindisi's province in 2001 and account for about the 7% of the national population. Its population has registered a small decrease of 19,000 people in the last two decades (Figure 16 b). From 2003 to 2014 the population living in the Apulia region has increased and decreases since then. and This decline in population could be associated with the closure of mining activities and the proposed closure of thermal power plant. From 2014 to 2019 the percentage of the working-age population decreased by 5%, while EU28 share remains almost constant (Figure 16 c): Brindisi Municipality (-5,4%), Brindisi province (-4.4%), Apulia Region (-3,9%), Italy (-2.5%) and Europe (-0.7%).

In term of employment, Figure 16-d shows that the share of employees has increased in the last year up to 54%, but is well below the EU level (73%).

From 2002 to 2016, we observe a decreasing of GDP per capita relative to the EU28 value (Figure 16-e) especially in Brindisi Municipality (-6,8%). Apulian GDP per capita was much lower than the national average. The national level is slightly below the GDP per capita at EU28 average.

Finally, the overall economic situation can be described by GDP growth (Figure 16-f). Apulia region economy is the 9th regional Italian economy with 69,5-billion-euro GDP in 2018. Apulian region had a stable increase with +3% GDP in the last 3 years and it stands above Italy average for GDP increase in 2018 (1,4% of Apulia Region vs 0.8% Italy).

Figure 16 – Economic overview



Sources:: Istat (dati.istat.it). Regional accounts; Demographic balance of yearly resident population from September 23 2019, the time series of national accounts, based on the new European System of Accounts (ESA 2010), have been subjected to an extraordinary revision, exploiting advances in methods and sources. The revision took place in coordination with other European countries.

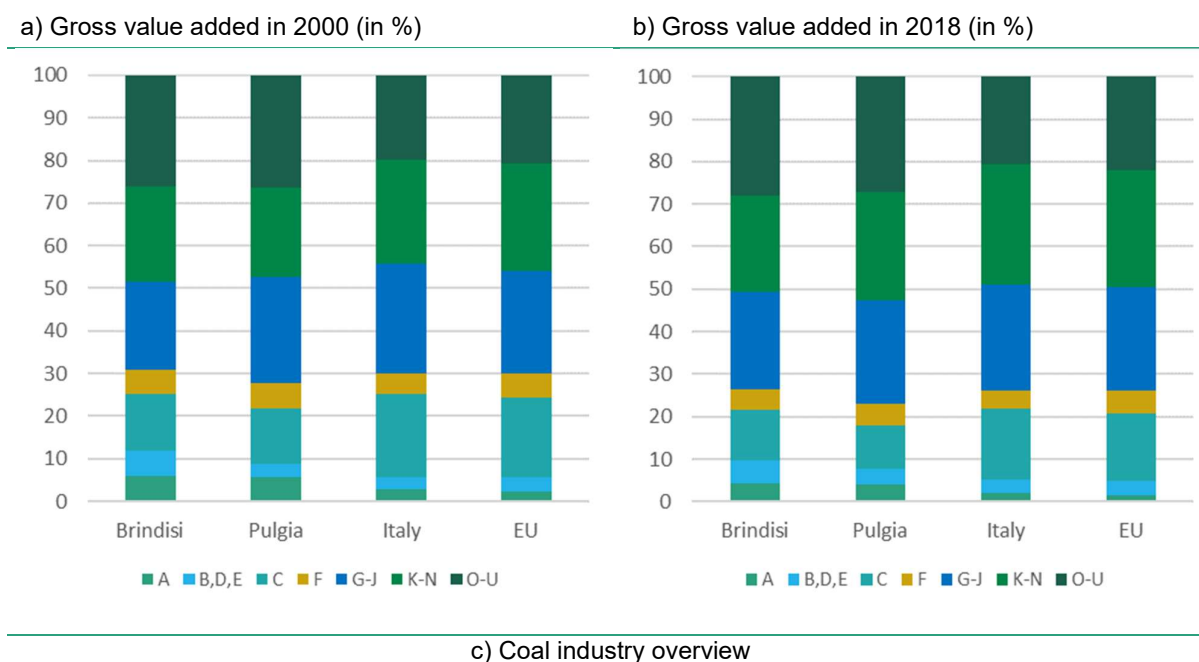
4.3 Sectoral structure

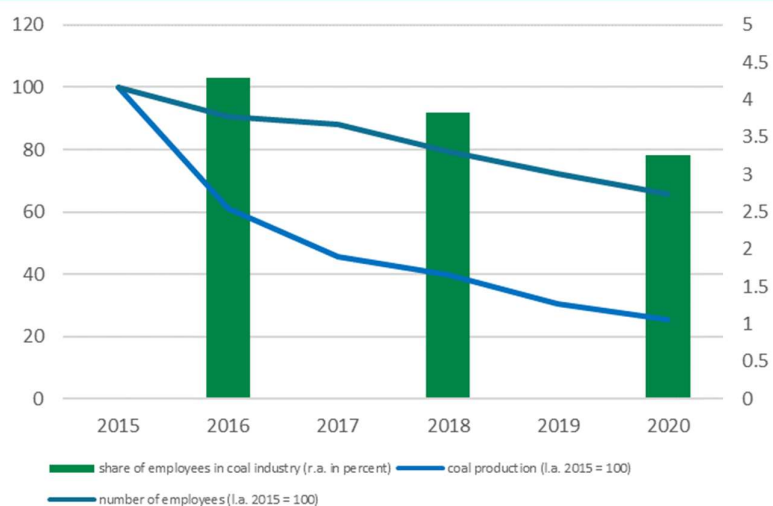
Figure 17 (a, b) shows the gross value added from 2000 to 2018 where the most important economic sectors are the service and finance sector. For Brindisi case, it is not possible to collect data at municipality level. In 2018, for Brindisi province, the largest share of the population (29.8%) was engaged in other services in transportation and storage, accommodation and food service activities, information and communication sector and workers in the manufacturing sector (10.3%). In general, from 2000 to 2018, we observed an increase of employment in the following sectors: industries (+12,2% for Brindisi province) and retail and finance (+11% in Brindisi province and Apulia Region). Figure 17 (a and b) shows also a significant decreasing in manufacturing sector for whole EU (-27,5%).

Figure 17-c shows that the share of employees in coals industry contributed with 4.0 percentage points to the overall growth in 2016 to 3.2% in 2020 from Brindisi municipality. Figure 17-c shows also an high decrease of production of fossil (294%) and employees (52%).

The most important economic sector is the service sector, which counts for 24.3% of GDP, almost 5% higher than the Italian average.

Figure 17 – Sectoral structure



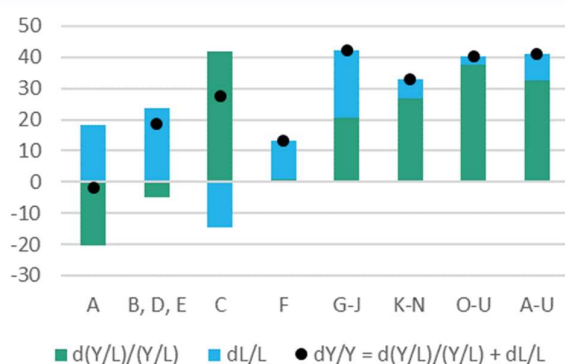


Sources: Istat (dati.istat.it). Regional accounts;

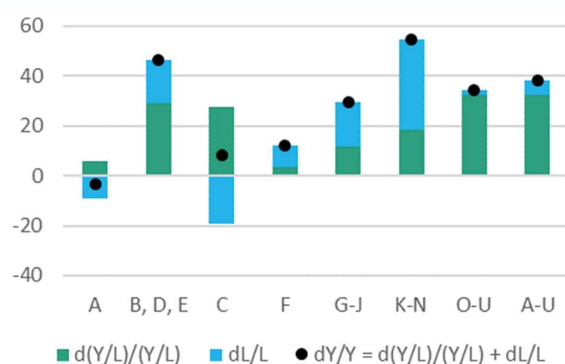
Note: The sectors are classified by: A Agriculture, forestry and fishing; B,D,E Mining and Utilities; C Manufacturing; F Construction; G-J Retail and IT; K-N Finance, real estate and other professional services; O-U Other services (Eurostat 2008).

Figure 18 – Growth decomposition (2018-2000)

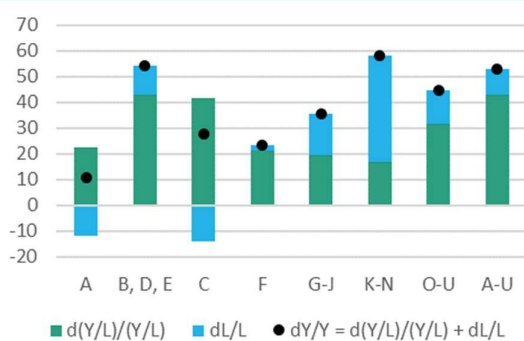
a) Brindisi (in %)



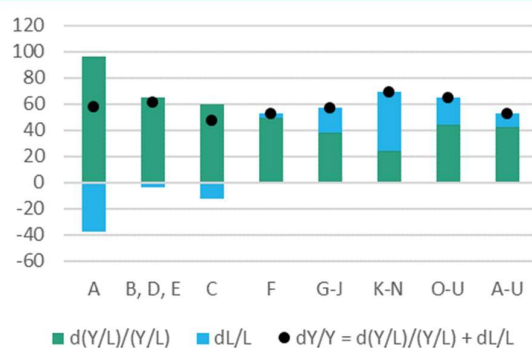
b) Puglia (in %)



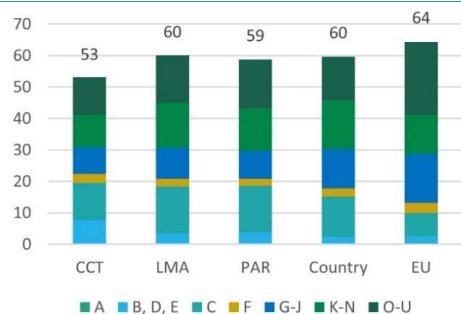
c) Italy (in %)



d) EU28 (in %)



f) regional gross value added growth contribution by sector (in %)



Sources: Istat (dati.istat.it). Regional accounts.

