



# ENTRANCES

Energy TRANSITIONS from Coal and carbon: Effects on Societies

## D3.6 Sulcis Case Study Report



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## Abbreviations

ASL	Local Health Unit
CCT	Coal and Carbon Territory
CEO	Chief Executive Officer
CET	Clean Energy Transition
CSO	Civil Society Organisation
DPCM	Decree-Law of the Prime Minister
EC	European Commission
ENTRANCES	ENergy TRANsitions from Coal and carbon: Effects on Societies
EU	European Union
EVLN	Exit, Voice, Loyalty, Neglect theory
FAIR	Findable, Accessible, Interoperable, Reusable Data
FSRU	Floating Storage Regasification Units
GDP	Gross domestic product
HVDC	High-voltage direct current power transmission system
JTF	Just Transition Fund
LMA	Labour Market Area
LNG	Liquefied natural gas
MAF	Multidimensional Analytic Framework
MW	Mega Watt
NACE	Statistical Classification of Economic Activities in the European Community
NGOs	Non-Governmental Organisations
NUTS	Nomenclature of Territorial Units for Statistics
PAR	Political Administrative Region
PEARS	Sardinia Region developed its Energy and Environmental Strategic Plan
PV	Photo Voltaic
R&I	Research and Innovation
RF	Research Focus
RQ	Research Question
SACOI	High-voltage direct current power transmission system Sardinia-Corsica-Italy
SAPEI	high-voltage direct current power transmission system Sardinia-Italy
SIN	Site for National Interest for reclamation
SME	Small and Medium Enterprise
Srl	“Società s Responsabilità Limitata”(Company s Limited Liability)
SSH	Social Sciences and Humanities
TC	Transformative Capacity
TJTP	Territorial Just Transition Plan
VAT	Value Added Tax
WP	Work Package

## Executive Summary

### ***The ENTRANCES context (chapter 1)***

ENTRANCES is a three-year project funded by the European Union's Horizon 2020 research and innovation programme. The project explores cross-cutting issues related to the "Social Sciences and Humanities (SSH) aspects of the Clean- Energy Transition" (call: LC-SC3-CC-1-2018-2019-2020). The project developed 13 case studies on coal or carbon-intensive regions in transition, Sulcis being one of them.

### ***The Multidimensional Analytic Framework (chapter 2)***

The case studies addressed questions related to the challenges faced by the regions, associated coping strategies, and processes of territorialisation. The case studies adopted a common analytic framework articulated in different research foci, units of analysis, and analytic components. The table below shows how this framework applies to the Sulcis case.

**Table A–Summary of the analytic framework**

Research focus	Unit of analysis	Component	Methodology
Territorial change	Sulcis	Socio-Cultural	Focus group mapping
		Socio-Psychological	Online Survey
Structural change	South Sardinia	Socio-Economic	Quantitative data collection
Clean energy transition	Sardinia	Socio-Political	Text analysis
		Socio-Ecological & Technical	Semi-structured interviews

### ***Background of the Sulcis Case (chapter 3, §3.1)***

The Sulcis Case study was centred on the Sulcis "coal and carbon territory", the portion of Sulcis territory composed of nine municipalities that has a strong identification with coal mining and that is dependent on carbon-intensive industries. This is the area that historically hosted the only Italian coal mine (that stopped production in 2015), where the non-ferrous metal industries proliferated, and where one of the two main coal-fired power plants of Sardinia is based. The area is relatively small (534.6 sq Km) and with a limited population (64474 inhabitants), a good part of which lives in the Sulcis capital, Carbonia (26,813 inhabitants), a city founded in the 30s by the fascist regime and whose name means "city of coal".

The Sulcis coal and carbon territory has been subject to significant and ongoing economic restructuring since the 90s when the publicly owned aluminium companies were privatised. In the period 2008-2012, following the economic crisis, two out of three of the biggest employers in the local non-ferrous metal industry closed or stopped production. It has been estimated a loss of 3000 direct and 10000 indirect jobs in the area. In the same period, following an infringement investigation on competition rules by the EU, the extractive activities of the local coal mine stopped, with a further loss of jobs. In this critical context, further pressure on the territory arrived with the decision of the Italian government to phase-out coal in Italy by 2025, and with the energy crisis started before the Russian war in Ukraine. The combined effect of these events endangered



other two main employers in the area, the coal-fired power plant and the Portovesme Srl, the only non-ferrous metal industry still active after the economic crises of 2008-2012.

***Key findings about territorial change in Sulcis (chapter 3, §3.2 - 3.4)***

The socio-cultural analysis focused on stress-strains in the territorial organisation. It led us to identify 29 “strain situations” including “conflicts and disputes”, “impasses and contradictions”, and situations of “dependence and related uncertainty”. Through a horizontal analysis of these strain situations, we identified 14 stress vectors pushing on the territory, as well as 12 recurring forms of strains (see Annex 4). The analysis also allowed us to explore the dynamics of changes and resistance to change in territorial identity, which can be summarised as follows: (i) there is an ambivalent interpretation about what the territory should be in the future as visions of continuity with the ongoing mining and industrial path as well as visions of rupture with this path co-exist without any significant attempt to find a shared synthesis or a compromise; (ii) the territory has always managed to defend its “boundaries” and has thus preserved its prerogatives and its distinctive features; (iii) a lack of negotiation spaces and the reliance on the state intervention as the main paradigm for problem-solving, have weakened the Sulcis capacity to steer its development endogenously; (iv) we found a simultaneous presence of a strong territorial stigma and a rich and positive symbolic reservoir.

The socio-psychological component assessed place attachment and individual coping strategies of Sulcis citizens in the context of the decarbonisation process. The results show a very strong sense of place attachment, especially in terms of place identity, indicating that Sulcis significantly contributes to the inhabitants’ sense of self and identity (e.g., who they are and what is their place in the world). The survey showed that several individual strategies are adopted to cope with the risk associated with decarbonisation. Both active strategies, such as protest, personal re-invention, or intention to relocate, and passive ones, such as submission or support, are significantly diffused. However, the passive strategies are more widespread than the active ones among the survey respondents. Finally, the interviewees self-assessed to have on average a high degree of resilience but a low degree of optimism. This difference can be interpreted in the light of “defensive pessimism”, where a certain degree of pessimism is functional to protect resilience capacities, and where a higher degree of optimism may expose to higher vulnerability.

***Key findings about structural change in South Sardinia (chapter 4)***

The socio-economic component has portrayed the socio-economic features of South Sardinia and Sardinia, i.e., the structural context in which the Sulcis Coal and Carbon Territory is inserted. In the last two decades, the total population, the share of the working-age population, and the GDP per capita decreased both in South Sardinia and in Sardinia as a whole. Moreover, the GDP has grown slower than the national and EU28 levels. In all those indicators South Sardinia scored worse than Sardinia as a whole. South Sardinia's growth is less than Sardinia's in the “retail to IT” and finance sectors. It scored better than Sardinia in the growth of mining and utilities, but worse than Italy as a whole. In the last two decades, the Sardinia economy didn't manage to fill the gap with Italy as a whole, and South Sardinia province didn't manage to fill the gap with Sardinia as a whole.

***Key findings about the clean energy transition in Sardinia (chapter 5)***

The socio-political component analysed the battles on the interpretation of the clean energy transition that is ongoing in Sardinia. We identified three narratives dominating the discourses: “Sardinia green island” pushing for a total and rapid electrification of the Sardinia island; “green

gas” pushing for the development of a proper gas infrastructure; and “Energy slavery”, which harshly opposes current transition policies that are interpreted as a form of domination of Sardinia by Italy. The analysis of the narratives allowed us to identify the alignment of heterogeneous actors across different constituencies, indicating a restructuring of the local field of power with the transition. Through a semantic analysis of the narratives, we have described how the process of “technological regularisation” – oriented to make normal the electrification paradigm – is characterised by different dynamics of exclusion, including a tendency to centralisation, which results in a reduced autonomy of the region in the management of its energy system as it is pushed toward the incorporation in the national system, where decisions and management are centralised.

The socio-ecological and technical components assessed the capacities present in the regional system that should allow a transformation of the system toward clean energy. Based on in-depth interviews with regional stakeholders, the results of this component give a sense of the differentiated perception of the regional stakeholders on the current process of transition towards clean energy. The analysis of the Transformative Capacities has shown that, despite the presence of a diffused interest and several ongoing experiments on the clean energy transition in Sardinia, there is a low degree of inclusiveness in the current policy-making process. The lack of a clear vision, weak regional leadership, and a scarce capacity to work across scales, including to capture the needs of the territorial actors, demonstrates that the clean energy transition is not intercepting the agency of the regional actors.

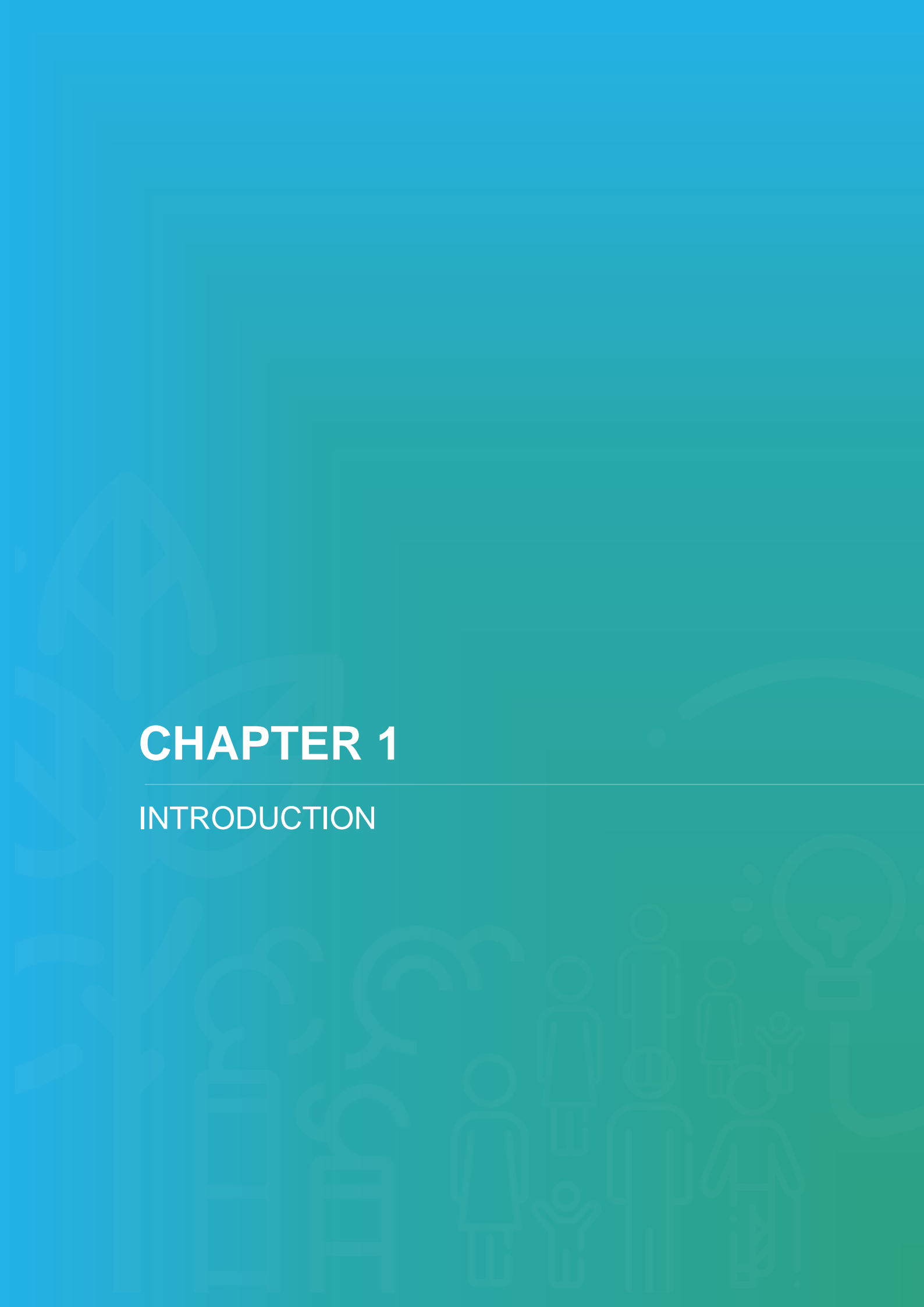
### ***Challenges, coping strategies and gender (chapter 6)***

Finally, we highlight four fundamental challenges for the Sulcis Coal and Carbon Territory: saving the metallurgic sector; diversifying the local economy; advancing ecological remediation and conservation; combating peripheralisation. We report the main coping strategies adopted as well as the main obstacles faced in coping with these challenges. We have found that all the challenges have been addressed with a gender-neutral perspective, thus making invisible the differentiated needs of men and women, as well as the different potential that men and women bring for territorial development. The case study ends with two further questions: i) “Why, despite community commitment, resources availability and strategic planning, the situation of the Sulcis coal and carbon territory has not significantly improved over the last 15 years?” ii) “What role the clean energy transition is playing in de/re-territorialisation of the Sulcis coal and carbon territory?”. Based on the research results across different dimensions of change, in chapter 6 we provide some tentative answers to these questions.

# CHAPTER 1

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## INTRODUCTION



# 1 Introduction

This report has been drafted in the framework of 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. The project finds its framework under the topic “Social Sciences and Humanities (SSH) aspects of the Clean-Energy Transition” and call: LCSC3-CC-1-2018-2019-2020. ENTRANCES is coordinated by the University of A Coruña and is conducted by a consortium of 14 European partners, including universities, research institutes, networks and umbrella organisations.

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

One of the key aspects of the project was thus the development of 13 regional case studies dedicated to just as many European coal and carbon-intensive regions in transition.<sup>1</sup> All the case studies were based on the application of the same Multidimensional Analytical Framework (MAF) developed to grasp the multi-faceted aspects of the de/re-territorialisation processes ongoing in the regions.

In this respect, a set of 13 deliverables have been developed, each dedicated to one of the case studies of the project. This report is dedicated to the case study of Sulcis which was developed by Knowledge and Innovation and ENEA. In this regard, the report has been drafted as a stand-alone document, which can be read with its 12 sister deliverables dedicated to the other case studies. All the documents are developed following a similar structure and organisation, and all of them are available on the ENTRANCES website.

The report is structured into six chapters: Chapter 2 presents the **conceptual, methodological framework** adopted for the development of the case study, including information on how Sulcis has been operationalised in different interrelated units of analysis.

Chapter 3 is focused on **the analysis of the Sulcis “coal and carbon territory”** (henceforth CCT), 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.

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

Chapter 5 covers the **analysis of the clean energy transition**(henceforth CET) 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 based on the research results.

Finally, some conclusions formulated by the case study team complete the Sulcis case study report.

In addition to the main text, the deliverable also includes **five annexes** providing complementary information to the main text.

# CHAPTER 2

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## CONCEPTUAL AND METHODOLOGICAL FRAMEWORK

## 2 Conceptual and methodological framework

### 2.1 Case study objective(s) and organisation

#### 2.1.1 The case study objective(s)

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

- 1) What are the principal socio-economic, socio-technical, socio-ecological, socio-cultural, socio-political, socio-psychological, and gender-related challenges facing coal and carbon-intensive regions in transition? What coping strategies have emerged in recent years?
- 2) What variables have been most influential in the appearance of the *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 a combination of policies would be most appropriate to recover the ties of the territory and community in coal and carbon-intensive regions while fostering their transition toward clean energy?