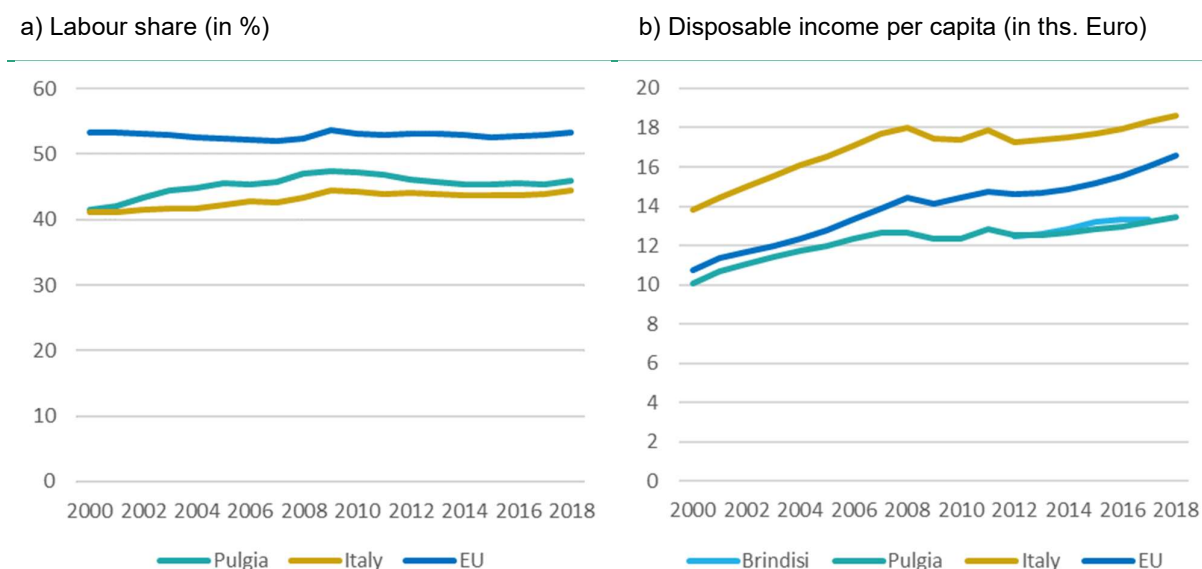
Note: Sectoral growth (dY/Y) is decomposed into labour productivity growth ($d(Y/L)/(Y/L)$) and labour growth (dL/L). The growth contribution by each sector (i) is the initial share of the sector (Y_i/Y) in the year 2000 times the sectoral growth rate between 2000 and 2018 (dY_i/Y_i). Abbreviations for the sectors are provided in Abbreviations and tabulated in Table 15.

4.4 Income distribution

On the sub-national level, harmonized data for the income distribution on a household or individual level is not available for all European case studies. However, it is possible to analyse 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 19a depicts the labour share defined as labour income divided by total gross value added as an key economic indicator for the distribution of income (between labor income and capital income).

The labour share in Apulia has been slightly above the national average (2000-2014) but significantly below that of the EU28 (Figure 19-a). Until 2010, the labour share slightly increased at both in Apulia region and in Italy. In term of disposable income per capita (Figure 19-b), we observe that the regional disposable income per capita is significantly lower than the EU-level, and almost 5,000 EUR below the national value.

Figure 19 – Income distribution



Sources: Istat (dati.istat.it). Regional accounts;
 Note: Labour share is the labour income divided by total gross value added.

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

4.5 Gender dimension

The Apulia Region had promoted policies for gender equality to prevent all forms of discrimination, taking on the principle of equality and equal opportunities in all government activity, programming, and implementation. In 2007, Apulia region approved the law “Norms for gender policies and reconciliation of life – work in Puglia” to provide a firm regulatory basis for services and initiatives that can guarantee effective conditions of equal opportunities and redesign the profile of cities around the right to liability and improvement of living conditions for all.

In 2019, the female employment rate in Italy was 50.1%, and 49.5% in the previous year. The Apulian figure stands at 32.9% with a very slight increase compared to 2019 and slightly lower than the rate recorded in the South (33.2%). In Brindisi province, the female employment rate is 37.4% in 2018 and 38.3 in 2019. These rates are under the average of the employment rate of the province: 48.5% and 49.5.

4.6 Conclusion

This chapter describes the socio-economic conditions of Brindisi and Apulia Region. We use the main socio-economic indicators to underline the strengths and weaknesses points so that it was possible analyse the context of Apulia region and its Carbon Territory. Our time series showed a decreasing of population, share of the working-age population, and the GDP per capita both in Brindisi and in Apulia. Moreover, the GDP has grown less than the national and EU28 levels. The sectoral structure in Brindisi and Apulia has changed much from 2000. The highest share is still observed in other services sectors and finance. That means that the percentage of the mining and utility sector has not made the greatest contribution to the growth of the region. The growth decompositions show that the sectors of real estate and other professional services are key contributors to the CCT.

CHAPTER 5

ANALYSIS OF THE ENERGY TRANSITION IN THE POLITICAL ADMINISTRATIVE REGION

5 Analysis of the Energy Transition in the PAR

5.1 Overview on the energy transition policies

5.1.1 Political system and context

Although the Brindisi case is in a centrally organised State, Italy, some significant powers are delegated to a regional administration whose representatives are elected by the inhabitants. The active electorate (over 18 years of age) elects the Regional Council which remains in office for five years and is made up of 51 members of which one is the President, who is Loredana Capone (Democratic Party).

Policy targets for energy are established at national level by a series of measures provided by specific regulations issued by the central administration. At local level, the regional administration provides rules and guidelines to implement the energy transition with the development of RES in its territories.

According to Art. 117 of the National Constitution, the Regions have legislative powers in the field of regional planning and mobility within the region, infrastructure provision, planning and organisation of health and social services, promotion of local economic development and organisation of business services within the region; without prejudice to the autonomy of educational institutions, in the field of school services, education and vocational training, promotion of the right to study, including university studies. Moreover, cultural activities, the enhancement of environmental, cultural and landscape assets, the enhancement and regional organisation of tourism, the regulation of financial relations between the territorial authorities of the Region in order to comply with regional and local public finance planning objectives are also regional areas of competence.

5.1.2 Decarbonisation process

Within the NECP (National Energy and Climate Plan), national targets are set for 2030 on RES level (30% of Total consumption, 21.6% for mobility consumption), energy efficiency (-43% vs PRIMES scenario 2007) and reduction of CO₂ emissions (-33% vs 2005) (MiSE, 2020). NECP also provides guidelines for the phase out of coal fired power plants in favour of a power mix based on an increasing share of RES and natural gas by 2015. Therefore, the implementation of this transition is subject to the planning and construction of replacement plants and the necessary infrastructures.

The majority of energy and infrastructural projects and policies fall under the Environmental Impact Assessment (EIA) procedure managed at National level by a competent Ministry. At regional level, the Landscape Plan of the Puglia Region (PPTR) define guidelines and constraints for the implementation of RES. The PPTR pursues, in particular, the promotion and the realization of a self-sustainable and durable socio-economic development and a conscious use of the regional territory, also through the preservation and recovery of the aspects and the peculiar characters of the social, cultural and environmental identity, the protection of biodiversity, the realization of new integrated landscape values, coherent with the criteria of quality and sustainability.

Through the European funds dedicated to the Regional Operational Programme - the European Regional Development Fund (ERDF), the European Social Fund (ESF) - the Apulia Region finances various opportunities for social, labour, entrepreneurial, cultural, technological, scientific,

environmental and infrastructural development, with particular attention to the social inclusion of all citizens. In the period 2014-2020 around 5,576 M€ from ERDF and 1,545 M€ from ESF were allocated for the Apulia Region (Regione Puglia, 2014).

In Italy, the Just Transition Fund (JTF) has allocated over 1 billion euros to support the transition to more sustainable economic models in the Sulcis Iglesiente area (Sardinia Region, coal case study of ENTRANCES) and in the Province of Taranto. The Arcelor Mittal Group, ex-ILVA steelworks located in the Municipality of Taranto (Taranto Province NUTS 3) produces Europe's largest steel output. Many controversies are currently open in this area due to the impact on health and environment.

The Apulia Region, the Municipality of Taranto and the Municipalities of the Province, with the support of the ASSET strategic regional agency, want to contribute to the development of the Territorial Action Plan for a just transition, defining the needs for economic diversification, professional requalification and rehabilitation of the territory. To this end, in compliance with the regional law on participation, we want to involve the main stakeholders of the public / private system and the citizens and their organized forms to define a shared vision of development to be structured in the territorial action plan. Even if Brindisi and Italian representatives have asked to include Brindisi in this action, the territory is still excluded from this financial measure. The Apulia Region recently (2019) approved a law that supports action for the promotion of the use of hydrogen. This is a set of organic and structural actions aimed to increase the use of hydrogen as an energy carrier and energy storage system to build a hydrogen value chain.

5.1.3 Public participation

In term of public participation, stakeholders are associated to the following narratives (Table 2.):

N1: The transition is needed for health and environment

N2: The future of the industry

N3: The future of the port

Table 11– The stakeholders involved in the narratives of Brindisi case study

Stakeholders
<p>N1: The transition is needed for health and environment</p> <ul style="list-style-type: none"> • European Union • The National Government, Ministries (Ministero dell'Ambiente; Ministero lavori pubblici; Ministero della salute; Ministero dello Sviluppo economico). • Local Authorities: Apulia Region, Brindisi municipality, Brindisi Province; ATO (Ambito territoriale ottimale) , ARPA (Agenzia Regionale per la Protezione Ambientale), ASL (Azienda Sanitaria Locale); Ente Parco Brindisi. • Research Institutions: Universities, ENEA (Italian National Agency for New Technologies, Energy and Sustainable Economic Development), CNR (National Research Council), ISPRA AMBIENTE (Istituto Superiore per la Protezione e la Ricerca Ambientale, DITNE

(Distretto Tecnologico Nazionale sull'Energia), Istituto enciclopedia italiana; Istituto tumori italiano.

- Environmental NGOs: WWF (World Wide Fund for Nature), Legambiente, UN (United Nations), IPCC (Intergovernmental Panel on Climate Change)

N2: The future of the industry

- Large and medium enterprise: ENEL, A2A, Agusta Westland, ILVA, Enipower, Snam, ENI
- Financial Institutions: CdP (Cassa Depositi e Prestiti); EIB (European Investment Bank)
- Authorities: ARERA (Italian Regulatory Authority for Energy, Networks and Environment), AGCM (Autorità Garante della Concorrenza e del Mercato)
- National energy utilities: TERNA, GSE (Gestore dei servizi energetici).
- Other national agencies: INAIL (Istituto Nazionale Assicurazione contro gli Infortuni sul Lavoro)
- Political parties: Movimento 5 Stelle; Other political parties (both right wing and left wing)
- Trade Unions: Cgil (Confederazione Generale Italiana Del Lavoro), Cisl (Confederazione Italiana Sindacati Lavoratori), UIL (Unione Italiana del Lavoro)
- Businesses associations: Confindustria

N3: The future of the port

- Authorities: Autorità portuale,
- Trade Unions: Cgil (Confederazione Generale Italiana Del Lavoro), Cisl (Confederazione Italiana Sindacati Lavoratori), UIL (Unione Italiana del Lavoro)
- Local opinion leaders
- National opinion leaders

5.1.4 Clean-energy transition (CET)

The CET in Apulia is a complex process comprising multiple actors with a variety of interests, agendas, and capacities to act. Within the NECP (National Energy and Climate Plan), national targets are set for 2030 on RES level (30% of Total consumption, 21.6% for mobility consumption), energy efficiency (-43% vs PRIMES scenario 2007) and reduction of CO₂ emissions (-33% vs 2005) (MiSE, 2020). Therefore, the implementation of this transition is subject to the planning and construction of replacement plants and the necessary infrastructures.

The majority of energy and infrastructural projects and policies fall under the Environmental Impact Assessment (EIA) procedure managed at the National level by a competent Ministry. At the regional level, the Landscape Plan of the Apulia Region (PPTR) define guidelines and constraints for the implementation of RES.

Through the European funds dedicated to the Regional Operational Programme - the European Regional Development Fund (ERDF), the European Social Fund (ESF) - the Apulia Region funds various opportunities for social, labour, entrepreneurial, cultural, technological, scientific, environmental and infrastructural development, with particular attention to the social inclusion of all citizens. In the period 2014-2020 around 5,576 M€ from ERDF and 1,545 M€ from ESF were allocated for the Apulia Region (Regione Puglia, 2014).

In Italy, the Just Transition Fund (JTF) has allocated over 1 billion euros to support the transition to more sustainable economic models in the Sulcis Iglesiente area (Sardinia Region, coal case study

of ENTRANCES) and in the Province of Taranto where the Arcelor Mittal Group, ex-ILVA steelworks, the Europe's largest steel output is located.

The Apulia Region, the Municipality of Taranto and the Municipalities of the Province, with the support of the ASSET strategic regional agency, want to contribute to the development of the Territorial Action Plan for a just transition, defining the needs for economic diversification, professional requalification and rehabilitation of the territory. The Brindisi area with its coal-fired power plants should also be included in this action, but the territory is still excluded from this financial measure.

The Apulia region has high influence and power and high interest in decarbonisation. Considering that the region is one of the areas with the greatest production of renewables, the region wants to be an active part in the development and implementation of the National Recovery and Resilience Plan (PNRR). In this context, the Region is starting the review and update of the Environmental Energy Plan which will include references to the issues of decarbonization, the circular economy and potential scenarios for the future energy mix. The recent Apulian legislation supporting the development of renewable energy has shown a strong sensitivity towards the issue of hydrogen as one of the tools for decarbonising industrial processes. In August 2021, the Regional Council approved the policy act through which the Apulia Region is a candidate for the location of the "National High Technology Center for Hydrogen", as required by the National Plan for Recovery and Resilience (PNRR).

As carbon-intensive industries form a significant sector of the Apulia economy, business and industrial leaders are key stakeholders in CET deliberations.

In general, the most involved stakeholders such as local institutions, companies, social forces and port operators confirm a full awareness that the region, after having hosted for many years one of the largest energy centers in the country, today represents one of the most significant and strategic places where the Italian energy transition is underway, with a series of opportunities typical of this phase. A diversity of other civic society organisations are also active in Apulia' CET. These include Universities, NGOs, advocacy bodies (environmental, business) and Trade Unions. However, none of them have developed a specific strategy for carbon phase out. In most cases they have signalled their commitment to the net-zero targets in principle. Legambiente Puglia, a non-profit association, has proposed the creation of a Green Innovation and Just Transition District in order to include Brindisi among the beneficiary areas of the Just Transition Fund. Also the Universities promote the training of professional and new figures that will be necessary for the creation of jobs linked to the ecological transition and decarbonisation. Legambiente and the Universities are stakeholders with high influence and with interest in the decarbonisation as well as supporters and drivers of the decarbonisation.

5.2 Socio-political component

5.2.1 Summary of results

A text mining analysis was conducted to outline the keywords that characterise the phenomena. The result of the analysis is drawn in Figure 20. Word Cloud shows how decarbonisation has been treated in Italian newspaper in the last 20 years. The results confirm that in the decarbonisation process

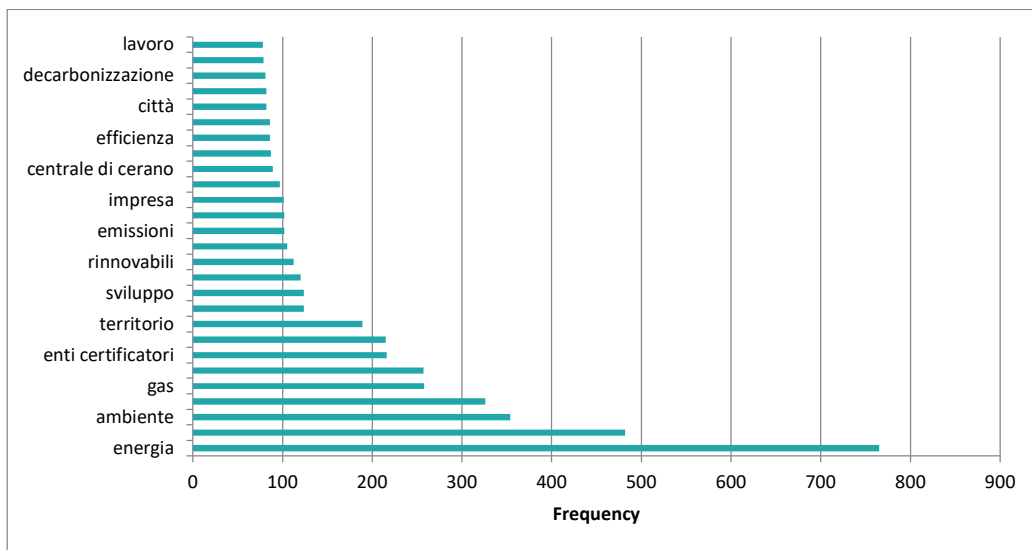
some key terms were particularly relevant in the local debate: energy, energy plants, environment, coal, natural gas, operators, territory, industry, development, fossil fuels, emissions, research, renewables, efficiency, transition, sustainability, production, pollution, decarbonisation, technologies and labour. Moreover, our analysis confirmed the role of National and Local Authorities, research organisations, environmental associations (Legambiente), energy industry (Enel), and of course trade unions.



Figure 20 – Text mining analysis results of the keywords of the national and local press. The size of the words represent the frequency

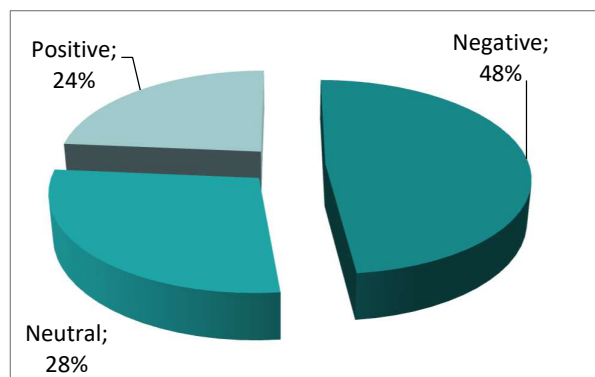
The following keywords resulted particularly relevant in the local debate. The frequency of the word shows how the decarbonisation process is perceived as a transformation of the territory which can affect different fields of the social sphere including: the environmental impact, the social development, the spread of renewables the role of energy producer, the industrial development, loss of job position, the energy operators are the main narratives.