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

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

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

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

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

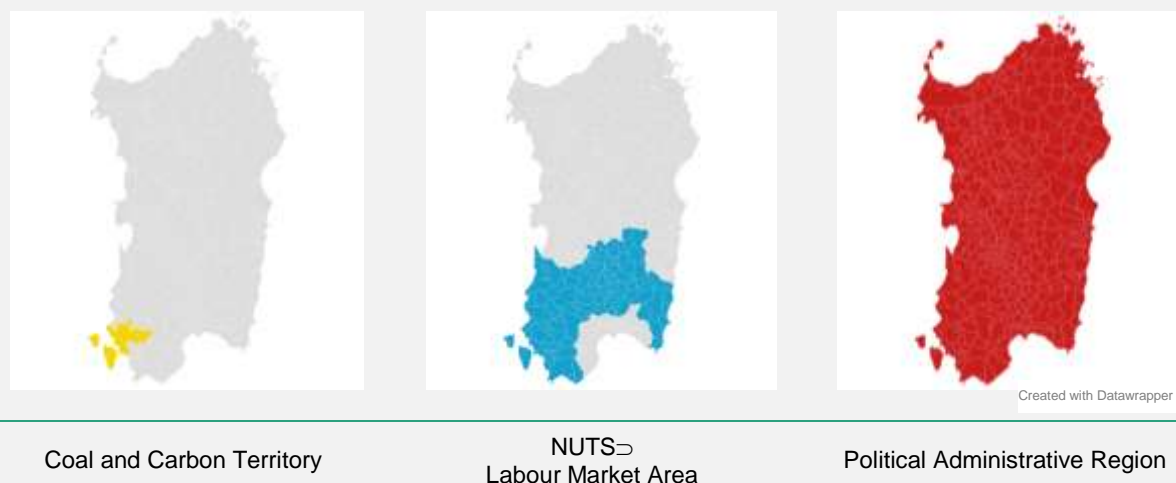
The structure of the case study is mirrored in this report as Chapter 3 will deal with territorial change in the CCT; Chapter 4 with structural change in the LMA; and Chapter 5 with the clean-energy transition in the PAR.



### Box 1– The three units of analysis

Following the structure of the case study, three units of analysis have been delineated in the Sulcis case. The coal and carbon territory (in yellow, below) is composed of nine municipalities including the five municipalities of the Sulcis coal basin (Carbonia, Portoscuso, San Giovanni Suergiu, Gonnese, Sant'Antioco) and four municipalities that belong to the Labour Market Area of Carbonia (Calasetta, Carloforte, Tratalias, Predaxus). As for the Labour Market Area, as calculated by ISTAT, the LMA encompasses the same 9 municipalities of the CCT. As the analysis of the socio-economic component is based on NUTS3 regions, we will consider as a unit of analysis the NUTS3 region including the LMA, i.e., the South Sardinia Province (in blue on the map). Finally, the Political Administrative Region that is governing the clean energy transition is the Sardinia Region (in red below, NUTS 2 level). Further information on case delineation is provided in Annex 1.

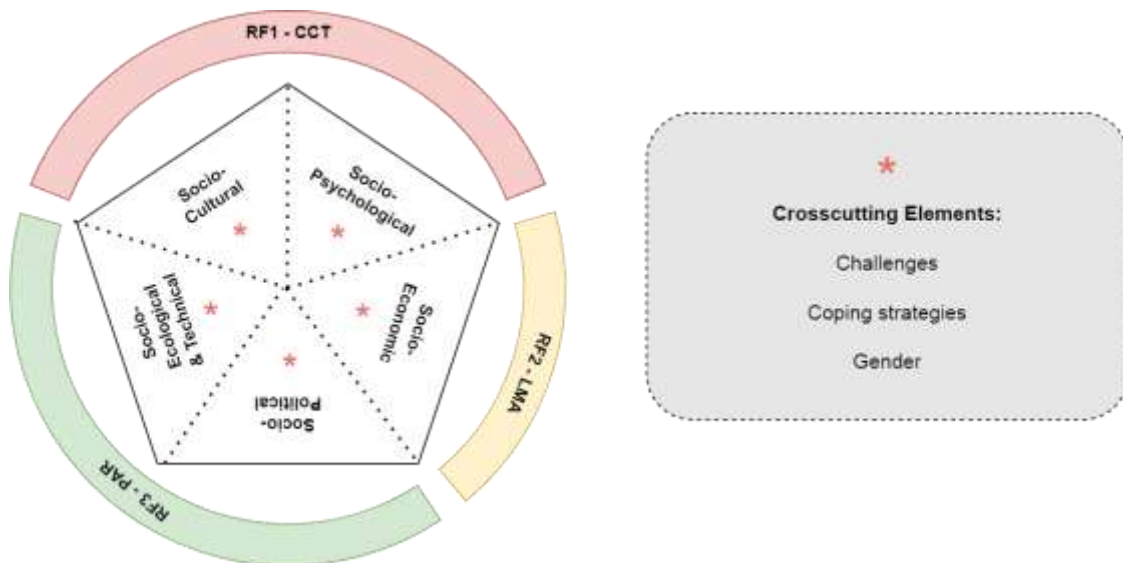
**Figure 1 – Case delineation**



## 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 aimed at adopting multiple approaches without losing their distinctive ontological, epistemic, theoretical, and methodological features (Olsson & Jerneck, 2018). Therefore, a multidimensional analytic framework (MAF) was adopted. The multidimensional analytic framework is articulated in five components – each relying on a set of specific concepts and methodology – and three cross-cutting elements, as shown in Figure 2. It also shows how the components relate to the above-mentioned research foci and units of analysis.

Figure 2 – Overview of the multidimensional analytic framework



In the following subsections, all the different components will be shortly described with their overall approach, the concepts and the methodology adopted. The two final subsections 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 such 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 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 stressors) 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<sup>2</sup>.

### **Methodology**

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

## **2.2.2 Socio-psychological component**

### **Overall approach**

The socio-psychological component studies the socio-psychological impacts of the closure of coalmines 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.

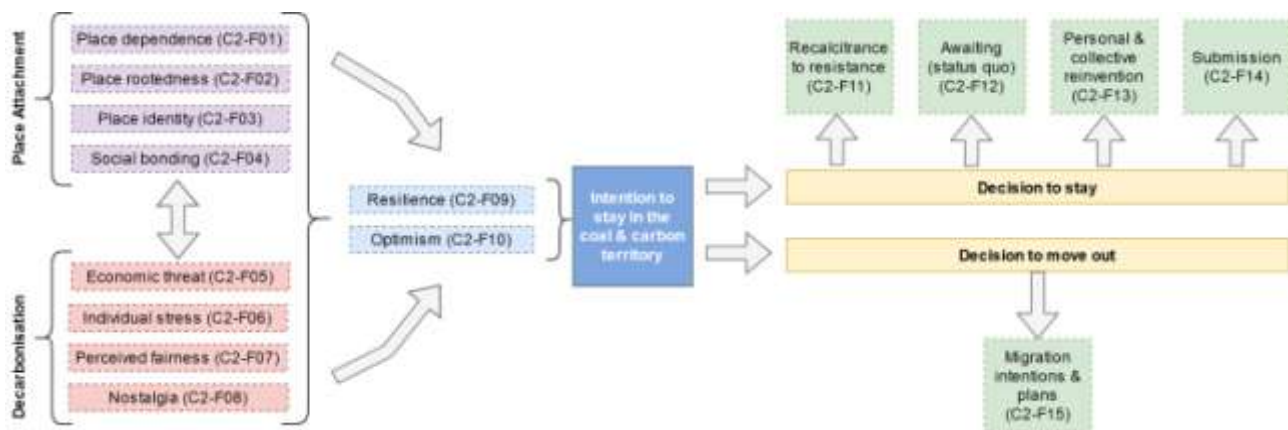
<sup>2</sup> The four categories are adopted in analogy with the four principles of personal identity singled out by Breakwell in the development of Identity Process Theory. See Jaspal & Breakwell, 2014.

## 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 bonding, reflecting the emotional dimension. **Personal attributes.** We selected two attributes to be investigated: resilience and optimism. In the socio-psychological component, the study of personal attributes 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 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 de-territorialisation 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, personal attributes act as a “filter” as individuals with high resilience or optimism 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. Further, it has direct implications for the depletion of coal reserves, the expansion of alternative energy sources, direct employment and production in the coal industry and carbon-intensive industry, indirect employment, and production effects on other industries. Investments in the stock of capital will respond to regional economic development. Further, the clean energy transition can change economic inequality, energy security, technological progress and migration patterns.

#### *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 of the decarbonisation process. Finally, the component shows the inclusion and exclusion dynamics resulting from technological change in the region.

#### *Concepts*

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

- *technological regularisation*, a design constituency tries to impose change, i.e., to appropriate the technological process so that its features implicitly embody the political aim of altering power relation



- *technological adjustment*, the impact constituency – the people who lose when a new technology is introduced or when a technological shift is ongoing – engage in strategies that try to compensate for the loss of social prestige or social power
- *technological reconstitution*, the impact constituency tries to reverse the meaning of the technology imposed through regularisation. Differently from technological adjustment strategies, the strategies related to technological reconstitution attack the foundation of technical regularisation and activate a self-conscious “revolutionary” ideology aimed at producing a symbolic inversion and antisignification of the technological regularisation process.

### Methodology

The socio-political component was based on a semantic analysis of public statements and counterstatements of different social actors about the energy transition and coal phase-out. The analysis was carried out at the 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 (Wolfram, 2016) 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).<sup>3</sup>

### 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.<sup>4</sup> 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
<b>Socio-Cultural</b>	Territorial change	Coal & Carbon territory	Stress strains in the territorial organisation	Strain Situations	Focus group mapping
<b>Socio-Psychological</b>	Territorial change	Coal & Carbon territory	Place attachment, Decarbonisation, Resilience and Coping	Citizens	Online Survey
<b>Socio-Economic</b>	Structural change	Labour-Market Area	Change in the socio-economic structure	The area as a whole	Quantitative data collection
<b>Socio-Political</b>	The clean energy transition	Political Administrative Region	Narrative battles to determine the meaning and “appropriation” of the energy transition	Statements & Counterstatements	Text research
<b>Socio-Ecological &amp; Technical</b>	The clean energy transition	Political Administrative Region	capacity available in the region to shape its decarbonisation pathway	Multilevel System interaction	Semi-structured interviews

Source: Caiati et al., 2021.

#### 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.

<sup>3</sup> For full elaboration of transformative capacity and its components, please refer to Wolfram (2016, 2019) and Wolfram et al (2019).

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

**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 in different ways 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 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 group (socio-cultural component)

To gather the empirical data for the socio-cultural component a Focus group was held in Carbonia on 26 and 27 June 2021. The focus group included 9 key informants living or working within the Coal and Carbon Territory (CCT). The participants covered all three types of key informants foreseen by the method, i.e., community leaders, memory keepers, and knowledge keepers. The development of the focus group included the following activities. (i) The selection and recruitment of the participants included the identification of desired profiles for each of the above-mentioned types of key informants, exchanges with local contact persons to identify relevant candidates, the implementation of web-based research to identify good candidates, and, obviously, direct contact with all the selected candidates. (ii) The focus group preparation included a wide range of activities, such as booking the venue, printing materials, communicating with the participants, and rehearsing the research team. (iii) The implementation of the focus group itself. (iv) The results of the focus group have been transcribed and elaborated. This implied also supplementary desk research to fill in the missing information or to make explicit some implicit or unclear references done by the focus group participants. All the data collected have been processed into a short report of the socio-cultural component.



### 2.3.3 Online survey (socio-psychological component)

An online survey was administered to 386 respondents all living in the CCT area of the case study. All data were collected through a self-completion online survey, using the ENEA's licensed LimeSurvey platform. A set of activities were implemented in this respect. Firstly, the basic questionnaire provided in WP2 was translated into Italian and slightly adjusted for tailoring it to the case study of Sulcis. Secondly, a set of activities were carried out to reach out to the potential interviewees, and to foster participation during the survey period including an awareness campaign on local media websites; word-to-mouth contacts initiated through the local collaborators of the ENTRANCES project and the participants to other research activities; the questionnaire was sent to employees of the ENEL power plant; the survey was advertised for 1 week on the local newspaper "Provincia del Sulcis". The survey was monitored and kept open from September to October 2021.

Finally, the data were cleaned and translated into an excel file. The processed data as well as an in-depth description of activities and approaches used were collected in a short report on the socio-psychological component.

### 2.3.4 Socio-economic data collection (socio-economic component)

For the socio-economic component, an extensive collection of data has been developed. The data collection was based mainly on national sources, such as Istat and Eurostat. Nevertheless, the data collection was also implemented by collecting data from companies active in the CCTs such as ENEL and CARBOSULCIS. The data collection covered the period from 1991 to 2021, and was focused on (i) extraction of fossil fuels and carbon-intensive industries data; (ii) demographic data; (iii) economic data; (iv) public finance data. The data were collected for the three units of analysis, CCT, PAR, and LMA as well as for upper levels (NUTS2 region), Country and European levels. The data collection was dependent on data available from national and European datasets.

### 2.3.5 Text analysis (socio-political component)

A set of subsequent activities have been implemented as concerns the text research. Firstly, to identify the "discursive domain" of the analysis 107 texts were read from the local press. This allowed identifying a set of relevant keywords, key events and the period of analysis of the regional debate on the Clean Energy Transition useful to limit the texts to be selected and analysed. Secondly, through applying a set of criteria such as significance (selection of the text within the discursive domain), relevance (texts including statements and counterstatements), and efficiency (excluding redundant texts), 53 texts have been selected to be coded. Overall, more than 300 texts have been filtered to select them. Thirdly, following a coding grid common to all the case studies, the texts have been coded using MAXQDA. In total 477 "statements or counterstatements" have been coded in the Sulcis case study. Fourthly, as the coding capacities evolved with the practice, a second coding round was applied to ensure the homogeneity of the application of the codes to all the texts. Finally, through the analysis of codes and related texts, a set of narratives and constituencies were identified. The results were reported in the short report on the socio-political component.

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

The socio-ecological and technical component was based on the implementation of 7 semi-structured interviews with key regional stakeholders of the PAR. The interviewees covered representatives of organisations of all the involved sectors, i.e., the public sector, private sector, civil society and third sector, as well as stakeholders playing the role of intermediaries in the clean energy transition. The interviews have been developed with a set of subsequent activities: (i) translation of the interview guide elaborated in WP2; (ii) identification of potential interviewees, based on a grid of pre-established categories; (iii) conduction of the 7 semi-structured interviews with key stakeholders; (iv) transcription of the interviews; (v) the processed data and results were transcribed in the short report of the socio-ecological and technical component.

### 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 extensive data processing and reporting activity. For each of the above-mentioned components, a short report describing the data collection procedure as well as a dataset were produced. This will allow making the data collected available to the public in the future following 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.

# CHAPTER 3

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## ANALYSIS OF THE COAL AND CARBON TERRITORY

### 3 Analysis of the coal and carbon territory

This chapter is dedicated to an analysis of the coal and carbon territory (CCT) of Sulcis. The analysis will be elaborated in three steps. Firstly, an overview of the coal and carbon territory will give us the main social, geographical and historical coordinates of the territory. Secondly, an analysis of the stress-strain in the territorial organisation will be provided through the lens offered by the socio-cultural component. Thirdly, an analysis of place attachment and decarbonisation in the CCT will be provided through the lens of the socio-psychological component.

#### 3.1 Overview of the coal and carbon territory

##### 3.1.1 Coal and carbon features of the territory

In the Sulcis case, the CCT has been delineated as the territory of the nine municipalities belonging to the SLL Carbonia, i.e., those more dependent on coal and carbon industries (Calasetta, Carbonia, Carloforte, Gonnessa, Perdaxius, Portoscuso, San Giovanni Suergiu, Sant'Antioco and Tratalias).

The extraction and deployment of coal characterise the socio-cultural and socio-economic landscape of the CCT area. With the case study, we refer specifically to the following activities: a) Coal mining and site conversion and reuse; b) Power Generation from coal; c) Non-ferrous metals transformation; d) all the satellite activities connected with the points a), b) and c). We provide a brief description of the four points from a) to d) below.