Figure 21 – The first 27 more frequent words funded by text analysis of national and local press



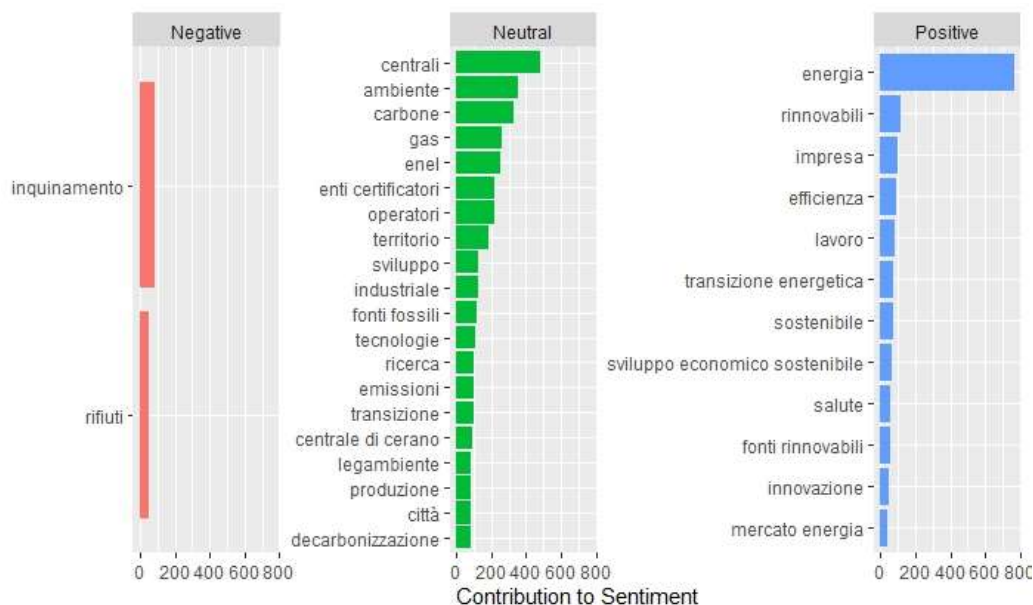
To identify what are the main discourses and how the key terms are perceived we analysed the “Sentiment” related to them. In particular, our attention is focalised on sentiment analysis related to articles and terms coming from a unique document. Terms and words with similar meanings are mapped closer to each other. Actually, the “sentiment” of articles shows a prevalence of negative opinion (48%), while positive (24%) and neutral (24%) represent 52% of opinions expressed by newspaper.

Figure 22: – Sentiment analysis results.



In term of words, the results (Figure 23) showed that the only two negative words were pollution and waste. The main neutral words were: energy plants, environment, carbon, land etc. Positive words included mainly: energy, industry, renewable, efficiency, labour, energy transition, health. So, the energy transition is mainly linked to positive opinion due to sustainable processes to a green energy system.

Figure 23: – Sentiment analysis results.



Indeed, we can conclude that the energy transition is generally accepted by locals but there is great concern about how it will happen. Alongside the thrust linked to the effects on the environment and health, we find concern about the future of industry and port activities.

The narratives could be identified in three main discourses:

- N1: The transition is needed for health and environment
- N2: The future of the industry
- N3: The future of the port

Defining Constituencies

In summary the constituencies can be summarised as follows:

Constituency 1: Technological Regularisation

Based on the analysis of the narratives reported above and other documents collected for their interpretation, three main factors characterising the technological regularisation processes developed by the design constituency have been identified. They correspond to the factors identified in D1.2. and are presented below.

Centralisation: Higher regional dependence on the centre. *Definition:* Access to the technologies and their benefits is in principle open to all, but the system is constructed so that users have little autonomy and significant decisions are made by central governments. *In this case study:* the decisions are centralised, government is pushing the process while the local community, trade unions, local municipalities, local and national businesses associations seem to be excluded. For example, the tertiary activities in the harbour area seem to be excluded in the transition process with

a collapse in the skill and professionalism of harbour companies that are strictly linked to the coal power plant activity.

Differential incorporation: *Definition:* Uneven incorporation in the decarbonization process is structured in a way that some groups are set aside and some are incorporated into it. *In this case study:* The transition process is related to job losses, especially for the port workers (directly involved in the logistics of goods in the energy sector and in the movement of crews or in the maintenance of the dockside unloaders and the conveyor belt) while for the workers of the power plant their absorption in the gas power plant is guaranteed. In the local community, the port workers are differentially incorporated in respect to those of the power plant in the decarbonization process.

Marginalization: *Definition:* Inferior versions of an artifact are expressly created or distributed to persons of subordinate race, class gender or achievement categories. *In this case study:* As regards to the access to Just Transition Fund, aimed at supporting EU regions most affected by the transition to a low carbon economy, access will be ensured to Taranto and Sulcis areas, while the Brindisi area will be excluded leading to a marginalization of the citizens of Brindisi.

Constituency 2: Technological Adjustment Constituency

Based on the analysis of the narratives reported above and other documents collected for their interpretation, one main factor characterising the technological adjustment process developed by the impact constituency has been identified. It corresponds to the factors identified in D1.2. and is presented below.

Contersignification: claim for a just transition. *Definition:* In technological adjustment, impact constituencies actively negotiate new meanings for the technological production processes, trying to direct changes, which are viewed as undermining their position and wellbeing, toward fairer and more favourable outcomes. *In this case study:* The justification of the transformation of the power plant from coal to gas as a step of the energy transition that reduces electricity generation from more polluting sources and improves environmental performance and ensures the stability of the electricity grid, is an attempt to develop a countersignification of the transition process. This reflects the interest in the jobs in the coal power plant and in the related industries, but also the immediate interests of the business community which have invested in the current economic and productive structure

Constituency 3: Technological Reconstitution

The analysis of the narratives and other documents collected for their interpretation, showed that the Antisignification strategy - rejecting and denial of decarbonisation - is not developed.

Constituencies, the local field of power and outcomes

In general, the most involved stakeholders such as local institutions, companies, social forces and port operators confirm a full awareness that the territory of Brindisi and Salento, after having hosted for many years one of the largest energy centres in the country, today represents one of the most significant and strategic places where the Italian energy transition is underway, with a series of opportunities typical of this phase.

The Apulia region has high influence/ power and high interest in the decarbonisation. Considering that the region is one of the areas with the greatest production of renewables, the region wants to

be an active part in the development and implementation of the National Recovery and Resilience Plan (PNRR). In this context, the Region is starting the review and update of the Environmental Energy Plan which will include references to the issues of decarbonization, the circular economy and potential scenarios for the future energy mix. The recent Apulian legislation supporting the development of renewable energy has shown a strong sensitivity towards the issue of hydrogen as one of the tools for decarbonising industrial processes. In August 2021, the Regional Council approved the policy act through which the Apulia Region is a candidate for the location of the "National High Technology Centre for Hydrogen", as required by the National Plan for Recovery and Resilience (PNRR). Furthermore, again in 2021, the Apulian regional council approved a project for the construction of the Research Citadel in Brindisi, within which it will host a Competence Centre for decarbonisation and environmental sustainability that provides also the development of highly efficient renewable energy technologies, including hydrogen.

The Brindisi area with its coal-fired power plants should also be included as an intervention area to allocate the funds of the JTF and therefore as an area included in the public consultation questionnaire.

As industrial stakeholders, Enel is a more involved company, with high influence and power on the decarbonisation process. Over the years, the company has always recognized the strategic nature of the Cerano power plant as part of its business plans and, at the same time, its importance in the scenario economic area of Brindisi and Salento. Trade unions report a positive opinion on industrial relations which over the last few years has evolved positively, even though there is no lack of critical issues, especially in relation to subject of direct investments made or to be made and, therefore, with reference to the need of the wider involvement of local workers and local entrepreneurship itself in the management of services and orders. In this context, there has been until now a substantial attitude of agreement with the cessation of coal-fired production and replacement with gas plant between institutions local and trade unions, even in the presence of adverse positions among the associations active environmentalists in the area. With regard to direct employees of ENEL Production that is currently operating at the plant, they will continue to work partly in the new plants that will be built on the site and partly in other business areas of the ENEL Group. For local industries the situation is more critical.

5.2.2 Interpretation

The results of social political component confirmed that in the decarbonisation process some key terms were particularly relevant in the local debate, including energy, energy plants, environment, coal, natural gas, operators, territory, industry, development, fossil fuels, emissions, research, renewables, efficiency, transition, sustainability, production, pollution, decarbonisation, technologies, and labour. Moreover, our analysis confirmed the role of National and Local Authorities, research organisations, environmental associations (Legambiente), energy industry (Enel), and of course trade unions.

The "sentiment" analysis of articles about decarbonisation process showed a prevalence of negative opinions (48%), while positive (24%) and neutral (24%) ones represent 52% of opinions expressed by newspaper. In term of word sentiment, the results showed that the only two negative words were pollution and waste. The main neutral words were energy plants, environment, carbon, land etc. Positive words included mainly energy, industry, renewable, efficiency, labour, energy transition, health. Therefore, the energy transition is manly linked to positive opinions due to sustainable

processes to a green energy system. Indeed, we can conclude that the the energy transition is generally accepted by locals but there is great concern about how it will happen. Alongside the thrust linked to the effects on the environment and health, we find concern about the future of industry and port activities. The emerging narratives about the energy transition in Brindisi could be identified in three main discourses: The transition is needed for health and environment; The future of the industry; The future of the port.

The defining of two constituencies and the analysis of the narratives allowed to identify three regularization strategies developed by the design constituency in the process of technological regularization: Centralisation, Differential incorporation and Marginalization. The Contersignification is the identified factor characterizing the technological adjustment process developed by the impact constituency. In contrast, the Antisignification strategy is not developed in the Technological Reconstitution.

5.2.3 Gender dimension

For Brindisi case, one fifth (4/20) of the total number of interviewers were women. In our survey, there were no direct items related to gender differences in the questionnaire, therefore there are not any differences between men and women respondents when explaining the aspects of the energy transition and the process of transformational capacity development linked to Brindisi case.

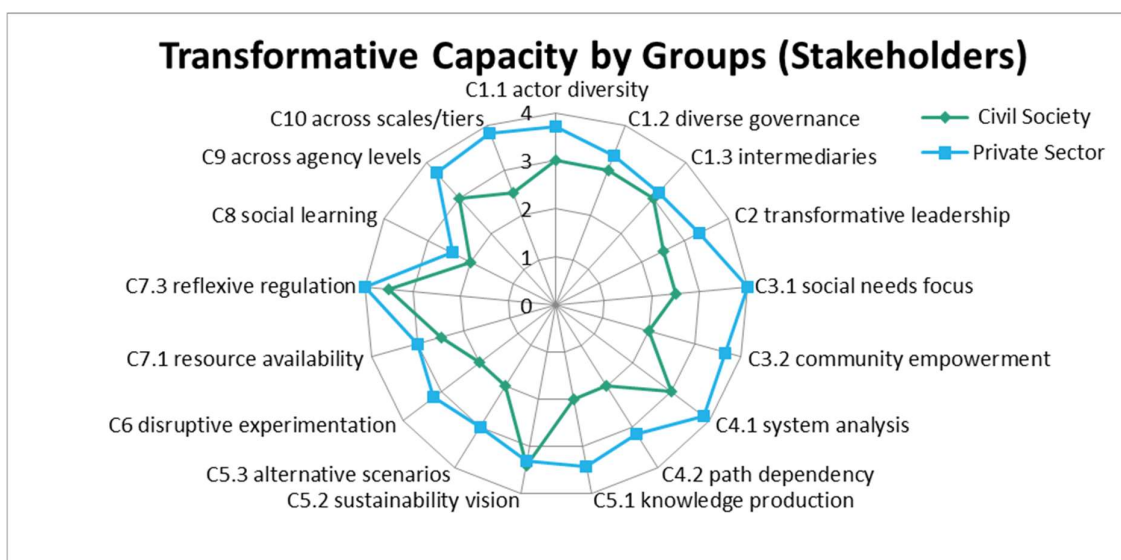
5.3 Socio-ecological and technical component

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 24 – Stakeholder assessment of transformative capacity



Source:

Based on ENTRANCES interviews conducted for the case study.

A Spider chart is a graphical method used to compare results from different indicators in the form of a two-dimensional chart and to visualize the performance of different groups.

From the point of view of the stakeholders, the results (Figure 24) showed that the most relevant factors are:

- C1.1 actor diversity
- C3.1 social needs focus
- C3.2 community empowerment
- C4.1 system analysis
- C5.2 sustainability vision
- C7.3 reflexive regulation
- C9 across agency levels
- C10 across scales/tiers

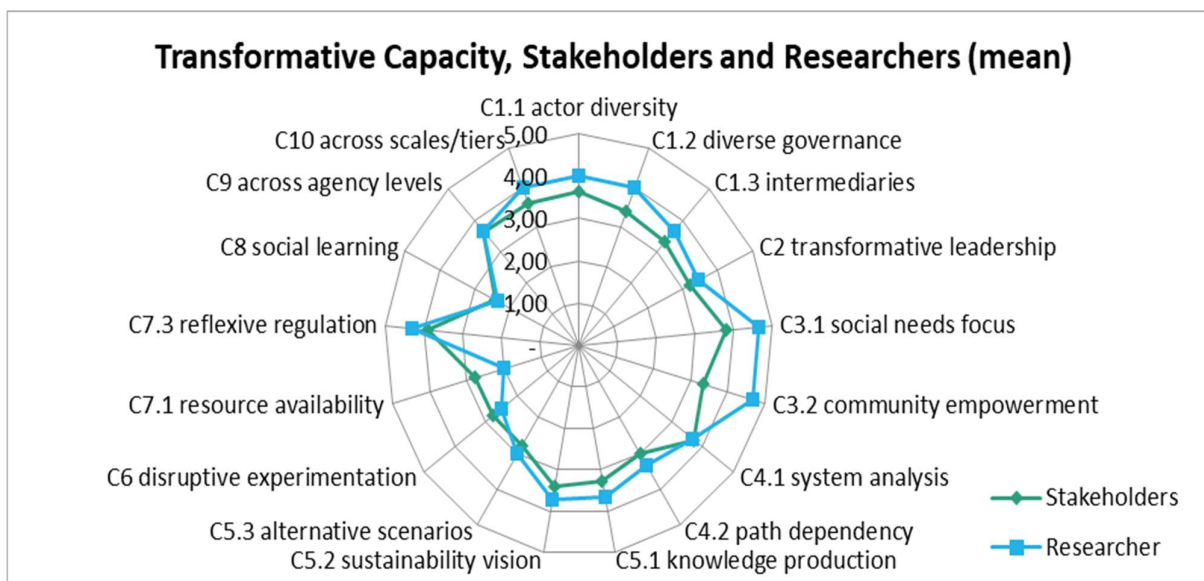
Differences between stakeholders

From the point of view of both stakeholders and researchers, the results (Figure 25) showed that the most relevant factors are:

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.

C3.1 social needs focus
 C3.2 community empowerment
 C7.3 reflexive regulation

Figure 25 – Transformative capacity by stakeholder type



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

5.3.2 Interpretation

Governance and Agency

C1. Inclusive and multiform governance

There was a consensus amongst interviewees that while nobody is purposefully excluded from CET deliberations in Apulia, several potential players are not participating. In this regard, more than one interviewee noted a lack of participation from the local territory, while others emphasised the need of including the world of school, considering the strong cultural and educational impact of this process and that far-reaching changes are required. This is a particularly interesting point, which suggests the need for a broader scope of consultation beyond the stakeholders most directly affected by decarbonisation policies. One interviewee argued that the voices of powerful groups tend to dominate CET deliberations, while not enough effort is made to ensure that the voices of less powerful actors are included. In general, larger companies have come together with government to work on the decarbonisation of industry. While it is understandable that the Government works with big companies, Apulia-based employers, to help them decarbonise (and protect livelihoods), the overrepresentation of carbon-intensive industry in Apulia CET deliberations could have important – and not necessarily positive - implications for its future direction.

Interestingly, according to one interviewee the sensitivity regarding the energy transition is now widespread in Apulia Region and in its Institutions, among the social forces and among young people. Probably, young people and women are less involved, though not excluded, in this process.

The Apulia CET appears to be characterised by diverse governance modes and network modalities and there are questions regarding their overall efficacy. Although most interviewees selected a numerical answer to this question, many did not elaborate on the reason for their choice.

There was a feeling amongst many interviewees that the current governance arrangements are not delivering enough meaningful actions and it is necessary to improve the governance related to local initiatives, and to remove confusing roles that often obstruct the energy transition process.

According to several interviewees, governance should be the result of democratic participation and decision-making processes based on scientific basis. Therefore, some of them ask that a regional task force and regional/local governance constituted by Apulia region, local public administrations, local organisation and local industrial consortia is created as it would enable shared high-level objectives to be developed locally in ways that take into account different local contexts.

The question about the definition of intermediaries caused confusion for the interviewees. Several respondents see politicians as intermediaries. Others see trade unions, business organizations and environmental associations, research organizations, both at local and regional level as intermediaries. Some pointed out that the influence of some intermediaries has been damaging in certain areas of Puglia (such as in Brindisi for the re-gasifier plant conversion). In general, the main indication was that the intermediaries should build a constructive dialogue to play a central role in the energy process transition decision-making for the future of the Apulia Region.

C2. Transformative leadership

Transformative leadership should be able to change the most deeply rooted perceptions and opinions. With these characteristics a facilitator helps the dialogue between the main stakeholders towards energy transition. The transformation of leadership is developed through a significant integration between the various actors, (public and private), in terms of vision and identification of collaboration's form and implementation of useful measures and instruments in political and general terms. In addition, a good leadership must be able to know, analyse and decide.

Most of the interviewees told us that the participation and discussion between the public, private and third sector is missing. In the decision-making process, the territorial actors (municipalities, cultural or social associations - trade unions, entrepreneurs, and professionals) are not included. The responsibility lies with policy makers who should plan and manage decision-making processes in an open fashion. Moreover, there is not a homogenous vision nor true system logic about energy issues. In the Apulia region, and in the Brindisi municipality, there are still many uncertainties, and the city is not ready for the change in terms of decarbonisation process. In other terms, the change does not seem rapid.

Several environmental associations created an organization for "a renewable future". They presented dossiers, proposals, project ideas, observations. These documents reflected the positions of energy enterprises and local companies. According to some interviewees, the idea of "a renewable future" is not considered enough by policy makers and Regional Enterprise association (Confindustria).

C3. Empowered and autonomous communities of practice

According to the majority of interviewees, in the Apulia region, the energy transition process responds to the following social needs:

- to protect the environment and health,
- to reduce pollution and CO2 emissions
- to generate ecological conversion of large industry
- to abandon fossil fuels towards renewable sources
- to improve decarbonisation process
- leading consumers
- to create new job opportunities in the renewable sector
- to reduce energy poverty through some instruments such as energy income and renewable energy communities
- to create the resilience of many small and medium-sized enterprises
- to plan adequate industrial policies
- research, technology development and innovation

In most interviews, it was clear that the energy transition process was implemented to reduce and eliminate the pollution associated to industrial production which damages the environment and health. There is a great social consensus and a strong collective sensitivity for the energy transition process, as for many years the Apulia region was a leader in energy production from fossil sources and was hosting big industries with high level of emissions.

Several interviewees noted how the investments in renewables sources produces supply chains with high employment, social and economic added value.