- *Coal mining and site conversion and reuse.* The local coal mine, the Nuraxi Figus coal mine, stopped the extraction activities in 2018. The coal mine is running a ten-year plan of reclamation (expected to end in 2027). Nevertheless, CARBOSULCIS, the regional-owned company managing the Nuraxi Figus coal mine, is still active, and a set of activities have been started to use the peculiar features of the site for R&I use in different domains, such as cryogenic distillation for the production of isotopes (project ARIA), energy storage (ES project), desulphurisation of coal for the production of fertilizers (FeDe project), geological storage of CO<sub>2</sub> techniques (Ulisse project), testing of photobioreactors for the cultivation of Spirulina algae (SPIRULINA project),

Figure 4– The Coal and Carbon Territory (CCT)



Source: Own elaboration

- *Power Generation from coal.* Two coal power plants are based in the CCT. The Grazia Deledda Power plant is a 590 MW coal power plant that is expected to phase out, like the other Italian coal power plants, by 2025. The power plant – which also has an extra 880 MW of thermic power, is managed by ENEL, the national energy company. The power plant is expected to be shut down after the national coal phase-out. The coal phase-out of the power plant was initially planned for 2025, but it was recently discussed that the phase-out date should be extended to 2028. In the context of uncertainty cast by the Russian war in Ukraine, these dates are also uncertain. Another small coal power plant, which is already inactive, is the Portoscuso Power Plant, also owned by ENEL, which has a total power of 320 MW and is placed in the Portovesme industrial area.
- *Non-ferrous metals transformation.* In the Portovesme industrial area, there are three main companies on non-ferrous metals transformation (almost focused on aluminium): two of them, i.e., Euralluminia and Alcoa, stopped production, while one of them, i.e., Portovesme Srl, is still operating. The non-ferrous metal industries are among the main employees in the area, and their closure and seizure determined in the last 15 years the loss of around three thousand direct jobs in the area. Other activities of non-ferrous metal transformation were closed in the past, among them, there was the Sardamag (which worked with magnesium on the Sant'Antioco island).
- *Satellite activities.* The above-mentioned activities of large businesses are accompanied by a certain number of satellite activities managed by SMEs, which, in principle, rely on the industrial specialisation of the area. Thus, the current situation of fast change and dismissal of the traditional economic activities of the area is also impacting a larger number of businesses.

Overall, the Coal and Carbon Territory is organised as an industrial district, in which the different components are supposed to work as input to the others (coal, for power and heat generation, which in turn are used for metal transformation). As a matter of fact, as many of these components no longer work, or work under different circumstances, the industrial synergies, as the history below clearly shows, are not working as planned.

### 3.1.2 Historical Development

The territory that we analyse can be divided into two main sub-areas: the Sulcis mountains, forming a semicircle (and including also some towns that have not been included in the CCT) and the coastal area near Portoscuso, flatter. The Sulcis area, which was known since ancient times for the richness of minerals in the soil, was populated as early as the Neolithic and in ancient times it was a destination for Phoenicians, Punics and Romans, also attracted by maritime traffic and fisheries. In the middle ages, the two sub-areas had different specialisations: while the internal area had a pastoral and agricultural vocation, on the coast (and on the islands), the prevailing activities were fisheries, with a particular emphasis on tuna commerce (as the area was in the tuna routes from the Atlantic to the Mediterranean Sea) (Pessina, 2018).

Starting from the second half of the 19<sup>th</sup> century, it starts the mining revolution in the area. The mining industry was fostered by the Savoia Kingdom's domination of Sardinia Island. At that time, mining activity was strongly launched in Sulcis and also in the neighbour region of Iglesiente. The mining industry had an impact on both areas: in the internal area, there was a shift from farming to

the mining sector, while on the coast, the fishing activities were rapidly accompanied and substituted by maritime transport and materials exchanges. The connection between the two areas was fostered by the development of a railway connection for the transport of materials (and people), which was active until the 20s of the 20th century. While the mining activities in Iglesiente were focused on non-ferrous metals, the CCT Sulcis area specialised in the extraction of coal. Coal mining activity started in 1889 in the localities of Bacu Abis and Terras Collu, and the extraction peaked during the First World War.

Extractive activities had a setback in the following decade and then resumed in 1935, when the autarchic policy was adopted by the fascist regime, despite the low quality of Sulcis coal, due to its low calorific value and its high content of sulfur. Between the end of the 1930ies and the beginning of the 1940ies, new mines were opened in the area between Iglesias, Portoscuso and Carbonia (Seruci, Serbariu, Cortoghiana, Nuraxi Figus) and the founding city of Carbonia was created, the symbol of the autarchic era (Carboni et al., 2015). The demand for coal remained high until the immediate postwar period, but following the reopening of the international markets, which took place in 1947, the coal of Sulcis proved to be uncompetitive, and the decline of the Iglesiente mines began. From over 17,000 employed in mining and related activities after the war, it increased to 2,000 in the early 1960s (Carboni et al., 2015).

To balance the loss of employment, starting in the 1960s, there was a new wave of national investments in the area. For the coal sector, a development program for the exploitation of coal was launched through an energy-metallurgical chain, which included the modernisation of the mine, the construction of a large thermoelectric plant (the Grazia Deledda Power Plant) and the laying of an underwater power line for the interconnection/integration with the national grid, necessary to eventually convey a part of the energy not consumed in Sardinia towards the Italian peninsula. For the non-metal transformation sector, the Portovesme industrial nucleus was designed, in the mid-sixties, mainly as an area for the processing and enhancement of minerals extracted in the area behind it, a territory in which in those years emigration was causing a dramatic decline in the resident population (Gherardini, 2013).

Despite these plans, the low quality of the Sulcis coal and its high environmental impacts resulted in anti-economic activity, and different passages of ownership of the coal mines between different public or semi-public bodies (Enel, Eni and then Sardinia Region through Carbosulcis), the coal mine was kept open with public funds, but the power plant worked with both locally produced and imported coal. In 2014, after an infringement investigation, the European Union 2014 ruled on the presentation of a closure plan as an alternative to a system for maintaining the activity that is no longer acceptable in terms of European competition. Hence a closure plan established the end of production activities by 2018 (CARBOSULCIS, 2021).

Starting from the 2000s, the Portovesme Industrial Complex started to be decommissioned mainly due to rising energy costs and the scarce competitiveness of production on the international scene. In 2008 the plants of Eurallumina closed and starting from 2009, the production of ALCOA decreased, stopping completely in 2012. In the context of the divestment, numerous industrial companies are also involved, in addition to the Thermoelectric Plant of Portoscuso, whose energy production was closely linked to the activity of the surrounding industries and ceased permanently in 2012.



The closure of the businesses was followed by a strong employment crisis in the Portoscuso area and, more generally, in the Sulcis area (Pessina, 2018). In the same years, starting from 2012, a "Sulcis plan" was developed by the Sardinia Region with the support of the Italian government to relaunch the economy of the area by attracting investments to save the metallurgical sector, diversify the productive sectors and promote environmental safeguard. Despite good results in terms of commitment to funds, resulting in 82% of the resources committed, the payment performance of the Plan was poor, with payment only slightly above 21% of the committed resources (Regione Sardegna, 2019a). This resulted in a delay or even a halt in the implementation of the Plan, whose activities have been suspended in 2019.

In the context of the substantial failure of the Sulcis plan, and the persistence of the economic and productive, demographic, and social crisis in the area, the announcement of the phase-out from coal arrives in 2019, somehow jeopardising the previous investment plans in the area. The uncertainty about the future of the CCT was also increased with the recent plans for the Electrification of Sardinia (see the socio-political component in Chapter 5).

### 3.1.3 The ecological and environmental situation

The Portovesme Industrial area presents a very high degree of environmental degradation due to the presence of metal contaminants in the soils and groundwater, the outcome of lead, zinc and aluminium processing (Murgia, 2018). Inside the pole, there is also the so-called "Red mud basin", which collects the industrial waste of Euralluminia (Invitalia, 2013), and is extended over an area of about 180 hectares between the Portovesme Industrial Area and the sea. As early as 1990, the entire pole, following a resolution of the Council of Ministers, was included among the "Areas with a high risk of environmental crisis", and in 1993 the Pollution Plan for the area was defined, and the implementation of which was defined with a Program Agreement between State, Region and other local authorities in 1994. The Ministerial Decree. n. 468/2001 established the Site of National Interest for reclamation (SIN) Sulcis - Iglesiente - Guspinese, whose perimeter provisional was proposed in 2003 and defined in 2011 (Murgia, 2018). An ordinance was issued in 2014 by the Mayor of Portoscuso, given the analyses of the competent Local Health Unit (ASL), which established the "ban of marketing or distribution for any reason" of some products of the territory of Portoscuso (wine, grapes, olives, tomatoes, peppers, zucchini), informing the resident population of the municipality of the risks associated with the consumption of local products (Municipality of Portoscuso, 2014). In the area, there are several planned interventions of environmental reclamation, addressing both closed mining sites and former industrial areas. Among the areas to be reclaimed, there is the "Sardamag" in Sant'Antioco, a former industry of Magnesium, former mining areas in the Iglesiente region, and the area of the Portovesme Power Plant.

## 3.2 Stress-strain in the territorial organisation of the Sulcis' CCT

We present here the analysis of Sulcis's CCT through the lens of the socio-cultural component of the MAF. The analysis was devoted to analysing stress-strain in the territorial organisation of the CCT. Through the implementation of a focus group mapping – and combining that with other methods (such as text analysis and desk research) – we identified a set of 29 strain situations in the CCT, which constitute the empirical basis for the interpretation of stress-strain dynamics in the territory. In Section 3.2.1 we present the empirical results – i.e., the list of the strain situations identified, while in Section 3.2.2 we interpret them.

### 3.2.1 Summary of results

#### List of the strain situations mapped

A total of 29 strain situations were mapped in the case study (Table 2). A list of the strain situations and related features is provided in the table below. The table overviews the strain situation mapped, classifying each strain situation in relation to (a) the type of the strain situation identified, i.e., conflicts and disputes, impasses or contradictions, or dependence and related uncertainties; (b) the position in space; (c) position in time. A description of the strain situations is provided in Annex 3.

**Table 2– List of the strain situations mapped**

⚡	Name	Type	Geo	Time
1	Conflict on the New Sant'Antioco Bridge	Conflict	Sant'Antioco	2008
2	Debt of Carbonia City	Impasse	Carbonia	2000
3	ARIA project impasse	Impasse	Nuraxi Figus	2019
4	Geomining Park unfulfilled	Impasse	Sulcis	2001
5	Disinvestments in Aluminium Industry	Conflict	Portovesme	2009
6	Uncertainties generated by the coal phase-out decision	Dependence	Portovesme	2017
7	Conflict over local biomass production	Conflict	ENEL PP	2010
8	Conflicts on biorefinery investment plans	Conflict	Portovesme	2014
9	Uncertainty on the TJTP	Dependence	Sulcis	2021
10	Gaps in the digitisation of regional services	Impasse	Sulcis	2019
11	Lack of updates of the training system	Impasse	Sulcis	2012
12	Administrative bottleneck of investments	Dependence	Sulcis	2012
13	Dependence on external investments for broadband infrastructures	Dependence	Sulcis	n.a.
14	Impasses in the tourism sector	Impasse	Sulcis	n.a.
15	Conflicts with surrounding areas on Tourism development	Conflict	Sulcis	n.a.
16	Conflicts related to circular migration	Conflict	Carbonia	1950s
17	Conflicts on the siting of a Floating Storage Regasification Unit (FSRU)	Conflict	Portovesme	2019
18	Conflicts with "populist" environmental movements	Conflict	Sulcis	n.a.
19	Conflict upon the abolishment of the province institution	Conflict	Sulcis	2012
20	Conflict sparked by the "people of VAT number"	Conflict	Sulcis	2012
21	Conflict on land remediation of "Area 5"	Conflict	Portovesme	2017
22	Conflict on the Coaquaddus Therms	Conflict	Sant'Antioco	2011
23	Impasse on Seamag (ex-Sardamag) area reclamation	Impasse	Sant'Antioco	1990
24	Impasse on "sa Punta de s'Aliga" area reclamation	Impasse	Sant'Antioco	1990
25	Material heritage unexploited	Impasse	Sulcis	n.a.
26	Dependence on national bureaucracy under EU scrutiny	Dependence	Nuraxi Figus	2012
27	Political dependence by Cagliari	Dependence	Sulcis	2012
28	Conflict on Offshore wind park	Conflict	Offshore	2020
29	Conflict on Eurallumina power plant	Conflict	Portovesme	2013

Note: The symbol ⚡ stands for strain situations.

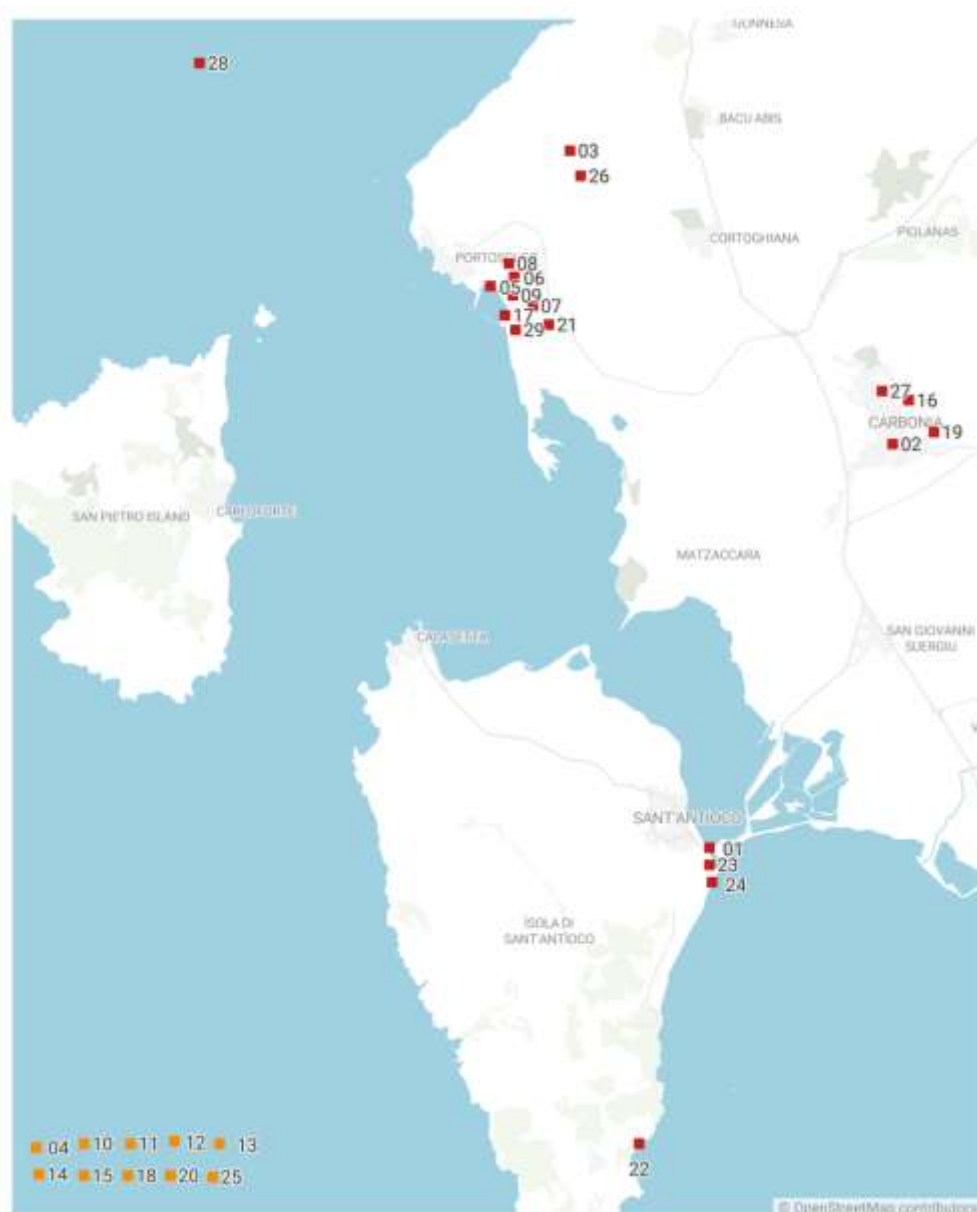
Source: ENTRANCES Focus Group Discussion.



### *Distribution of the strain situation in the geographical map*

Of the 29 strain situations mapped about 1/3 (10 out of 29) cannot be localised in a specific point of the map as they are related to the whole Sulcis/CCT area. These strain situations are represented in yellow on the map below (see Figure 5). The other strain situations are distributed across five different locations: 8 strain situations are sited in the Portovesme industrial area; 4 in Carbonia city; 4 in the Sant'Antioco island; 2 in the Nuraxi Figus coal mine; 1 offshore in front of the Portoscuso coast. These “sited” strain situations are visualised in red on the map. It is worth noticing that, while the Portovesme industrial area is the area with the highest number of strain situations, not all the strains of the territory are based there.