For other interviewees, the energy transition process is not able to safeguard and relocate employees from large energy production plants and highly polluting industries. Investments in new skills and "knowledge" are required to gain a competitive advantage, starting with businesses.

Moreover, several interviewees pointed out that the energy transition could lead to the closure of small and medium-sized enterprises related to the economy of large plants.

It was also clear that the energy transition is not able to offer programs, projects and investments alternative to fossil fuels, therefore social and energy poverty are already increasing. Today in the industrial and research field there are many best practices that would need political and institutional instruments.

The priority of social needs is decided by:

- public institutions (European, national, state, region, province, municipality, local authorities).
- public Authorities, after listening to active citizenship associations, local communities and social organizations
- large industrial groups, involving social actors.

In any case, the priority of social needs should derive from a concerted action between the central and peripheral levels and should be supported by intermediaries and the third sector.

According to several interviews, today the big industrial groups and institutional organisations decide the priority of social needs. They are not able to develop policies for energy transition nor counter the ongoing financial speculation.

The Apulia Region is one of the first Italian regions to have approved a law for energy and hydrogen communities, introduced the energy (for renewable plants) income for poor families and promoted calls for proposal to support Apulian firms in the energy transition process.

Moreover, the region has adopted various measures to protect and prevent damage to the environment and people's health, especially from emissions from large industrial plants. The regional law on energy communities needs to be implemented through the definition of implementation

procedures and the availability of adequate support and economic resources and the definition of organizational models.

For NGOs, a regional energy plan, which has been missing for 15 years, would be required and it would be necessary to update and identify suitable areas for renewable energy plants.

Capacity Development Processes

C4. System(s) awareness and memory

In general, all interviewees agreed that there is awareness of the importance of systemic interdependencies for energy transition both in the governance of energy issues and in everyday life of consumers, but they cannot always do system analysis.

According to some interviewees, this awareness should further develop in local administrators, school and university operators, research and development technology operators, and policy makers (local authorities), intermediaries of collective interests (employers' associations and trade unions)

Some respondents also believe that policy makers should understand that systemic interdependencies are necessary due to the complexity of the energy transition process, which is also a process of cultural change and has impacts on the social life of citizens. Therefore, a greater integration between public policies, innovative industrial initiatives and environmental awareness mainly linked to health is required. Moreover, the institutional political actors and governance in general should disseminate and develop good practices: e.g., the case of "UnPannelloInPiù campaign" promoting by Legambiente and Enel X to donate photovoltaic panels to energy poor families with social and energy poverty was highlighted.

According to the stakeholders, the interdependencies could be positive or negative and considered among the biggest obstacles/critics for energy transition due to the stakeholder' relationships that are promoted. The interdependence obstacles are also linked to socio-economic and institutional aspects, as well as landscape constraints. Some obstacles are the results of not being able to achieve total convergence between social partners and local institutions. Further, another important obstacle is the hyper concentration on the subject, and not the object, of each measure.

C5. Sustainability foresight

For most interviewees there was still a widespread feeling that more work is required in this area. Problems identified in this area included a lack of a long-term plan which can direct decisions and actions. Also, although the goal for the phasing out coal is clear, the actions to obtain it are not clear. According to some interviewees, the energy transition policies do not take into account the social aspects in the local communities involved and the relative impacts on social capital (workers, young people seeking employment, gender issues).

Other problems identified are loss of jobs or lack of adequately skilled professionals or new professional profiles, problems with the reconversion and remediation of production sites, including abandoned industrial sites, reconversion of the SMEs linked to industrial activities and energy production.

In most interviews, a deeper analysis on how to save or reconvert high risk jobs was suggested.

One interviewee identified the need for a cultural revolution that removes the old politics that has heavily conditioned the territories (mainly Taranto and Brindisi) and the social-economic development: e.g., coal has favoured subcontracting and not a business culture. It is necessary to

start a virtuous acceleration process for the construction of plants and renewable sources supply chains.

The respondents identified several strengths of the vision for energy transition in the region:

- role and weight of renewables sources,
- energy transition is based on a European Program, related to fossil abandonment,
- a policy in supporting the development of hydrogen and energy communities,
- great awareness towards the decarbonisation process for energy industry and chemical and steel companies,
- the widespread awareness, among all institutional socio-economic actors, and citizens, of the positive impact of the energy transition process due to clean energy production and the development of sustainable industrial models.

The main weaknesses identified are the following:

- high bureaucratization, slow down the energy transition process,
- own economic interests slow down the energy transition process,
- lack of efficient coordination between the stakeholders,
- lack of common vision/policy about gas in the energy transition phase,
- energy transition process is clear in the objectives and unclear in terms of strategies and actions,
- the loss of jobs in SMEs and large companies that could close or reconvert,
- the delays of transition processes due to the absence of adequate policy of employment and alternatives production in these areas (Brindisi, Taranto).

Some interviewees highlighted that there are different visions about the energy transition, as shown by some critical choices made by the Apulia region, including to establish new renewable sources plants and open new fossil fuel plants. The institutions should encourage proposals, projects and entrepreneurship concerning the energy transition.

There are no alternative scenarios in use. The framework is set out by the EU. At the regional level, all scenarios deal with the question of how existing industries can be maintained through the energy transition. The choice of renewables sources also is not supported by scientific studies about systemic interdependencies. Alternative scenarios between stakeholders are lacking and the strategies and the policies are not clear and are often based on the suggestions of the moment.

C6. Disruptive experimentation

According to some respondents, in the Apulia Region most of the experiments are based on the production of energy from renewable sources. They also mention alternative technological approaches and studies that focused on the production of green hydrogen as well as experiments of urban sustainability solutions related to the decarbonisation process of the Brindisi energy hub and the transformation of the production model of ILVA in Taranto.

Some interviewees identified experiments at entrepreneurial level, with many companies that are not only experimenting, but also implementing innovative projects, and at research level with universities and CNR as actors. They mention projects and initiatives at social level like energy communities and bottom-up experiences.

The main actors identified in these experiments include:

- research centres,
- international enterprise

- national industries,
- workers,
- SMEs,
- public, private and third sector institutions.

In addition, several interviewees also mention shortcomings in terms of the participation and involvement of most citizens and active citizens' associations and in general in social area. Moreover, the gaps mainly concern delays at the institutional and business level in which possible changes only include large enterprises. Other gaps are the lack of a vision of the supply chain in the energy transition process.

C7. Innovation embedding and coupling

One key issue for several interviewees is the lack of adequate financial support to fund the necessary investments required to drive a successful CET. In other cases, there are neither financial nor technical resources to support stakeholders and their participation in the energy transition process. Few interviewees think that these resources are available but should be used in a better way while many stakeholders don't use them.

One interviewee highlighted a general lack of resources indicating that the stakeholders need to activate "do-it-yourself" programs, access their own resources or other funds such as the Foundation with the South to increase their pressure capacity in the process.

In terms of reflexive regulation, it is possible to observe a change due to:

- energy communities and self-consumption.
- energy income with contributions for RES plants and for lower-income families.
- hydrogen regional law
- new regional energy and environmental plan:
- law on sustainable environmental industrial areas
- environmental controls of large industrial productions
- law about environmental limits
- recovery funds.

For few interviewees some regulatory measures for energy transitions could become an obstacle to the growth of renewables. In addition, many legislative interventions are not adopted by regional and territorial institutions.

Moreover, more funds should be provided for innovative enterprises, research technology development in the field of energy transitions.

Relational Factors

C8. Reflexivity and social learning

Most of the interviewees do not know any monitoring and learning tools in the field energy transition. Some interviewees noted that institutional and business systems are extremely lacking, but there are many initiatives that are producing cultural and practical changes towards the energy transition. One interviewee thinks that the monitoring tools for energy transitions is the PEAR (Energetic and Environmental Regional Plan), however it should be updated more frequently.

C9. Cooperation across human agency levels

According to all interviewees in the energy transition school and university are not sufficiently involved, whereas civil society is often mentioned (in most cases, this refers to the citizens as individuals). For some interviewees, the research institutions, intermediaries, professional associations, merchants, consumers and energy communities should be better informed about costs and opportunities of the energy transition. Some respondents think that the third sector is sufficiently involved.

C10. Cooperation across political-administrative levels

Several interviewees think that, in recent years, the Apulia Region is the institution in the territory with the most developed policies to support the energy transition process, and acts as stimulus and coordinator for other local institutions (municipalities, provinces) and mainly for national and community institutions. Indeed, the Apulia Region has been one of the first to bring issues related to the energy transition to the Committee of the Regions. Moreover, compared to the national government, for the Apulia region the issue of decarbonisation and the issue of environmental reconversion of Taranto municipality (ex-ILVA) are a priority. It was also highlighted that within Apulia the impact and costs of the energy transition in the Brindisi municipality has been considered less important. For other interviewees, there is no coordination or dialogue at any level to be able to direct choices towards a real energy transition process (e.g., the Apulia Region decisions about the GNL coastal deposit and the clumsy attempts to candidate Brindisi municipality having the regasification freighter).

To improve the process, several actions would be required including:

- to reinforce the coordination among institutional actors to support policies and projects for energy transition in favour of local communities including institutional and social structures,
- to improve the relationships among the regions in terms of guidelines, policies and measures both for the regions and the European Union,
- to centralize the coordination of the territories at the regional level to be able to dialogue with the central institutions,
- to involve municipalities, which are the institutions closer to citizens and territories
- to further develop the relationship between the Apulia region and the national government in support of the case of Brindisi, as previously done for Taranto.

5.3.3 Gender dimension

It is worth noticing that the gender issue has not been addressed in the main documents, proposals and discourses on the CET of Sardinia.