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



Note: The numbers represent a strain situation and are reported in Table 2. Strain situations which are not allocated to a specific place in the CCT are presented in yellow in the lower-left corner of the map.

Source: ENTRANCES Focus Group Discussion.

### *Distribution of the strain situations in the time map*

Table 3 shows the starting year of the strain situations mapped, and the duration of the strain situation. The table shows that except for ≈16 (“Conflicts related to circular migration”), all the strain situations started in phases 4, 5 and 6. Of all the strain situations mapped, only two can be considered over, while all the others are still present in the Coal and Carbon Territory. Interestingly enough, the duration of the strain situation mapped is rather high, with some of them lasting more than 10, 20 or even 30 years.

**Table 3– Strain situation over time**

Years	Phase	Strain Situation	Duration (years)
<b>1945-1953</b>	1. Postwar period	No strain situation mapped started in this period	-
<b>1953-1968</b>	2. A change of strategy	1950s: Conflicts related to return migration (≈16)	About 60
<b>1968 - mid90s</b>	3. The development of the metal industry	No strain situation mapped started in this period	-
<b>mid90s – 2012</b>	4. The decline of the coal and metal industry	1990: Impasse on Seamag (ex-Sardamag) area reclamation (≈23)	31
		1990: Impasse on “sa Punta de s’Aliga” area reclamation (≈24)	31
		2000: Debt of Carbonia City (≈02)	22
		2001: Geomining Park Unfulfilled (≈04)	20
		2008: Conflict on the New Sant’Antioco Bridge (≈01)	14
		2009: Disinvestment in Aluminium Industries (≈05)	12
		2010: Conflict of local biomass production (≈07)	over
		2011: Conflict on the Coaquaddus Therms (≈22)	10
<b>2012 – 2019</b>	5. In search of a solution to the crisis	2012: Dependence on national bureaucracy under EU scrutiny (≈26)	9
		2012: Conflict upon the province institution (≈19)	9
		2012: Conflict by the “people of VAT number” (≈20)	4
		2012: Political dependence from Cagliari (≈27)	9
		2013: Conflict on Eurallumina power plant (≈29)	8
		2014: Conflict on biorefinery investment plan (≈08)	over
		2017: Uncertainty generated by coal phase-out decision (≈06)	4
		2017: Conflict on land remediation of “Area 5” (≈21)	4
<b>2019 – 2021</b>	6. The coal phase-out	2019: ARIA project impasse (≈03)	2
		2019: Gap in the digitisation of regional services (≈10)	2
		2019: Conflict on the siting of FSRU (≈17)	2
		2020: Conflict on offshore wind park (≈28)	1
		2021: Uncertainty on the TJTP (≈09)	0

Note: The symbol ≈ represents strain situations.

Source: ENTRANCES Focus Group Discussion.

### **3.2.2 Interpretation**

This section is dedicated to interpreting what the strain situations mapped tell us about our unit of analysis, i.e., the CCT. The interpretation is divided into three subsections: (i) stress vectors, (ii) stress-strains, (iii) change, resistance to change and ambivalence. The three subsections describe

all the key aspects considered in the socio-cultural component. Subsection (i) deals with the vectors of change that are exercising pressure on the territorial organisation thus producing stress. Subsection (ii) deals with the stress-strains itself, and it describes what the stress is and how it manifests itself (stress-strain). Finally, subsection (iii) illustrates how under the pressure of the vectors, and in a context of stress-strain, the territorial organisation itself is changing, is resisting change and/or is in an ambivalent position between these two poles. While subsections (i) and (ii) consist of a descriptive interpretation, based on a list of stress vectors and stress-strains, subsection (iii) uses all the data collected and elaborated for providing a synthetic interpretation of the position of the CCT concerning change/resistance and ambivalence.

### i) Stress vectors

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 brackets. The list of the stress vectors identified is provided in Annex 4.

- **Disinvestments.** Two main vectors of change have been identified concerning disinvestments in the territory. ↗01: The public and private *disinvestments from the non-ferrous metal industries*, produced widespread and long-lasting chains of conflicts and impasses in the territory. One of the stresses produced in the territory concerned the closure or the halting of production of the industries which resulted in almost two decades of conflicts for preserving jobs and subsidies for the workers (≈05) and other categories indirectly impacted by such disinvestments (≈20). The disinvestments also produced impasses (≈23; ≈24) and conflicts (≈21) regarding the remediation and reclamation of lands formerly used for industrial purposes both in Portoscuso and in Sant'Antioco. Such impasses and conflicts are, apparently, difficult to overcome, as they last for decades even when funds for reclamation are available. This stall hinders land reuse and the exploitation of existing infrastructure both for industrial activities and for other purposes, such as housing, agriculture, or tourism. As for the latter, the current impasses are also blocking the deployment of the untapped potential of former mining and industrial sites (≈25). ↗02: Another form of disinvestment is related to the *scarce capacity of the public actors to fulfil and give continuity to their investments within the territory*. This form of disinvestment, which is surely also linked to the reduced economic capacity of public actors, concerns the impasses experienced by both infrastructural investments of the municipalities (≈02) and regional innovation strategic projects (≈03).
- **Exogenous private investments.** Even though exogenous private investments are normally considered desirable for peripheral territories, these financial flows have proven to be among the main stressors of the Sulcis CCT. In this respect, three stress vectors have been identified. ↗03: A first stress vector concerns *investments in renewable energy production*. Sulcis is a target of investments in both wind (≈28) and biomass energy production (≈08). Such investments generate opposition to the investments in the name of territorial and landscape defence, as well as internal conflicts among those in favour of the investments as a way to support local industries (and thus local employment) and to progress toward the energy transition and those oriented toward protecting local ecosystems and traditional – non-

industrial territorial vocations. ↯04: Moreover, the *investments in accommodation facilities*, generate stress in the form of conflicts both within the local community (where structures are seen as invasive of the natural environment) (≈22) and between Sulcis and the neighbour areas – which compete with Sulcis over limited resources (≈15).

- **Top-down development projects.** Different vectors of stress can be identified related to top-down development projects. ↯05: A first stress vector is related to development projects aimed at *restarting the aluminium industries of Portoscuso* by enhancing the local production of energy (≈07, ≈08, ≈17, ≈29). These plans, which foresee strong public support for private companies, generate deep conflicts within the local communities – among those supporting the industries and those concerned with the health and environmental damages of the industries within the territory. ↯06: A second stress vector concerns the *development projects oriented to transitioning from coal mining to other sectors such as R&I* (≈03) or tourism (≈04). Despite some successes, these projects often are blocked by administrative or financial impasses. This vector generates stress as development promises and perspectives of these projects remain unfulfilled. ↯07: A third stress vector concerns the *development projects on other territorial interventions*, focused on improving the quality of life of the local community, such as those related to transport and mobility. These development projects are developed without a strategic and shared vision of the territory, generating long-lasting conflicts, impasses and uncertainties on whether and how they will be realised (≈01, ≈09).
- **Public transfer and subsidies.** The adoption of public transfer and subsidies adopted to mitigate the symptoms of economic and social decline in Sulcis has paradoxically proven to be among the source of stress in the territory (on this issue see also Rodriguez-Pose, 2018). Two stress vectors have been identified in this regard in the Sulcis CCT. ↯08: A first vector is related to *transfers aimed at sustaining mining and industrial activities* carried out in the territory. Such transfers provided relief to the local economy, but they also exposed the territory to sudden shocks and crises. Such transfers generated stress in the form of dependence on national decision-making and national administrative capacities (≈26), such stress is enhanced in a context in which the space for state intervention in the market is reduced by European law and rules on fair competition. ↯09: A second vector is related to *subsidies aimed at compensating losses for the closures of local industries*. This vector generates internal and external conflicts regarding who should be targeted by such compensation mechanisms (≈20).
- **Global environmentalism.** Global environmentalism showed the presence of two different stress vectors. ↯10: On one hand, the *progressive shift toward top-down climate-oriented policies and regulation*, such as the decision of a short-term coal phase-out by the Italian government (≈06), is generating uncertainties about what will come next, what concerns energy generation and energy use – a key for the carbon-intensive industries in Sulcis. ↯11: On the other hand, *environmentalism also spreads at the local level*, where bottom-up actions are implemented to contrast structural or infrastructural interventions (≈08, ≈21, ≈29), implementing a strategy of territorial defence (≈18).
- **Urban-centred ideology.** ↯12: An important stress vector that can be identified through the analysis of the strain situations is an *ideologically driven depowering of the province institution*, ongoing both in Sardinia and Italy. In the CCT this vector of change provoked

stress in terms of conflicts in the design of the different provinces in Sardinia (≈19) and resulted in a situation of political dependence on the regional capital city of Cagliari (≈27). The depowering of the province institution also generated a loss of local political representation in Sulcis.

- **So-called populism(s).** ↗13: A vector of change related to this factor is the *spread of reform populism* in Sardinia and Italy. Such a form of populism framed citizens as victims and political and societal institutions only as aimed at privilege and power conservation. This vector triggered conflicts within the local community (≈20) and at the regional level (≈19).
- **Digitalisation.** Two vectors may be identified related to digitalisation processes in Sulcis.
  - ↗14: The *digitisation of bureaucracy* is leading to contradiction and impasses at the regional level, which hinder easy development and the management of economic activities (≈10).
  - ↗15: The development of *new digital markets* is challenging the coal and carbon territory due to both the lack of a training system able to prepare for the digital market (≈11) and the *reluctance to invest in broadband infrastructures* and the gap cumulated creates stress in the form of uncertainty in the local community (≈13), thus determining low competitiveness of the territory in the digital market.

## ii) Stress-strain

Once identified the main vectors of change that are “pushing” on the territory and creating stress in the territorial organisation, we can analyse here how this stress and strains manifest. Through reading horizontally, the strain situations we have singled out recurring forms of strains within the CCT. The recurring forms of strain are coded in progressive order and marked using another special symbol “✧01”. Each recurring form of strain is shortly described and a reference to the strain situations related to this recurring form is provided in brackets. A list of the recurring form of strain is available in Annex 4.

**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. The first type of recurring conflict is between ✧01: *environmental protection and development projects*, in which the creation of jobs and employment is seen as opposed to the need of preserving the natural environment, the landscape, or citizens' health and safety (≈18). This type of conflict can be singled out in different investment sectors such as in projects for developing (or re-opening) the aluminium industries (≈17; ≈29); concerning land remediation (≈21); in the instalment of renewable energy plants (≈07, ≈08, ≈28); in tourism sector (≈22). The second type of conflict or tension that can be singled out is between ✧02: *permanent work and independent workers* (≈20). A third type is related to ✧03: *conflicts of interest between the CCT and “Low Sulcis”*, an area more devoted to farming and agriculture rather than coal mining or the industry (≈08). The external conflicts are mostly related to ✧04: *conflicts with private companies in the aluminium or energy sectors*, which are also often associated with ✧05: *conflicts with the national and regional governments*, in their role of arbiter and guarantors (≈01, ≈05). Finally, the research revealed a ✧06: *conflict between Sulcis and Cagliari* both as a territory and as a centre of power, in different domains, including tourism (≈15), and energy (≈17).



**Impasses and contradictions.** Many of the impasses mapped in the research are related to the ❖ 07: *reclamation or reuse of former mining or industrial sites or landfills*. In this respect, some of the impasses mapped are related to land reclamation (≈23, ≈24, but also ≈21), others to the deployment of the mining and industrial heritage (≈04, ≈25), and further others to the deployment of the former mining sites for innovative projects (≈03). Other impasses, seem to be related to the ❖ 08: *difficulty of creating, developing, or updating a territorial system* in different sectors, such as tourism (≈14), training (≈11), or administrative services (≈10). This impasse seems due to a mix of social fragmentation – in particular among the different municipalities – and weakness of the regional administrative machine, both these problems have been exacerbated since the province institution has been revised and disempowered. Finally, we have found ❖ 09: *impasses in public spending of local municipalities*. Due to their precarious financial and economic situation, when the municipalities do some investments they are exposed to debt leading to the inability to act (≈02).

**Dependence and uncertainties.** Through the analysis of the strain situations, we have identified different forms of stress by dependence and uncertainty. Firstly, the Coal and Carbon Territory is ❖ 10: *deeply dependent on national decisions concerning the energy transition*. This form of territorial dependence and vulnerability was made obvious by the decision to phase out coal (≈06), which was taken without previous local consultations, in the absence of a territorial impact assessment, and before formulating a plan of territorial transition from coal. Even when the European Funds available through the Just Transition Fund requires the formulation of a territorial plan (TJTP), local actors have been consulted only in a scattered, fast, and tokenistic way, where real decisions are taken at the national level, creating further uncertainties on what will come next (≈09). In a regime of European scrutiny over the market, the CCT is not only exposed to national decisions but also failures in the national bureaucratic machine, as administrative errors translate into huge territorial damages (≈26). In other domains (different from the Energy transition), the territory has also ❖ 11: *dependency on the region*. The research finds out that territorial interventions and plans find a bottleneck in the regional administrative capacities (≈12) and most decisions are taken in the regional capital of Cagliari as the Carbonia-Iglesias province has been dismantled (≈27). Finally, the territory, like other parts of Sardinia, is ❖ 12: *dependent on national or international companies* (and/or on governmental interventions) to fill the gap in digital infrastructures as well as other infrastructures.

**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 a 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 policymaking and by other actors. Paradoxically, all the measures that could offer a good occasion to cope with stress at the territorial level, such as the establishment Sulcis Plan, the reform of the provinces, or the grant of the Just Transition Fund, resulted in increased stress and strains in the territory.

### *iii) 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 interpretation of territorial identity and visions of the territory in the future. On one hand, the territory is dominantly interpreted in continuity with the past and with its present as a coal mining and industrial area. This interpretation is reflected in the development plans and investment plans in the territory, most of which are aimed at re-launching or keeping open the industries of Portoscuso or deploying the territory as an energy hub (with the instalment of GNL and wind energy infrastructures). Even the strategies that are aimed at changing territorial vocation and re-orienting the territory toward new sectors, such as R&D and tourism, present elements of continuity with the coal and carbon features of the territory, respectively by deploying the peculiar feature of the coal mine for launching an R&D hub, and with plans to deploy coal and industrial structures and infrastructure for tourism. On the other hand, the research has registered a deep and widespread anti-industrial attitude, which leads to the rejection of any attempt to perpetuate or re-launch the industrial or energy production activities in the area. The motivations for such rejection are: industrial activities have already proven to be unprofitable and unstable; they can produce further environmental and social damages to an already damaged territory; and they prevent the development of other sectors such as tourism, agriculture and fisheries. This ambivalence between continuity and rupture, in the interpretation of the Sulcis area, is also proved by the presence of both old-time nostalgia - in terms of industrial and mining nostalgia - and anti-industrial attitudes.

#### ***b. Territorial boundaries: between distinctiveness and alignment.***

The research has shown how the distinctive feature – the reliance on coal and carbon-intensive industries – of the region is under threat since the second world war. Among the main threats to Sulcis as a coal mining and non-ferrous metal producer territory, there was the process of unification of European markets of Coal and Steel, the globalisation of the market, and the privatisation of state-owned companies due to the low quality and competitiveness of Sulcis coal, to stricter rules for fair competition in Europe, and the convenience of relocation of productive activities in middle or low-income countries. Despite this threat, the territory has always managed to defend its distinctiveness, even though, through the intervention of support from the outside, mainly from public actors in the National and Regional governments. The fight with the national government for compensating the loss of industrial closure for local SMEs and professionals, rather than only for the workers, and the establishment of a Sulcis plan, 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 section above, the territory has also shown tiredness and a rejection of this reliance on coal, in industrial production and energy generation, and the desire to take other paths, more aligned with the features of other territories in Sardinia, as the willingness to develop a re-launch of the region based on tourism, agriculture and fisheries. 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. First of all, it should be stressed that since the 19th century, the territory has been systematically shaped following the model of the company town. The territory has thus developed a consolidated culture of dependence on external intervention. The analysis of stress highlighted a recurrent action pattern: request of intervention, external intervention on the territory, and generation of stress in the form of conflicts, impasses, or uncertainties. 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. In the context of the rapid shift toward a decarbonised energy system changes in rules and plans happen very rapidly, and the current institutional setting seems unable to ensure that territorial views and needs are properly considered. *Secondly*, with the recent reform of the province institution, Sulcis territory has lost the institutional body that was dedicated to territorial management. The power shift from the province to the Region has meant a loss of sovereignty over the territory. The first effect of this shift has been the dismantlement of the previous territorial system, and a consequent loss of capacities for example in the sectors of tourism or training. Another effect of this shift is the institutional fragmentation of the territory, which is now divided into a set of medium or small municipalities, without an institutionalised space for dialogue and decision-making. Finally, the shift from the province to the region, means that the key decisions are taken in the regional capital of Cagliari, and this not only means a gap in the knowledge and understanding of local needs but also that some key decisions are taken into another territory which is also in competition for the already scarce public resources in the island. The Sardinia region, which is currently the only institutional level at an intermediate position between the state and the municipality, has proven to be not able to steer the processes of transition to ensure the inclusiveness of local actors and the effectiveness of an inclusive territorial transition. This is also due to the lack of effectiveness of the established governance practices, based on multilateral dialogue among a pre-defined set of stakeholders, such as trade unions, companies, public institutions, etc. These actors, who once represented the different souls of the territory, have lost their capacity to represent the multiplicity of viewpoints and needs of the citizens in the territory. While the established practices of “territory making” seem to fail their task – i.e., creating convergence among citizens on territorial directions and priorities –, new practices of territorial governance have not been established yet.

### ***d. Territorial symbols: between myth and stigma.***

At the symbolic level, the research has documented the presence of a strong Territorial Stigma. The stigma characterises both the Sulcis territory, which is represented as characterised by irremediable pollution, unemployment, detrimental disorganisation, and without a future, and the population, which is portrayed as disorganised, lazy, and with other moral deficiencies. The territorial stigma portrays the whole of Sulcis as a polluted and declining industrial area, despite the industries being concentrated just in a small area of the historical region of Sulcis. The stigma is perpetuated both from within the community and from the outside and is reinforced by the social problems that affect the area. The stigma is also bolstered by the historical origin of the Sulcis people from Africa: through local jokes and epithets referring to Sulcis people as Africans, the stigma of Sulcis is reinforced by the Stigma of Africa. The Stigma should be interpreted also



in light of very high territorial self-esteem documented in the period of coal mines, where the miners and the whole territory benefitted from high social status and a widespread perception of the central role of the territory in public life. Partially these feelings are still present, e.g., in the pride of the energy autonomy of Sardinia, thanks to its two coal-fired power plants. Despite these detrimental images, the research has also registered a tiny re-emergence of “coal” as a positive and motivating symbol for the territory. With the success of the national museum of coal and the launch of avant-garde R&D projects carried out by Carbosulcis in the Nuraxi Figus coal mine, a symbolic inversion has started. Even though this process is just at its inception, the stigma on coal as a dirt and polluting element is also perceived as an element of territorial rebirth. Finally, the research has shown that Sulcis territory has available a rich symbolic reservoir, including the following myths: Sulcis, as the place where Sardinia's civilisation, started a territory that passed through and survived millennia of different civilisation processes and that preserved memories of his past; Sulcis as land that influenced Italian writers, artists and thinkers; Sulcis as the frontrunner of the fight for the worker's rights both in the past and in the present.

### 3.3 Place attachment and decarbonisation

In the previous section, we analysed the territory as a form of social organisation. Now we will focus on the socio-psychological dimension of the residents of the Coal and Carbon Territory. Through a self-administered online survey that reached 386 residents of the CCT, we have investigated how people's place attachment and perceived impacts of decarbonisation are affecting the coping strategies of individual citizens in the area. The analysis, therefore, enriches and complements the one developed in the socio-cultural component above. As in the previous section, we will present the empirical results (Para 3.3.1) and then interpret them in light of the socio-psychological approach proposed (Para 3.3.2).

#### 3.3.1 Summary of results

##### *Profile of the respondents*

In the case of Sulcis, of the total of 386 respondents, 50.6% are women and 49.2% are men (0.2 “other”). This gender distribution represents approximately the proportion of both sexes in the total population of the area. In terms of age distribution, the majority of the 137 respondents (35.5%) belong to the 46-65 age group, followed by 111 (28.9%) respondents from the 31-45 age group, 58 (15.0%) from the 65+ age group and the remaining 80 (20.7%) from the 18-30 age group. Education is an important characteristic affecting living standards and labour market position. Among the respondents, 112 (29.2%) have university degrees, 41 (10.6%) completed some professional training, 213 (55.2%) have completed secondary education, and 20 (5.2%), have primary education or less.

For what concerns employment, most of the respondents are either employed (221, 57%) or retired (65, 16.8%). A small number of respondents are unemployed (37, 9.6%); while the number of inactive is a little bit higher (63, 16.3%).

Of the 221 respondents who are currently employed, approximately half of them work in the service sector (106, 48.0%), one out of four is employed in industry (61, 27.6%), and one out of five in the public sector (47, 21.2%), a small percentage is employed in agriculture (4, 1.8%), and a small people has not answered to the question (4, 1.8%). It is worth mentioning here that of the 61 respondents employed in the industry, 55 are currently working in a coal-related or fossil fuel-

intensive industry (90.1% of the employed in the industry and 14.3% of the total number of respondents). It is also worth mentioning that among those not employed in the industry (including thus also the retired, unemployed and inactive) 53 (13.7%) respondents had previously worked in coal-related industry, making the total percentage of those working in such industries or that have worked there, more than one-fourth of the respondents (108, 28.0%).

In terms of marital status, around half (192, 49.7%) of the respondents were married, while 152 (39.4%) were never married. Of the remainder, 26 (6.7%) were divorced or separated and 15 (3.9%) were widowed. Of the total respondents, 200 (51.8%) were living with dependents (children under 16 or relatives over 65).

**Table 4– Profile of the respondents of the survey conducted in the Sulcis case study**

Sample Size 386 Valid answers								
Gender	Males(190, 49.2%)			Females (195, 50.6%)		Other (1, 0.2%)		
Age	18-30 (80, 20.7%)		31-45 (111, 28.8%)		46-65 (137, 35.5%)		65+ (58, 15.0%)	
Education	Primary (20, 5.2%)		Secondary (213, 55.2%)		University (112, 29.0%)		Professional (41, 10.6%)	
Occupation	Industry (64, 16.6%)	Agriculture (4, 1.0%)	Services (106, 27.5%)	Public Servants (47, 12.2%)	Unemployed (37, 9.6%)		Retired (65, 16.8%)	Inactive (63, 16,3%)
Working in Carbon Industries	Yes (55, 14.3%)				No (331, 85.7%)			
Worked in carbon industries	Yes (53, 13.7%)				No (333, 86.43%)			
Marital Status	Never married (152, 39.4%)			Married (192, 49,7%)	Divorced/ Sep. (26, 6.7%)		Widowed (15, 3.9%)	
Living with dependents	Yes (200, 51.8%)				No (186, 48.2%)			
Nativity	Born in Sulcis (319, 82.6%)		Born in other parts of Italy (62, 16.1%)		Born outside Italy (5, 1.3%)			
Duration of Stay	0-5 years (4, 1.0%)		6-10 years (9, 2.3%)		11-20 years (20, 5.2%)		20+ years (353, 91.5%)	

Note: Numbers and corresponding proportion of the total of the respondents are provided.

Source: ENTRANCES survey data.

The level of place attachment and the social bond with the local population depends to a large extent on the length of time spent in the region. People who were born in the region or who migrated when they were very young have more attachment to the place compared to newcomers. Of those surveyed, 319 (82.6%) were born in Sulcis, followed by 62 (16.1%) born in other provinces of Italy, and only 5 (1.3%) were born outside Italy. Most of the interviewees have lived in Sulcis for more than 20 years (353, 91.5%).

### **Socio-psychological profile of the region**

In the survey, we collected data on several aspects related to the socio-psychological well-being of the inhabitants of the Sulcis area, which is facing decarbonisation policies. We collected information on the degree of attachment to place (including place identity, place dependence, place attachment and social bonding), some key personal attributes (including resilience and optimism), the threats and impacts of decarbonisation (including perceived stress, perceived fairness, economic hardship, economic optimism, and nostalgia) to which they are exposed, faced

by different respondents and the coping strategies (including “intention to relocate”, “personal reinvention”, “support”, “resistance and protest” and “submission”) adopted by different respondents to cope with the adverse impacts of decarbonisation policies. All the information is collected with the help of 17 batteries of items in the questionnaire representing different constructs or latent factors. Table 5 shows the mean scores with standard deviation and Cronbach's Alpha for the different factors/constructs.

The table shows that the respondents present medium to high average scores in place attachment factors, with a peak high on “place identity”. As for the personal attributes, the respondents have on average a high score on resilience and medium to low scores on optimism. The decarbonisation impacts are also low to medium, most of them with an almost medium average score. As for the coping strategies, “support” and “submission” are those that received a higher score on average, while “intention to relocate”, personal reinvention, and resistance and protest obtained a lower score, indicating that on average these coping strategies are less frequently adopted. Life satisfaction is on average a bit above a medium score.

**Table 5 –Mean score and standard deviations for all factors**

Factors/ Latent constructs	Sub constructs	Mean score	Standard deviation	Cronbach's Alpha
Place Attachment	Place Identity	4.20	0.90	0.92
	Place Dependence	3.20	1.12	0.89
	Place Rootedness	3.51	0.6	0.60
	Social Bonding	3.39	1.02	0.66
Personal attributes	Resilience	3.98	0.63	0.81
	Optimism	2.74	0.66	0.93
Decarbonisation Impacts	Perceived Stress	3.01	0.84	0.74
	Perceived Fairness	2.98	0.90	0.89
	Economic Hardship	2.48	0.94	0.82
	Economic Optimism	3.03	0.96	0.90
	Nostalgia	2.74	0.66	0.93
Coping Strategies	Intention to relocate	2.63	1.18	0.89
	Personal reinvention	2.56	1.02	0.78
	Support	3.22	0.91	0.89
	Resistance and Protest	2.65	0.93	0.82
	Submission	3.20	0.70	0.28
Life Satisfaction		3.29	0.89	0.89

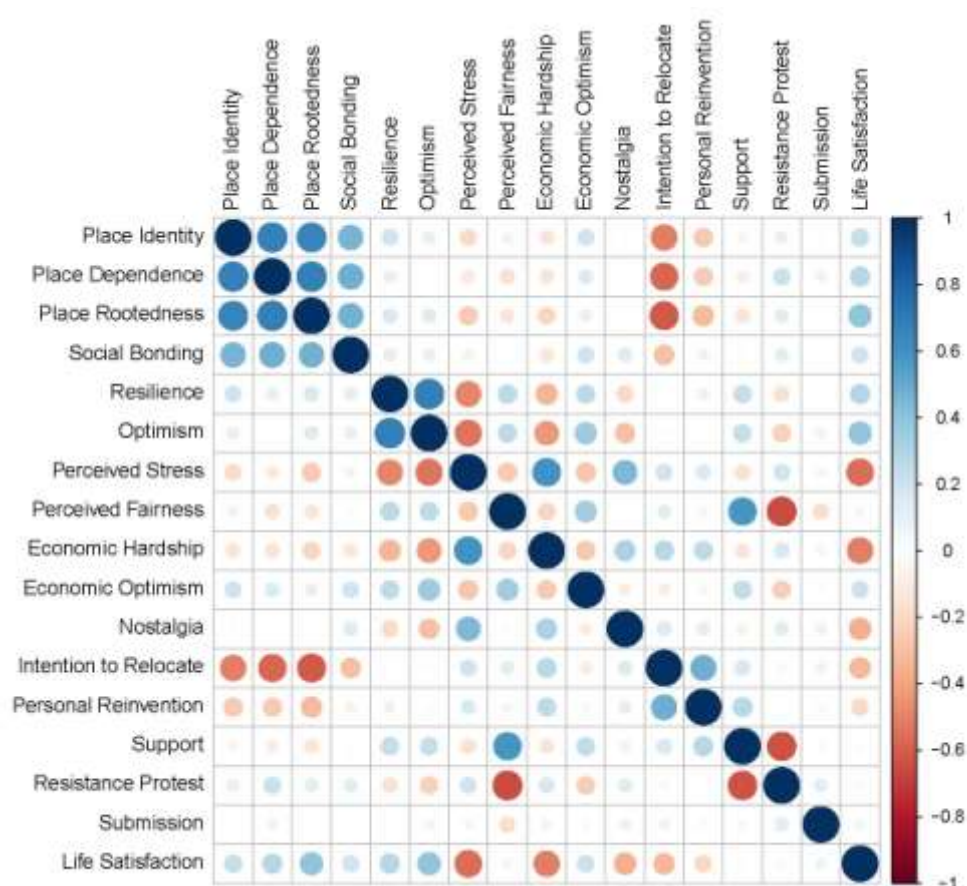
Note The factor mean is the average of all respondents' scores for each construct. A mean score close to 5 shows a higher value for all constructs, and a mean score close to 1 shows a lower value for all constructs. Cronbach's Alpha provides a measure of the internal consistency of a test or scale indicate (Cronbach, 1951); it is expressed as a number between 0 and 1. Internal consistency describes the extent to which all the items in a test measure the same concept or construct and, hence, it is connected to the inter-relatedness of the items within the test. An alpha score below 0.7 is not acceptable. A score below 0.7 is highlighted in red in the table above.

Source: ENTRANCES survey data.

### Correlation of factors

In the case study of Sulcis, we found a strong positive correlation between different elements of place attachment (Figure 6). Similarly, we found a strong positive correlation between the two factors related to personal attributes, i.e., resilience and optimism. Such factors have a negative correlation with the Perceived Stress factor. In terms of coping strategies, there is a strong negative correlation between the factors “support”, “resistance” and “protest”. This is evident because if a person supports the decarbonization process, they are unlikely to engage in resistance and protest activities. Similarly, there is a strong negative correlation between the Perceived Fairness and Resistance and Protest factors, and a positive correlation between the Perceived Fairness and Support factors, which is to be expected. Both place attachment and resilience-optimism indicators have a positive correlation with the Life Satisfaction factor, while Life satisfaction is strongly negatively correlated with perceived stress and economic hardship.

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



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

Source: ENTRANCES survey data.

### Gender differences

Among the 17 factors analysed, seven resulted in a significant difference between men and women (p-value <0.05, marked in red in the table below). Women show a significantly lower

degree of attachment in two of the four dimensions of place attachment investigated in the survey, i.e., place dependence and place rootedness, reflecting the functional and cognitive dimensions of place attachment. Moreover, Women score higher in all the factors related to decarbonisation impacts, with a significant difference in three of them. Finally, women show a lower degree of submission than men and a lower degree of life satisfaction than men (Table 6).

**Table 6– Gender differences in mean score for all constructs**

Factors/ Latent constructs	Sub constructs	Mean score		T-test (df 504)	P-values
		Men	Women		
Place Attachment	Place Identity	4.3	4.1	1.233	0.218
	Place Dependence	3.4	3.0	2.833	0.005
	Place Rootedness	3.6	3.4	2.176	0.030
	Social Bonding	3.4	3.4	-0.544	0.587
Personal attributes	Resilience	4.0	4.0	-0.899	0.369
	Optimism	3.7	3.8	-1.450	0.148
Decarbonisation Impacts	Perceived Stress	2.7	2.8	-1.747	0.081
	Perceived Fairness	2.9	3.1	-2.789	0.006
	Economic Hardship	2.9	3.0	-2.172	0.030
	Economic Optimism	2.3	2.6	-2.925	0.004
	Nostalgia	2.9	3.1	-1.851	0.065
Coping Strategies	Intention to Relocate	2.5	2.7	-1.566	0.118
	Personal Reinvention	2.5	2.6	-1.454	0.147
	Support	3.2	3.3	-1.258	0.209
	Resistance and Protest	2.7	2.6	0.634	0.526
	Submission	3.3	3.1	3.523	0.000
Life Satisfaction	Life Satisfaction	3.4	3.2	2.062	0.040

Note: Meanscore indicates the mean score for all constructs. A mean score close to 5 shows a higher value for all constructs and a mean score close to 1 shows a lower value for all constructs.