5.4 Conclusion

The results of socio-political component confirmed that in the decarbonisation process some key terms were particularly relevant in the local debate, including energy, energy plants, environment, coal, natural gas, operators, territory, industry, development, fossil fuels, emissions, research, renewables, efficiency, transition, sustainability, production, pollution, decarbonisation, technologies

and labour. Moreover, our analysis confirmed the role of National and Local Authorities, research organisations, environmental associations (Legambiente), energy industry (Enel), and of course trade unions.

The results of social ecological and socio-technical component showed that regarding Apulia' transformative capacity, the findings are mixed. Moreover, the interviewees' evaluations of the different aspects questioned were heterogeneous. Indeed, although there appears to be a significant amount of political will from the Apulia Government to drive the CET forward, a great social consensus and a strong collective sensitivity for the energy transition process, there is still a lot of work required in multiple key strategic areas where gaps currently exist. Most notably, major deficits in social learning, resources availability, disruptive experimentation and alternative scenarios have been identified. It is important to highlight that, in all areas of deficit, the Apulia Government has capacity to intervene. The areas that were identified by the stakeholders as being most advanced in terms of transformative capacity were, social needs, community empowerment and reflexive regulation. However, stakeholders identified considerable room for improvement in these areas too.

Although the quantitative ratings assigned to these three factors by the stakeholders was above average (3.9, 3.4, 4, respectively), it is worth noting the following points. A common criticism regarding social needs was that the energy transition process is not able to safeguard and relocate employees from large energy production plants and to offer programs, projects and investments alternative to fossil fuels. The priority of social needs should derive from a concerted action between the central and peripheral levels and not decided by big industrial groups and institutional organizations. Moreover, the general public is not being actively engaged in CET deliberations. This absence is a significant problem which could have grave consequences.

According to most stakeholders, the assessment shows that the Apulia region is actively working towards the energy transition. However, some interviewees (namely civil society representatives) think that energy transformation alone is not enough. They believe that a broader social change is necessary and this could be obtained only by fully involving citizens in the change processes.

CHAPTER 6

CHALLENGES, COPING STRATEGIES & GENDER

6 Challenges, Coping Strategies & Gender

6.1 Challenge 1: [Diversifying local economy]

6.1.1 Challenge description

Current situation

For over forty years the Brindisi CCT economy is based on two main pillars, the energetic and chemical industries. All other industrial activities including the development of harbour activities have been reliant on them. The decrease of coal plant activities due to planned phase out of the coal, the delocalization processes, the progressive decrease of the price of tenders in the energy sector, the impoverishment of harbour activities led to a significant loss of direct and indirect jobs. The employment crisis and a lack of work attractive opportunities for young people results in a loss of young people which don't believe in this current development model. This lead to a lack of generational change with progressive aging of the population and impoverishment of the territory.

Desired outcome

The desired outcome is that of diversifying the local economy and going beyond what has been called the "mono-culture", thus making the territory more attractive and resilient and less exposed to the markets and national and supranational decision-making. Fulfilling this challenge will have among other effects, the capacity to retain young people from leaving Brindisi preserving and developing other vocation of the territory.

6.1.2 Coping strategies

Coping strategy 1: [Promoting tourism and nautical sector].

The vision of this strategy is that of territorial development based on touristic and maritime sectors. The territory is represented as full of attractions that should be better deployed, including built and natural environment, cultural heritage, food, fisheries, etc. Among the actions pursued, there is the relaunch of the harbour by developing a cruise pole and a pleasure boating tourism, proposals to redeveloped of polluted area as Sant' Apollinare. Among the obstacles faced there is the lack of digitalization infrastructures of Brindisi harbour, the impasses in land reclamation; portion of the sea are polluted and are forbidden to public access; a stigma on Brindisi as a polluted area equated to Taranto which creates a bad reputation for tourism.

6.1.3 Gender dimension

The diversification of the local economy may have a positive impact on women's employment opportunities mainly in the sectors of tourism as women have many difficulties in finding jobs in big industries. Indeed, due to both lack of suitable job opportunities and the misalignment of the expectations of young people and the current developmental model of their home area, there is a continuous increase in youth outmigration especially people with university degree. The focus group highlighted that the migration rate to other regions in Italy is significantly higher for women more than men. And this is confirmed by the data from ISTAT for the years 2011-2020.

6.1.4 Discussion

The research about stress and strains has shown that this challenge and related coping strategy are also producing different strains within the territory. Notably, this challenge is sometimes seen as in

opposition to the challenge of re-launching the industrial sector (conflicts over harbour vision). We have highlighted how in the territorial organization there is ambivalence on development vision of the harbour activities. The analysis of the clean energy transition has shown as in principle the CET is welcomed as it will improve the quality of the environment and open new perspectives and opportunities. The energy transition is seen, mainly from young people, as an opportunity for the redemption of the territory and for the revaluation of its resources. However, the current transition plans are perceived within the population with uncertainty for their own future. The centralization of the energy transition process and the lack of synergies across scales have not helped to align the energy transition with the territorial efforts to diversify the local economy.

6.2 Challenge 2: [Saving the energetic sector]

6.2.1 Challenge description

Current situation

Brindisi has a four-decade history of coal-based energy industries which have made this region dependent on a few basic industrial units. The closure of the Brindisi east coal plant, at the end of 2012, and the planned phase out of the Federico II Brindisi South coal-fired power plant has produced loss of direct and indirect jobs with a chain effect on workers of all activities linked to the coal plants, on all harbour activities and has a strong impact also on the receptive structures (hotels) and all activities that uses to work with this sector. This has created a vacuum in the Brindisi industrial complex that is difficult to fill and determines a dramatic social and economic situation within the territory.

Desired outcome

The desired outcome is the re-launching of local industries and activities linked to them based on development of the renewable energetic sources facilitating the renewal and reconversion of the industrial fabric in the region of Brindisi with a technological innovation. This will help to generate new employment opportunities in the area and/or to preserve the jobs that are at risk while preserving the “industrial energetic vocation” of the territory.

6.2.2 Coping strategies

Coping strategy 1: [[Installation of green energy projects].

The vision of this strategy is connected with a territorial development of industrial activities based on renewable energies to turn Brindisi into the sustainable energetic hub with the help of renewable sources and green hydrogen projects. This will lead to a innovation technological and the development of new products, technologies and materials. Among the actions pursued, there is the project of installation of photovoltaic power plant using the infrastructure built for the coal and the development of a floating photovoltaic park. Among the obstacles faced there are complicated regulatory rules, the impasses in land remediation and use of SIN and bureaucratic hurdles that discourage investors from investing in new projects.

6.2.3 Gender dimension

The development of energy sector based on renewable sources should help to a diversification of the local economy and this may have a positive impact on women's employment opportunities in companies of the new circular and sustainable economy. However, as far as we know, the active role of women is not explicitly addressed both in the formulation and in the pursuit of this challenge.

6.2.4 Discussion

The research about stress and strains has shown that this challenge and related coping strategies are also producing different strains within the territory. The analysis of the clean energy transition has shown as in principle the CET is welcomed as it will improve the quality of the environment and open new perspectives and opportunities. However, the current transition plans are also perceived as a threat as it doesn't give time to find appropriate solutions for saving or converting jobs linked to fossil fuels. In general, the social and economic development aspects are quite unbalanced in the energy transition process in Brindisi. For the companies the loss is economic, but for all workers the loss is moral, cultural and emotional. Therefore, in the transition processes and those who make the decisions, must take special care of these aspects. The saving the energy sector of Brindisi is necessary not only to maintain economic development, but also to maintain the social fabric of the region.

6.3 Challenge 3: [Land remediation and use]

6.3.1 Challenge description

Current situation

One of the main concerns of CCT are the environmental damage caused of its coal and industrial history. Many of the harbour and marine areas of the SIN (site of national interest of Brindisi which covers a surface of 11,000 hectares, includes the industrial area as well as the whole port and a strip of 5,500 hectares of marine areas) need of remediation interventions. The main issue is represented by the fact that any intervention in these areas would require in depth analysis and remediation with big investments and long timelines and this discourages investments from external companies. Although 95% of the areas has already been characterised, only 10% has undergone some remediation activity so far.

Desired outcome

The desired results include the remediation of the polluted natural areas and making these areas available for other industrial and public uses.

6.3.2 Coping strategies

Coping strategy 1: [Land remediation].

The vision is to restore the natural landscape of the region affected by coal and industrial activities. Some actions have been undertaken to characterize the site and the 95% of the areas has already been characterized, but only 10% has undergone some remediation activity so far. Among the obstacles faced there are impasses on lack of permissions to carry out the risk analysis of the areas of interest, the long timelines and the big investments required for any intervention in these areas.

6.3.3 Gender dimension

We have not identified gender-specificities for this challenge.

6.3.4 Discussion

Environmental remediation is a key challenge to fight against some of the negative effects of the coal and industrial activities in the area, including territorial and environmental stigma. Environmental remediation is also a key to the diversification of the local economy, as some development opportunities are undermined by the persistent state of degradation in some areas as the harbour. Nonetheless, the research has shown that the intervention of environmental reclamation is among

those that have stalled for decades, despite the was decreed by law the site of national interest. Collaboration between different actors, such as the local administration, environmental groups, Ministry of the environment (now called MITE), local companies and the national government and the allocation of funds are necessary steps to accelerate the remediation process.

6.4 Challenge 4: [Bridging the infrastructural divide and human capital formation]

6.4.1 Challenge description

Current situation

There is in the territory, mainly in peripheral area, a lack of adequate communication infrastructures and services. This put the territory in a condition of fragility, create inequalities and results in lower attention to peripheral areas. Moreover, there is a gap between the job profiles needed and available in the region. With the energy transition, all industrial and energy sectors require a modernization of profiles and new skills as many of existing professional profiles become inadequate for the needs of the innovation and automation.