Source: ENTRANCES survey data.

### 3.3.2 Interpretation

Based on the data collected with the survey, we can, with some caution, provide an interpretation of place attachment, decarbonisation impacts, and coping strategies adopted in the CCT.

*Place attachment.* Place attachment has been surveyed across four different dimensions, i.e., the symbolic dimension (place identity), the functional dimension (place dependence), the cognitive dimension (place rootedness) and the emotional dimension (social bonding). While the survey shows a middle to high average level over the functional, cognitive, and emotional dimensions, it marks a remarkably high score on average in the symbolic dimension (place identity = 4.2). Place attachment is thus nurtured across all the dimensions, but the symbolic dimension is the strongest one. This piece of evidence shows that the Sulcis CCT significantly contributes to the inhabitants' sense of self and identity e.g., developing a sense of who they are and what is their place in the



world. While the long-lasting socio-economic crisis in the CCT may have weakened the functional and social bonds over the territory, its rich symbolic identity is still very high.

*Decarbonisation impacts.* The respondents have a medium to low perception of economic hardship (i.e., feeling their financial situation as non-secure or at risk) and a medium to a low degree of old-time nostalgia. The survey also indicates medium results for all the other indicators of decarbonisation impacts. In general, it seems that there is not a dominant positive or negative idea about the prospect of the territory under decarbonisation.

*Coping strategies.* The coping strategies show an interesting result. Indeed, of the five coping strategies considered in the questionnaire, the two that seem to be the dominant ones are those more “passive”, as they imply support for the current decarbonisation process or submission to it. These two strategies receive a much higher score on average (respectively 3.22 and 3.20) than the three strategies based on active engagement, i.e., Intention to relocate (2.63), personal reinvention (2.56) and resistance and protest (2.65). Among the three coping strategies considered in the theory behind the questions, Exit-Voice-Loyalty-Neglect, it seems that Loyalty and Neglect are dominant among the respondents. Nevertheless, it is worth noticing that the Exit strategy (represented here with “intention to relocate”) has not obtained a very low score and it has a relatively high variance (the highest of the 17 constructs), indicating that, at least for a portion of the respondents the option to relocate has been seriously considered. In general, as the survey is not statistically representative, what we can state is that the three strategies seem to be significantly present in the CCT.

*Personal attributes.* It is puzzling to interpret the average results of the two personal attributes considered, i.e., resilience and optimism. It is noteworthy that resilience scores rather high on average (3.98), while optimism scores much lower (2.74). This difference may be interpreted in the light of “defensive pessimism” (Cantor & Norem, 1989), where a certain degree of pessimism is functional to protect resilience capacities, and where a higher degree of optimism may expose to higher vulnerability if circumstances don’t improve. This interpretation should be taken with caution as “defensive pessimism” has not been directly assessed as a construct in the survey. The presence of high resilience and low optimism makes sense in light of the results about coping strategies, seeing passive/conservative options (Loyalty) privileged over the active and disruptive ones (Voice/Exit) on average.

### 3.4 Conclusions

The organisation of the Sulcis CCT is exposed for a long time to profound stress and strains, including all the forms of organisational stress that we have considered, i.e., conflicts, impasses and dependence. The territorial organisation is experiencing a deep ambivalence about what the territory is and what it should become next. Moreover, due to regressive institutional change, widespread fragmentation, and polarisation of the population the territory has weakened its capacity to exercise endogenous governance. This observation is mirrored by the relative lack of optimism and by an apparent prevalence of passive coping strategies over active ones. However, despite the presence of territorial stigma, the territory is endowed with a rich symbolic reservoir, and with a high degree of place attachment 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

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## SOCIOECONOMIC 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 here both to the Province of South Sardinia (NUTS3), which is the province where Sulcis is placed and the Sardinia Region (NUTS2), which also has other carbon-intensive territories, as the main units of analysis. We will use national and European data for comparison.

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.<sup>5</sup> Real GDP per capita ( $Y/N$ ) can be decomposed into three components, i.e., labour productivity ( $Y/L$ ), the employment rate ( $L/E$ ) and the share of the population of 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.<sup>6</sup>

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 in 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 6 provides an overview of the determinants of economic development in South Sardinia Province and Sardinia Region, as compared with Italy and EU-28.

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

<sup>6</sup> 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.

The labour productivity (Figure 7a) in both the South Sardinia Province and the Sardinia Region show similar values – with South Sardinia showing slightly lower productivity. The labour productivity of both the Units of analysis has been lower than the national average for the whole period. The labour productivity of both South Sardinia and Sardinia as a whole decreased in the last two decades. A similar trend is also registered for Italy, making the gap between Italy as a whole and Sardinia unchanged in the period considered. While in 2000 the labour productivity of both our units of analysis was much higher than the EU average, this gap has almost been filled due to the decrease in labour productivity in Sardinia and the steady and rapid increase in labour productivity in the European Union.

In the period from 2002 to 2020, the population of South Sardinia decreased by 7.2% (see Figure 7b). In the same period, the population of Sardinia as a whole slightly increased at first, with a peak in 2015 (+1.9% compared to 2002) and then started declining more rapidly with a low in the last data available i.e., in 2020 (-1.3% compared to 2002). As a reference for comparison, in the same period, the population of Italy has grown by 4.0% and that of the European Union has grown by 4.2%.

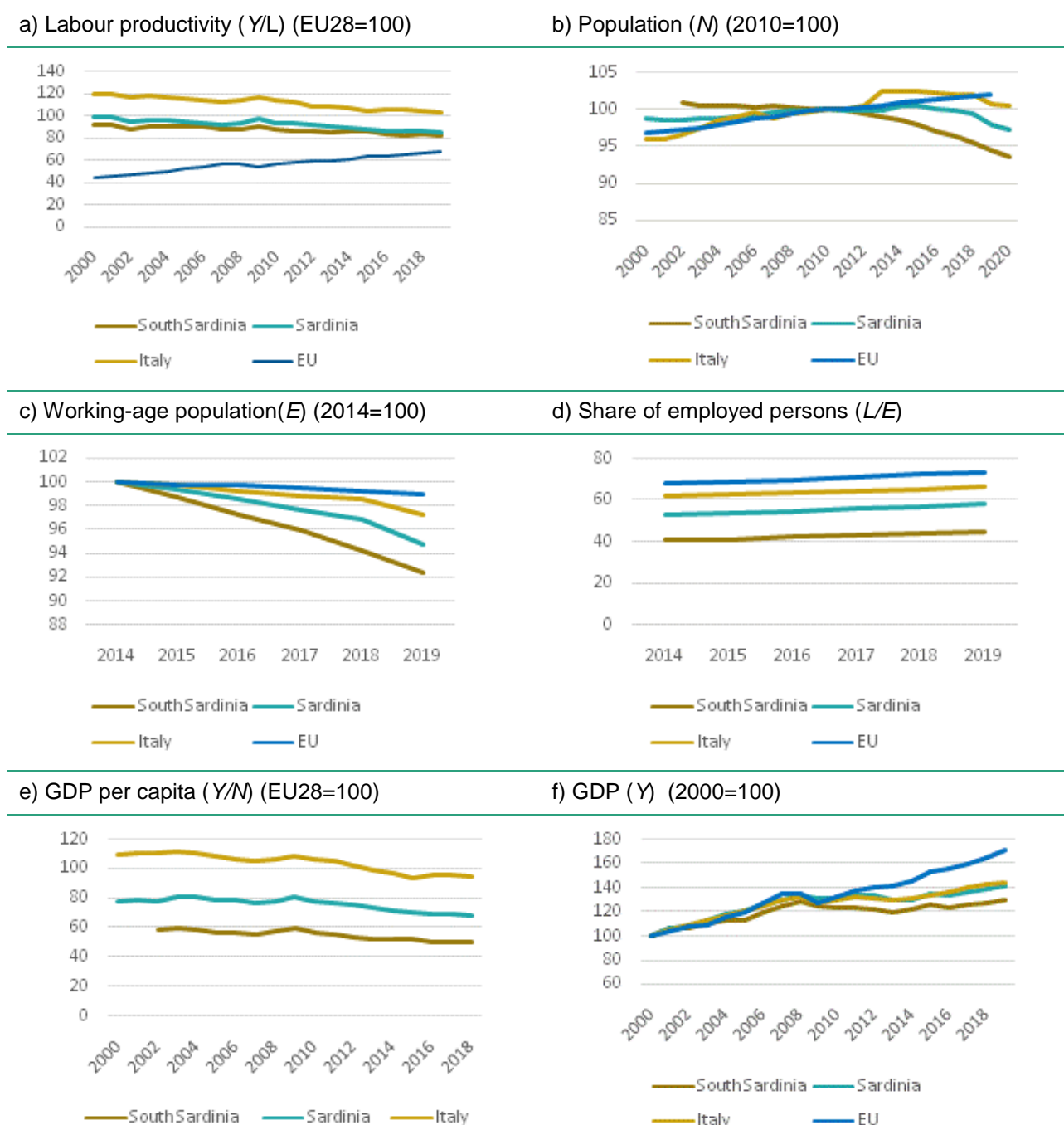
In the period from 2014 to 2019, the percentage of the working-age population decreased in all the units considered, but with different magnitudes (Figure 7c). From the greater to the lesser percentage loss, we have South Sardinia (-9%), Sardinia (-6.5%), Italy (-3.6%) and Europe (-1%).

Overall employment has increased in both South Sardinia province and Sardinia as a whole in the period from 2014 to 2019 (Figure 7d). Nevertheless, South Sardinia in 2019 only had an employment share of 40.9% which is slightly lower than the employment share in the whole of Sardinia (44.8%), which in turn is much lower than the national average (66.7%), which is slightly below the EU average (73.1%). These data put in the figure the well-known employment crisis in South Sardinia and the serious difficulties in employment in Sardinia as a whole.

A similar observation can be drawn if we look at the GDP per capita relative to the EU28 value Figure 7e. In the period considered (2002 – 2019) in South Sardinia, the GDP per capita decreased from 57.8 to 49.9% of the EU average. Sardinia as a whole in the same period decreased from 79% to 67% of the EU28 average. Both regions have a lower GDP per capita than the national average which also dropped in comparison to the average EU28 from 110% in 2002 to 94% in 2018. In 2018 GDP per capita in South Sardinia is almost 48% lower than the national average and 50% lower than the EU28 average.

Finally, the overall economic situation can be described by GDP growth. An upward trend in GDP is obvious in all the units considered (Figure 7f) in the period 2000-2019. However, this increase is less pronounced in South Sardinia (+30%), than in Sardinia, Italy, or the European Union (+41%, +44% and +70%, respectively).

Figure 7– Economic overview



Sources: Istat (demo.istat.it). Note: (b) Reconstructed series 2002-2018; "Sud Sardegna" Province is calculated only in the 2002-2018 series.

### 4.3 Sectoral structure

Overall gross value added in the South Sardinia Province amounted to 4.8 billion EUR in 2018. The total amount is based on a contribution of about 9.2% from agriculture, 4.1% from mining and utilities, 7.3% from manufacturing, 4.4% from construction, 20.6% from retail and information

technology, 24.7% from finance and 29.6% from other services (see Figure 8 below).<sup>7</sup> Compared to Italy, the sectoral composition indicates a higher share for agriculture (+7.0%), other services (+9.0%) and only a slightly higher share for producing industries (+1.1%). Always compared to Italy, South Sardinia marks a smaller share for manufacturing (-9.4%), retail to IT (-4.6%) and finance (-3.6%). These data should be interpreted thinking that the Sulcis Coal and Carbon Territory (CCT) represent only 1/6 of the population of South Sardinia (which incorporates it). As shown in Figure 8, since 2000, the sectoral pattern in South Sardinia changed with a slight decrease in manufacturing (-2.3%), construction (-2.8%) and retail to IT (-1.4%), while other services significantly increased (+4.9%).

**Figure 8– Sectoral structure**



Note: (a) (b) 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). (c) The employment in the region working in mines is taken from the corporate reports.

Sources: (a) (b) Istat; (c) CARBOSULCIS, 2021.

<sup>7</sup> All sectors follow the European Classification of Economic Activities (NACE), Eurostat (2008).

Figure 9– Growth decomposition (2018-2000)



Note: Sectoral growth ( $dY/Y$ ) is decomposed into labour productivity growth ( $d(Y/L)/(Y/L)$ ) and labour growth ( $dL/L$ ). The growth contribution by each sector (i) is the initial share of the sector ( $Y_i/Y$ ) in the year 2000 times the sectoral growth rate between 2000 and 2018 ( $dY_i/Y_i$ ). A list of sector codes is provided in Annexe (Table 11).

Source: Istat.

As for the number of employees in the coal mining industry, they fell from over 446 in 2012 (first data available) to 183 in 2018. In the analysed period, i.e., 2010-2018, the coal production was already shrinking and, besides a peak of 730330 tonnes extracted in 2012, the extraction rapidly fell and stopped completely in 2018. The stop of the production was in line with the Closure Plan



presented in 2014 by the Italian government to the EC for the closure of the mining activities, considered no longer competitive without state support.

All aggregate sectors exhibit positive labour productivity growth in the period from 2000 to 2018. Figure 9a to Figure 9e shows that labour productivity, i.e., the ratio of sectoral output to employed persons, in the agricultural sector grew more than in any other sector in South Sardinia and Sardinia, while in this sector, in both the regions the Labour growth has been negative in the period. It is also worth mentioning that in South Sardinia Province, labour has grown in the mining and utilities sectors more than in all the other sectors. The total growth of this Sector in South Sardinia is in line with the national average, while in Sardinia the same aggregate sector had a significantly smaller growth. In the period analysed, in South Sardinia, the only sector with negative growth has been the construction sector, pushed by a decrease in labour in the sector. In Sardinia, the labour in the construction sector decreased as well, but the loss of labour was compensated with an increase in labour productivity. In Sardinia, the only sector with negative growth in the period considered has been the construction sector.

Figure 9e shows that the “mining and utilities” sector contributed 2% to the overall growth of almost 28% in the South Sardinia province. Therefore, the economic development in the province from 2000 to 2018 was not mainly driven by the development in the mining and utility sector, and it even gave a smaller contribution than it did at the national level. “Other services” is the sector which contributed most to the overall growth of the South Sardinia province with a score of 13% on a total of 28%. As far as Sardinia is concerned, the total growth of 39% was mostly driven by three sectors: “other services” (+15%), “Finance, real estate and other professional services” (+13%) and retail and IT (+10%), which are also the three more growing sectors at the national level.

#### 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 fewer subsidies on production.<sup>8</sup> Figure 10a depicts the labour share defined as labour income divided by total gross value added as a key economic indicator for the distribution of income (between labour income and capital income).

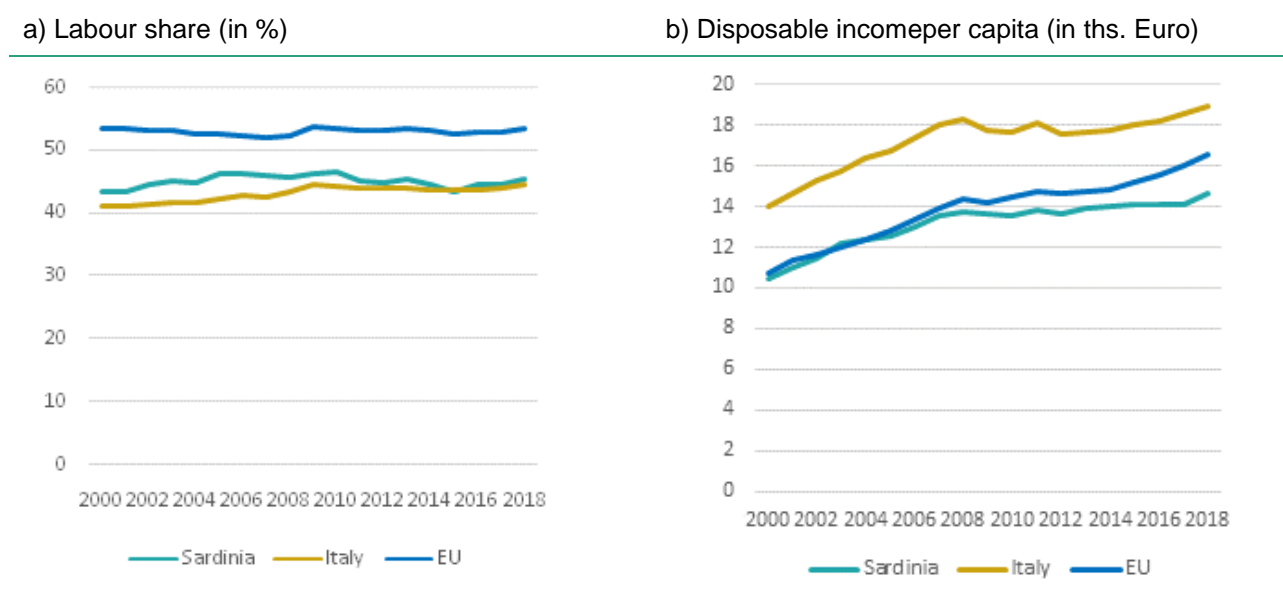
The labour share in Sardinia has been slightly above the national share from 2000 to 2014, while the two data are almost paired from 2014 up to now. While the labour share slightly increased both in Sardinia and Italy, even though with different curves. The labour share of both Sardinia and Italy is significantly below that of the EU28.

Figure 10b depicts the disposable income per capita respectively in Sardinia, Italy and the EU in the period 2000-2018. Over the whole period, the disposable income in Sardinia has been higher than that of Italy, which, in turn, is much higher than that of the EU-28. As we see in the figure, the level of disposable income per capita fluctuated during the period, but the relative position of the

<sup>8</sup> [https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Glossary:Income\\_approach](https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Glossary:Income_approach).

three geographical units and their relative magnitude is almost unvaried at the beginning and the end of the period.

**Figure 10– Income distribution**



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

Source: Istat.

## 4.5 Gender dimension

The energy transformation will primarily affect the producing industries. Over 80 % of the employees in the producing industries are male in Sardinia. Therefore, the energy transition will have a more direct impact on the labour biography of male workers than female workers. Female workers' direct exposure to the energy transition is lower. However, they might be indirectly affected through social networks, such as marriages and life partnerships. Female workers are mainly working in public services, especially in the education sector. Lower tax income might also reduce labour demand in this sector and also indirectly impact this sector.

## 4.6 Conclusion

This chapter portrayed the socio-economic features of South Sardinia and Sardinia, i.e., the structural context in which the Sulcis Coal and Carbon Territory is inserted. In the last two decades, the total population, the share of the working-age population, and the GDP per capita decreased both in South Sardinia and in Sardinia as a whole. Moreover, the GDP has grown slower than the national and EU28 levels. In all those indicators South Sardinia scored worse than Sardinia as a whole. South Sardinia's growth is less than Sardinia's in the “retail to IT” and finance sectors. It scored better than Sardinia in the growth of “mining and utilities”, but worse than Italy as a whole. In the last two decades, the Sardinia economy didn't manage to fill the gap with Italy as a whole, and South Sardinia province didn't manage to fill the gap with Sardinia as a whole.

# CHAPTER 5

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## ANALYSIS OF THE CLEAN ENERGY TRANSITION IN SARDINIA

## 5 Analysis of the clean energy transition in Sardinia

This chapter is focused on the analysis of the clean energy transition in Sardinia. In the research, Sardinia has been considered as the Political Administrative Region (PAR) which is more directly in charge of the Energy Transition process that impacts and involves the Sulcis territory (the CCT). We will then analyse here the clean energy transition of the Sardinia Region, as the salient context of transition in which Sulcis is inserted. The chapter starts with an overview of the current energy transition policies in the Sardinia Region. We will then analyse the energy transition with two separate and complementary lenses: the socio-political component, which focuses on the ongoing battles for the interpretation of the social meaning of the clean energy transition; and the socio-technical and ecological component, focusing on the “Transformative Capacities” that are already available in the region.

### 5.1 Overview of the energy transition in Sardinia

#### 5.1.1 Sardinia and its energy system

Sardinia Region (ITG2) is one of the two islands regions of Italy, with 1.590.044 residents on the island in December 2020 (ISTAT, 2020). Some of the peculiarities of Sardinia's geographical and economic attributes are summarised by Biagi et al. (2019, page 2): *"Sardinia is a big island, with a relatively small population, which is quite remote from the mainland. In other words, those 'first-nature' geographical conditions slow down growth and development in various ways. Firstly, Sardinia suffers from insufficient local demand, which is one of the main historical reasons to explain the presence of too many small and isolated companies unable to benefit from economies of scale and therefore, on average, unfit for exporting and investing in research and innovation. Secondly, Sardinia is physically cut off from all tangible networks across regions and countries, which form the basic platform for infrastructure in energy, transport and communication. Finally, Sardinia is a small regional economy dependent, for better or worse, on the economic dynamics and the political strategies at the national level, that is Italy."*

Sardinia Region is among five Italian regions with a special status, i.e., those that have special legislative powers and a larger autonomy than the other regions. Among other issues, Sardinia has legislative power regarding energy production and electricity distribution as established by the Italian constitution. The Sardinian energy system is characterised by the lack of a natural gas transport system, while, in some cities, there are city distribution networks (many of them are still under construction). Some plans for the “methanisation” of the island have been elaborated by the Sardinia region since the 2000s, but as we will see later, such plans have been debated under the impulse of the EU efforts to achieve climate neutrality by 2050.

As concerns the electric network, Sardinia Region produces electricity from a variety of different sources. Two coal-fired power plants are of pivotal importance: the Fiume Santo Power plant (2 x 320 MW) in the North of Sardinia, and the already mentioned Grazia Deledda Power Plant in the South (340 MW + 240 MW), in the Sulcis Coal and Carbon Territory. These two power plants have also strategic importance for local industrial production. Following the decision of the Italian government, it is foreseen that the two power plants will be phased out by 2025. Nonetheless, the phase-out date may be postponed due to delays in substituting the plants and as a result of the impact of the Russian war in Ukraine on the energy market. Besides the two coal-fired power

plants, there is the IGCC technology plant (575 MW) powered by residues from the Sarlux refinery in Sarroch. Moreover, Sardinia Region also has 466 MW of hydroelectric plants. Finally, a growing development of renewable energy plants, including wind power (1055 MW in 2019) and photovoltaic (873 MW in 2019).

The energy production in Sardinia exceeds the consumption needs of the island. Sardinia exports energy to the Italian mainland by two power lines: SA.PE.I. (Sardinia-Italian Peninsula) of 1000 MW and SA.CO.I.2 (Sardinia-Corsica-Italy) of 300 MW, which in 2024 will be replaced by the new 400 MW SA.CO.I.3. The operator of the national transmission network Terna also proposed a new interconnection project consisting of a double HVDC Continent-Sicily-Sardinia link of 1000 MW, called “Tyrrhenian Link”, corresponding to an expected investment of € 3,700 million.

### 5.1.2 Evolution of the clean energy transition (CET) policies and plans in Sardinia

It is difficult to summarise the intricacy of the different political and administrative decisions and plans connected with the clean energy transition in Sardinia. However, we have summarised some key phases and passages of the recent history. The timeline described below will be used as a reference for the analysis of the public debate conducted in section 5.2., this is why the last 2 years are analysed in greater detail. The information provided will also offer a background for the analysis of transformative capacities conducted in section 5.3.

In early 2010, under the impulse of the 20-20-20 strategy envisaged by the Kyoto Protocol (Achieving by 2020, 20% of energy production from renewable sources, improving energy efficiency by 20 % and reducing carbon dioxide emissions by 20 %) the Sardinia Region developed its own Energy and Environmental Strategic Plan (PEARS) for the years 2015-2030 intending to pursue a "shared economy of energy" (Regione Sardegna, 2019b). The plan seeks to provide a framework policy for the transition of the regional energy system. Notwithstanding, a series of other changes in the overall national, European and international context have determined further shifts in the vision and de-facto planning of the energy transition.

In 2017 the Italian Government announced a national coal phase-out by 2025. After the announcement, the energy transition debate in Sardinia accelerated, focusing, among other things on how to substitute energy production coming from the two main coal power plants of the island (i.e., Sulcis and the Fiume Santo Power Plants). The debate focused on the conversion to natural gas of these two power plants, and how this change should be implemented. Among the issues discussed, there were: continuing the operational capacity of the coal-fired power plants thus preserving jobs both in the power plants and in the industries which rely on the power plant for energy supply; ensuring Sardinia's energy autonomy and energy security; filling a historical gap by developing gas supply and distribution infrastructure, i.e., the so-called "Sardinian Gas Drift"; providing a fairer price of energy and electricity to the Sardinian people and businesses, while moving toward cleaner energy sources.

In 2021, the European Green Deal and the pandemic recovery funds gave further acceleration to the national transition policy. As a result, in July 2021 the Italian government announced a new plan called “Sardinia Green Island”. The plan foresees a technological leap, by entirely focusing the regional energy system on electricity to be produced with renewable energy plants (solar, wind) and with a system of energy storage power plants, thus skipping the already envisaged development of gas infrastructures. The proposal included the laying of a submarine cable

connection between Sardinia and Sicily and Calabria, the so-called Tyrrhenian link to ensure energy security and to provide the mainland with the surplus of energy produced by the Sardinian Region. The plan is presented as an alternative to the “gasification” of the island, and it discontinues the previous plans that were mostly focused on providing the island with gas infrastructures.

**Figure 11– The Tyrrhenian Link**



Source: [www.terna.it](http://www.terna.it).

Following this proposal, a set of multilateral negotiations started for the development of a Decree-Law to support the energy transition in Sardinia. The actors involved in such negotiations were the Italian Ministry of Ecological Transition, the Sardinia Region, the different energy companies and businesses involved, and other regional and national actors. The negotiations started in September 2021 and ended in February 2022, when the Italian Ministry of the Ecological Transition signed the decree law. At the end of March, the decree-law was signed by the Italian Prime minister and thus entered into force. The Decree-Law included transitory measures for strengthening the provision of gas through a "virtual pipeline", as well as the development of new renewable energy plants and battery storage power plants on Sardinia Island. Even though the decree foresees some infrastructure related to gas distribution, it excluded investments in the development of "the rift" to create a proper gas infrastructure over the whole Sardinian territory through a physical pipeline, relying instead on establishing "a virtual pipeline" by providing LNG via maritime transport and Floating Storage Regasification Units (FSRU) for the transforming LNG back into gas for industrial and civil use. The decree-law relies on the already decided development of the Tyrrhenian link for the exchange of electricity between Sardinia, Sicily and Calabria (and the Italian mainland).

## 5.2 Narrative battles on the clean energy transition in Sardinia

### 5.2.1 Description of the empirical dataset produced

#### *Perspective adopted*

Against the background sketched above, the text analysis was centred on the proposal of the government to pursue an "electrification of Sardinia Island". This proposal, which discontinued the previous plans focused on gas distribution, is the outcome of the shift in the energy policy of the



European Union in the attempt to achieve climate neutrality by 2050. For this reason, the research has considered those promoting and backing the "Electrification" of Sardinia as the *design constituency*, while those backing the previously established changes in the energy system (the Sardinian gas "rift") as the *impact constituency*. In this regard, we choose to focus the analysis on the European "design" of accelerating the energy transition and pursuing a climate-neutral Europe, rather than on the previous regional or national transition plans. In our view, the investments connected with the green deal and next-generation Europe are, at least in this phase, the main propulsive forces of a "purposive" energy transition. The perspective adopted allowed both to focus only on the latest development of the policy and to provide a coherent *discursive domain to be analysed*.

### **Discursive events analysed**

The research has focused on the debate about the energy transition in Sardinia from August 2020 to February 2022. The research focused on the debate sparked by the following events:

- **August-December 2020: RSE Report and related consultations.** A cornerstone of the debate was the publication of an independent study report, the so-called RSE report, commissioned by the Italian Government, on the energy supply in Sardinia in the period 2020-2040. The report analysed the costs and gains of an alternative configuration of investments in the infrastructures needed to cover the energy needs of Sardinia while phasing out coal. Even though this report preceded the proposal of a technological leap for the electrification of Sardinia, the debate sparked by this report has been inserted in the analysis as a liaison with the previous debate. Moreover, as this report discouraged the development of a proper gas distribution infrastructure and supported the idea of developing a "virtual pipeline", it paved the way for the proposal of Sardinia electrification. The publishing of the report was followed by debates and meetings for stakeholder consultations.
- **June-July 2021: Announcement of Plans for Sardinia Electrification.** The Italian minister for the Ecological Transition and the CEO of ENEL released a coordinated interview in Sardinian newspapers jointly launching the idea of the Electrification of Sardinia Island. These apical public statements which represented a discontinuity with the previous plans sparked a widespread debate among regional stakeholders.
- **September 2021 - February 2022: Drafting of the Decree-law (DPCM) on Sardinia Energy.** The ongoing negotiation about a decree-law to regulate the investments in the energy sector in Sardinia has been accompanied by a widespread debate. The debate was focused on the different versions of the DPCM and changes introduced or requested from time to time by different stakeholders. Besides the comments and position statements reported on the occasions of official consultation meetings organised by the Italian Government, we analysed written declarations and statements produced in the context of a set of public events organised by different stakeholders on the energy transition.

### **Limits of the discursive domain analysed**

The **first limit** of the discursive domain analysed concerns the sources adopted. Due to the limited time and resources allocated for text research, we relied only on publicly available written sources. Thus, it was not possible to reflect in the analysis the complexity and depth of the discussion ongoing at the regional level, which was also developed in several public meetings and seminars in

which numerous word-to-mouth statements - which have not been transcribed in publicly available texts - have been done. Nevertheless, as we will see in the next sections, the discursive domain composed of only publicly available written sources allowed us to identify and analyse the main features of the different narratives about the energy transition in the Sardinia region. A **second limit** of the discursive domain analysed concerns the period of observation of the public debate. It is worth mentioning here that the period considered in the analysis ends before the start of the Ukrainian war. Therefore, the analysis doesn't take into account the regional debate on the energy transition triggered by the abrupt change in the geopolitical and energy context in Europe and worldwide determined by the war (e.g., the plan to prologue domestic energy production from coal, to increase domestic energy-related extractive activities, etc.).

### Statements and counterstatements

To analyse the discursive domain delineated above, the research team selected **53 texts** as representative of the domain. Overall, more than 300 texts have been filtered to select them. In these texts, we identified 477 statements and counterstatements, i.e., short sentences producing statements or counterstatements about the transition. To catch the specificity of the Sardinian debate, we adopted inductively produced codes, identifying recurring statements and counterstatements, i.e., statements using the same argument to support or to go against the transition plans and visions promoted by the different actors. The codes were then grouped and organised as follows

- *Constituency statements*: all those statements positioning the “speaking actor” among those promoting or supporting the purposive transition (design constituency) and those impacted by this political process (impact constituency) (2 codes in total)
- *Transition statements*: all those statements and counterstatements related to the transition as such, including technical advantages or disadvantaged of the designed transition or its alternatives (9 codes in total)
- *Distributive justice statements*: all those types of statements or counterstatements about the distributive advantage (or disadvantage) of the designed transition policy and its alternatives (18 codes in total)
- *Procedural justice statements*: all those types of statements or counterstatements about the fairness or unfairness of the procedure adopted to promote the transition (11 codes in total)
- *Recognition justice statements*: all those types of statements related to the capacity of the designed transition policy to fit or unfit with the specific features and needs of the territory (12 codes in total).

A codebook of recurring statements and counterstatements is available in Annex 5. In this section, we will refer to statements and counterstatements listed in the codebook with their numbers reported in brackets, e.g. [S01]= statement n.1 or [C03]= counterstatement n.3.

### 5.2.2 Narratives and their proponents

The analysis of the coded statements and counterstatements, the authors of the statements, and how statements and counterstatements occur with each other, allowed us to identify some emerging narratives about the energy transition in Sardinia. The narratives are summarised below,

with a reference in squared brackets (e.g., [S07]) to the statement types retrieved in the text analysis (see the codebook in Annex 5). For each narrative, a list of the main actors supporting and perpetuating the narrative is provided.