Desired outcome

The desired outcome is to reduce the communication infrastructures and services divide between the CCT of Brindisi and the peripheral area of Brindisi and to prepare differently skilled professional figures for the changing and innovation labour market.

6.4.2 Coping strategies

Coping strategy 1: [Transition to new job profiles].

Helping relocated and redundant workers and equipping young people with the new skills needed to satisfy the request of new professional figures to work in the modernized and automated industries and in the green energy sector. The industries are operating a relocation of figures professional already employed. The main obstacles are: most of workers are not happy with their new job relocation which impacts on their career and professional development and creates severe tensions. Moreover, there is a general difficulty of learning from a certain age and a disaffection and a lack of trust in the territory that discourages young people and emigrate due to lack of job and social expectations.

Coping strategy 2: [Infrastructural intervention].

The vision is to provide an adequate communication infrastructure and services for young people to connect with the outside world and new businesses so that they can operate globally without any problems. Some plans to improve the situation have been proposed but the dependence on the central government and on PNRR funds for the investments needed to fill this gap is the main problem.

6.4.3 Gender dimension

We have not identified gender-specificities for this challenge.

6.4.4 Discussion

The personal reinvention is an important element of all strategies to cope with the effects of the ongoing energy transition on the labour market. The changes introduced by decarbonisation policies and automation in the labour market have left a large number of workers who were employed in carbon-intensive industries unemployed and or relocated. These workers have few skills to work in other industries and economic sectors. To make them useful again for the economy, people have to relocate and learn new skills to survive in the labour market. However, even in this case, it appears clear the lack of vision and coordinated efforts in the territory to match these challenges.

6.5 Conclusions

The challenges and coping strategies outlined above present a very clear picture of the real situation in the Brindisi region. It highlights the problems related to the demographic, economic, social, cultural and political configuration of the area that can help policy makers to develop policies to address the problems faced by the different stakeholders. Even in this case, it appears clear the need of a vision and coordinated efforts in the territory to match the challenges and to identify the strategies that work well in the region.

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APPENDIX

Appendix

Regional Delineation

Table 12 – Case delineation

CCT		CCT (NUTS 3)	LMA	PAR
74001	Brindisi	74001 Brindisi	ITF44 Brindisi	ITF4 Apulia Region
74002	Carovigno			
74003	Ceglie Messapica			
74004	Cellino San Marco			
74005	Cisternino			
74006	Erchie			
74007	Fasano			
74008	Francavilla Fontana			
74009	Latiano			
74010	Mesagne			
74011	Oria			
74012	Ostuni			
74013	San Donaci			
74014	San Michele Salentino			
74015	San Pancrazio Salentino			
74016	San Pietro Vernotico			
74017	San Vito dei Normanni			
74018	Torchiarolo			
74019	Torre Santa Susanna			
74020	Villa Castelli			

Source: own delineation.

Table 13 – Municipalities in CCT

Comm unity	National Identifier	Area in km ²	Population	Population Density	Average Age
Brindisi	74001	333,01	85.397	256	46,71

Source: Istat, Movimento e calcolo della popolazione residente annuale and own calculations (2018)

Economic Data

Table 14 – Economic data overview

	Brindisi Municipality	Brindisi	Apulia	Italy	EU28
Labour Force Population					
total	22,462	131,400	1.382,200	25.370,900	256,181,680
Unemployment Rate (%) ^{a)}					
Total (BA)		14.5	16.1	10,6	6.9
Total (ILO)				10,6	7.2
Employment Shares by Industries (%)					
Manufacturing		10.3	11.5	15.5	14.7
Services		68.6	71.2	73.5	73.5
Mining and utilities		1.6	1.5	1.3	0.3
Gross Value-Added					
Total (Bn Euro real)		7	69	1,590	14,240
Gross Value-Added Shares (%)					
Manufacturing		12,0	10,1	16,7	15.9
Services		73,5	77,1	73,9	73.7
Mining and utilities ^{b)}		5,3	3,6	3,0	3.3
GDP per capita (Euro)		18,71	19,51	30,10	31,087
in relation to country Ø		62%	65%		
in relation to EU Ø		60%	63%	97%	
Disposable Income per capita (Euro)		13,47	18,64	16,58	17,818
in relation to country Ø		81%	112%		
in relation to EU Ø		76%	105%	93%	

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 15).

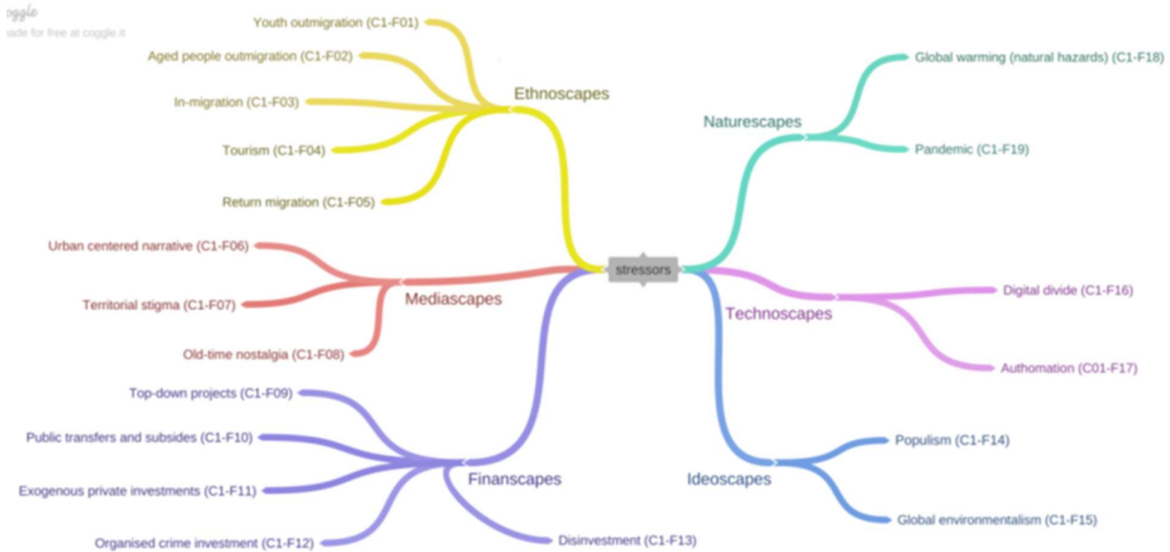
Sources: Destatis (13312, 82411, 82111), Eurostat (nama_10_gdp, nama_10r_2hhinc, tps00203, ifsa_egan2, nama_10_a10) and own calculations.

Table 15 – 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-cultural factors



Source: *Modernity at Large, Cultural Dimensions of Globalization* (Arjun Appadurai, 1996).

Appendix socio-ecological and technical component

Table 16 – List of quantitative indicators and corresponding questions for transformative capacity assessment

T.C. Factor	Description	Corresponding Question	Question Text <i>To what extent do you agree or disagree that:</i>
C1.1	actor diversity	Q2	“Beyond public authorities, diverse stakeholders – citizens, civil society, businesses, NGOs and academia – are actively participating in steering the clean energy transition.”
C1.2	diverse governance	Q5	“Governance/steering approaches used for the clean energy transition are varied and hybrid – including formal AND informal processes, centralised AND decentralised, top-down AND bottom-up arrangements, as well as governing through hierarchy, market, and networks.”
C1.3	inter-mediarities	Q6	“Intermediaries are playing an influential role in governing the clean energy transition at present.”
C2	transformative leadership	Q7	“Leadership for the energy transition (i) comes from all sectors (public, private, civil society), (ii) offers motivating visions and (iii) drives collaboration between stakeholders.”
C3.1	social needs focus	Q8	“The clean energy transition addresses social needs.”
C3.2	community empowerment	Q9	“Support is given to citizens, innovators and communities of change (e.g., energy cooperatives, local sustainability networks, start-ups) to act autonomously to advance the energy transition.”
C4.1	system(s) analysis	Q10	“There is a widely shared awareness among stakeholders of the importance of (systemic) interdependencies between the cultural, institutional, socio-economic, ecological, and technical aspects of the transition.”
C4.2	path dependency	Q11	“Stakeholders recognise (systemic) interdependencies between the cultural, institutional, socio-economic, ecological, and technical aspects of the transition as critical obstacles to change.”
C5.1	knowledge production	Q12	“There is a broad diversity of knowledge produced from different stakeholders that informs the transition (e.g., technical science, social science, civil society, government, industry).”
C5.2	sustainability vision	Q13	“The transition vision for [region] is explicit, radical, collectively produced, motivates action 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	“Present implementation of / planning for the transition makes use of future scenarios, including alternative development options based on stakeholder choices, and addressing uncertainties and (systemic) interdependencies (between the cultural, institutional, socio-economic, ecological, and technical aspects).”
C6	disruptive experimentation	Q15	“There is a diversity of experiments undertaken to develop fundamental alternatives to current ways of thinking, organizing and doing.”
C7.1	resource availability	Q16	“Stakeholders are given access to resources that enhance their organisation and cooperation, their inclusion and participation, or enable vision- and scenario-development and experimentation.”
C7.2	organisational adjustment	– n/a –	– n/a –
C7.3	reflexive regulation	Q17	“Regulatory changes have been implemented to support the transition and overcome obstacles.”
C8	social learning	Q18	“There is monitoring of and active learning of all stakeholders about the transition process that feeds back into its implementation.”
C9	across agency levels	Q3	“Measures to move the clean energy transition forward actively involve all different types of social actors; including individuals and households, as well as groups, organisations, networks, and associations.”
C10	coordination across scales/tiers	Q4	“Measures in support of the clean energy transition, as it is presently unfolding, involve strong dialogue and coordination across spatial scales; from local to regional, national, inter- or transnational, and EU.”



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