### **Narrative A: Sardinia Green Island (design constituency)**

*Design constituency statements.* The narrative sees Sardinia Island as ready to implement a radical transition from coal to green energy, thus skipping - or at least minimising the investments - the intermediate step of gas for the production of energy. This narrative, which is also supported by a plan that has been developed by ENEL (the Italian state-owned energy company), envisions the energy security of Sardinia as guaranteed by the above-mentioned Tyrrhenian Link (and the other already existing cables SAPEI and SACOI), the development of new RE power plants (wind and solar), the development of energy storage power plants. The plan envisioned also for Sardinia to produce green energy to be consumed in the Italian peninsula. Moreover, the vision foresees also a change in energy use, with a full switch to electricity, not only for power generation but also for domestic use (cooking, heating), mobility (cars, buses) and transport in general (including boats).

*Transition statements.* The starting point of this narrative is that Sardinia represents a favourable context for its full electrification [S01], exactly because it lacks gas infrastructure. This narrative stresses that the context of the European transition toward climate neutrality requires that, in a few years, all fossil fuels should be abandoned, gas included [S02]. This makes investments in gas infrastructures unworthy and outdated [S03]. The investments in electrification are thus not only necessary but also urgent as the window of opportunity for using the European funds is only temporary [S04]. This means also that the administrative procedures for the instalment of renewable energy should be speeded up and facilitated. As already mentioned, in this narrative, the electrification of the island, through the connection with the mainland with the Tyrrhenian link, is considered a way to ensure energy security in Sardinia after the coal phase-out [S05].

*Distributive justice statements.* The proponent of this narrative sees the distributive advantages of this plan with the creation of green jobs [S06], and reduced energy costs for both citizens and businesses [S09]. In this narrative, moving away from fossil fuels means less pollution and thus it results in benefits in terms of an improvement in the natural environment [S10], increased attractiveness of Sardinia Island and opportunities for economic growth (for agriculture and tourism) [S08], increased air quality and with positive impacts on the health of the Sardinia population [S07]. To the claim that the electrification of the island will mean the closure of some industries in the region, and thus a loss of direct and indirect jobs, this narrative counter-states that some sacrifices are needed now, to have more gain in the future [C01]. Moreover, to the claim that gas infrastructures will guarantee benefits in the energy costs for the final users, this narrative counter-states that, in the long run, the high costs for gas infrastructures will be distributed among the users, and that the price of gas is expected to increase in the future, and thus that the gasification of Sardinia will have a high cost for Sardinian citizens [C02].

*Procedural justice statements.* Sardinia Green Island is considered a way to respect the Paris agreement and the Italian duties in Europe [S11]. This narrative highlights that a survey conducted among Sardinian citizens showed support from a majority of interviewees for the electrification of the island [S12]. This narrative also says that the fossil fuel lobbies are against electrification and thus some key actors are biased toward the proposed transition [S13].

*Recognition justice statements.* Sardinia Green Island is based on the idea of giving value to the resources of Sardinia in terms of wind and sun [S14]. Moreover, the vision foresees that Sardinia can become a unique experiment of Green Island that can be a forerunner of the clean energy transition at a worldwide level [S15]. This narrative goes against the idea that Renewable Energy plants pollute the landscape, counter-stating that people can get used to them, as it happens for roads and other infrastructures; that RE plants are less polluting than climate change itself; that new technologies reduce the size or the visibility of the plants [C03].

*Narrative's promoters.* This narrative is promoted by the Italian government, ENEL (state-owned energy supply company), Terna (state-owned energy infrastructure), wind energy and solar energy companies and investment funds, by WWF, Legambiente, Italia Nostra (National Environmental NGOs), and Movimento 5 Stelle (national party with a strong environmental commitment), independent (not confederated) trade unions.

### **Sub-narrative A: Green Communities**

Some of the proponents of the Sardinia Green Island, even though they support the plan, they also promote a slightly different vision, where an important role is played by prosumers, energy communities and energy efficiency measures [S16]. In line with that, the proponents of this sub-narrative also warn about the risk that the electrification process, if not adequately regulated, may lead to the predatory behaviour of Renewable Energy enterprises, which can speculate on the clean energy transition [S17]. The green communities sub-narrative is supported by WWF, Legambiente and Italia Nostra and by independent (not confederated) trade unions.

### **Narrative B: Clean gas for Territorial Equality (impact constituency)**

*Constituency statements.* This narrative that we have called “Clean Gas for Territorial Equality” is based on the idea that the transition designed does not take into account both previous inequality and the needs of the Sardinian Region, both as a whole and in its main industrial areas (the Sulcis area and the Porto Torres area), which depends on the continuity of fossil fuel supply for the involved industrial sectors. For this reason, this narrative put at the centre of technological discourse the development of gas supply and distribution infrastructures.

*Transition statements.* From the *technical side*, this narrative states that the development of gas infrastructure is not only a way to ensure energy security for the island [S19] but also that such gas infrastructures can be deployed for the transport of hydrogen in the future, thus making gas infrastructures both a medium-term and a long-term investment [S18]. On the other hand, for the proponents of this narrative, the electrification plans lack a transitional strategy able to guarantee energy security and give continuity to the industrial activity in the region [S20]. Several critics are formulated by the proponent of this narrative both to the Virtual Pipeline and to the Green Island plan, i.e., to all the plans that opposed the construction of a proper “ridge” to distribute gas on the whole island.

*Distributive Justice.* From the distributive point of view, in this narrative, the virtual pipeline carries hidden or indirect economic, social, and environmental costs connected with maritime and road freight transport (traffic jams, pollution and costs) which makes it less rewarding than the development of proper infrastructure for gas supply and distribution [S21]. On the other hand, always in the view cast by this narrative, the development of such infrastructures is key to responding both to the basic needs of the local population, such as warming or cooking [S23] and

for regional development. The provision and distribution of gas through proper infrastructures not only give continuity to the industries which are put at risk by the coal phase-out but also increase the competitiveness of local businesses in other fields such as farming, by providing them energy and heat at a price comparable to that of the Italian mainland [S22]. In this regard, this narrative stresses that without a gas supply and distribution infrastructure, it will not be possible for Sardinian businesses to access the free market, and monopolistic or oligopolistic positions will be established, with direct consequences on energy prices [S31]. The lack of capillary gas infrastructure is also perceived as reinforcing territorial inequalities within Sardinia, as only the main centres will receive a proper gas supply, while the peripheral areas - where the investments are less rewarding - will not benefit from gas supply at advantageous prices [S24]. The proponents of this narrative are also concerned about the possible electrification of Sardinia Island. In their view, the electrification of Sardinia means a threat not only to the two main regional power plants but also to the thousands of jobs connected with the industries which are supplied by these power stations (e.g., the non-ferrous metal industries in Sulcis). The promoters of this narrative, state that, while thousands of green jobs have been promised, very few, if any, details of how these jobs will be created have been provided so far [C04]. Moreover, while the "Sardinia Green Island" narrative states that some sacrifices will be needed, the Clean Gas narrative highlights how the mechanism to compensate for these losses has not been identified yet [C05]. Moreover, the proponents of this narrative are sceptical about the real opportunity to create green jobs as renewable energy power plants and other infrastructures (e.g., the Tyrrhenian Link) are capital-intensive investments rather than work-intensive ones [C04]. Finally, as the plan aims at exporting energy from Sardinia to Italy's mainland, the clean gas narrative explains that this is unfair as Sardinia will pay the costs (in terms of use of resources, landscape pollution, etc.) of this choice, but it will have few advantages from that, as Sardinia energy production already goes beyond the level of consumption. In other terms, following this narrative, electrification is guided by the national interest which is not in line with the regional interests [S25].

*Procedural Justice.* Strong critics of the transition plans based on Sardinia's electrification come from the procedural point of view. First of all, the proponents of this narrative, claim that the ongoing electrification plans lack inclusiveness, as they are formulated without proper consultations with all the impacted actors [S26]. Moreover, within this narrative, the proposal of Sardinia's electrification, as it came as a breaking announcement from the national government, jeopardises the decisions that were agreed upon in the previous years [S28], thus creating a context of uncertainty about what will happen next, which also impact negatively on the planned investments in the islands [S27], in particular, those relying on a stable and long-lasting gas supply and distribution infrastructure. In this respect, the electrification plans are perceived as further threatening the development and the survival of the industrial activities on the island. In this narrative, the development of the electrification plans has been characterised by a lack of governance of the transition of the regional energy system [S29] and a lack of transparency of the plans [S30], which is also producing a lack of control, free riding, and predatory economic action by private investors in the RE sectors [S17].

*Recognition justice.* The dismissal of the plans to develop a proper gas supply and distribution infrastructure in Sardinia is strongly criticised in this narrative from the point of view of the recognition of local history, needs and expectations. The plans for electrification as well as the choice to establish a virtual pipeline, in this narrative, mean a strengthening of the existing



territorial inequalities, for which Sardinia is put in an uneven position concerning all the other Italian regions for its lack of energy-related infrastructures [S32]. While the development of the "drift" was seen in this narrative as a way to reduce (or even cancel) the existing inequalities, the options that the design constituency has put on the table, i.e., the virtual pipeline combined with the island electrification, are seen as a way in which these differences will be strengthened, as these solutions will result in disadvantages for Sardinian people and an uneven competition for Sardinian businesses [S31]. The proposal of electrification is seen as a way for the island to increase its dependence on national energy production, and a threat to the energy independence of the island, which is seen as a key for regional growth [S33].

*Narrative's proponents.* This narrative is embraced by the Sardinian confederate Trade Unions (CGIL, CISL and UIL which are also the main trade unions in Italy), by businesses associations in different sectors, by both left-wing and right-wing political parties (PD and Lega) and by the Sardinia Region (even though the Region has not clearly stated its position).

### **Narrative C. Energy slavery (impact constituency)**

This narrative is not well structured and well documented as the previous ones, as it has been proclaimed only by some opinion leaders, representatives of independent local environmental NGOs, and some mayors of local municipalities. Even though all these subjects express themselves with different words and images, all of them express strong opposition to the transition designed through a mix of electrification and virtual pipelines for gas supply. Another common trait of this narrative is that such opposition is not accompanied by the proposition of an alternative policy or technical solution. The narrative is not developed on the technical side but has produced several statements about distributive, procedural and recognition justice.

*Distributive Justice.* From the *distributive* point of view, Sardinia is described as a "sacrifice zone", i.e., the region has been deputed to suffer the disadvantages of the energy transition disproportionately compared with the other Italian regions and territories [S34]. In this narrative, the territories that have been sacrificed in the past with a mining or industrial monoculture, are now to be sacrificed for the production of renewable energy for the mainland. The distributive unfairness denounced by this narrative does not only concerns a geographical axis (Sardinia VS Italy) but also concerns the social and economic position (Lobbies VS citizens), as it is stated that this design will favour the lobbies of renewable energy [S35] while the costs of the electrification of the island will be paid by Sardinian citizens [S36].

*Procedural Justice.* Harsh critics of the transition plans based on electrification are also formulated in this narrative from the procedural point of view. In this regard, such plans aim at cancelling the energy autonomy of the island, in overt violation of the Italian Constitution, which acknowledges such autonomy [S37]. In this narrative, a set of inconsistencies are highlighted to show that the transition plans have been already decided secretly by the lobbies, while the ongoing official decision-making process is only a facade [S38].

*Recognition Justice.* But it is at the level of Recognition that this narrative expresses its stronger opposition to the ongoing transition process. This narrative frames the proposal of electrification of Sardinia as an attempt to put the island in a position of Energy slavery [S39], as the only ones to take advantage of the plan are those living in the peninsula, not the Sardinian people. Some proponents of this narrative, describe the Tyrrhenian link as a leash through which Italy will control



and subjugate Sardinia. Moreover, the transition plans mean the robbery of Sardinian natural resources, such as wind, sun, and internal waters [S40]. In this respect, the transition is assimilated to a plan of “energy colonialism”, where local energy production plants (e.g., coal-fired power plants) are shut down and energy security is ensured only through the connection with the mainland [S41]. Using strong images, some of the proponents of this narrative compare the plan to install several offshore wind plants all around the island as a siege of the Region, or as an energy war to conquer the island. Unsurprisingly, among the consequences of these plans denounced in this narrative, there is the pollution of the Sardinian landscape caused by a huge amount of wind and solar plants to be installed [S42]. This huge “colonisation” is considered in this narrative not only detrimental for Sardinia, but also unnecessary, as Sardinia already exceeds the production of energy needed for its internal uses [S45], and it will be also difficult to export the energy produced in advance given the limited capacity of the electric cable connection with the mainland. Finally, the electrification plan is seen as overt discrimination against Sardinians: the negative impacts of the Italian energy transition should be paid for by Sardinians, who will see their landscapes ruined and who will be assigned inferior kinds of energy services and infrastructures, such as those foreseen by establishing a virtual pipeline [S44]. This process is described as the last, of a historic series of discrimination acts perpetrated against Sardinians and Sardinia [S43].

### **Defining constituencies**

In summary, two constituencies can be identified: the “design constituency” (Sardinia Green Island and Green Communities) including those designing or backing the Electrification of Sardinia and the “impact constituency” (Clean Gas for Territorial Equality and Energy Slavery), including those impacted by this design. The two constituencies are summarised in the table below.

**Table 7– Design and Impact constituency of the ongoing energy transition process in Sardinia**

Design constituency	Impact constituency
European Union	Confederate Trade Unions (CGIL, CISL, UIL)
The National Government	Local municipalities
State-owned electricity energy companies (ENEL, Terna)	Businesses confederation (CONFINDUSTRIA)
National Environmental NGOs	Local opinion leaders
Non-confederate Trade Unions (COBAS - USB)	Local Environmental NGOs
Some political parties (M5S)	Some political parties (PD, Lega)
	Sardinia Region
	State-owned gas energy companies (ENI, SNAM)

Source: ENTRANCES.

### **5.2.3 Analysis of the Technological Drama**

Following the Technological Drama approach, three processes can be described through their factors: technological regularisation, technological adjustment and technological reconstitution.

#### **Technological Regularisation**

The analysis of the narratives and other documents collected for their interpretation, allowed us to identify different regularisation strategies developed by the design constituency in the process of technological regularisation.

**Compartmentalization.** *Definition:* Access to technology and its benefit is in principle open to all, but access is rigidly structured to keep some persons at arm's length. *In the case study:* The preference for large-scale technical systems (offshore wind farms, Tyrrhenian link, etc.) produces a distancing of system designs from local and regional decision-making processes. So central authorities and local authorities are incorporated in different ways in the process.

**Centralisation.** *Definition:* Access to the technology and its benefits are in principle open to all, but the system is constructed so that the users have little autonomy and significant decisions are reserved for central management. *In the case study:* The shift from coal mining and local power generation to the “electrification” of the whole system, produces a reduced autonomy of the regional energy system and pushes toward the incorporation into the national energy system, where decisions and management are centralised.

**Segregation.** *Definition.* Access to technology and its benefits are in principle open to all, but it's so difficult or so expensive to enjoy that few can enjoy it. *In the case study.* Without appropriate re-distributive or compensation mechanisms, the electrification of the island risks generating segregation of those less wealthy, due to costs of electric equipment and higher electricity costs.

**Standardization.** *Definition:* Access to the technology and its benefits are in principle open to all, but at the price of conformity to zealously maintained system standards and rules of procedures that diminish local autonomy and marginalise local culture. *In the case study:* as the local culture of some areas (Sulcis) is narrowly related to coal and industrial production, the regularisation process, even though it promises alternatives, risks threatening the local industrial vocation, as the closure or reduction of some industrial activities is seen a necessary price to pay for technological innovation and social and ecological progress.

**Marginalization.** *Definition.* Inferiors versions of an artefact are expressly created or distributed to persons of subordinate race, class gender or achievement categories. *In the case study.* The “virtual pipeline” is an inferior version of the gas distribution network present in all the other parts of Italy.

**Differential incorporation.** *Definition:* The technology is structured so that people of different social categories are incorporated into it in ways that reflect the attempt to reinforce their status. *In the case study:* As regards the access to gas, the “virtual pipeline” will ensure access to key cities in Sardinia, while the rural and more remote areas will be marginalised. Sardinian citizens and citizens are differentially incorporated by those from other parts of Italy.

**Deflection.** *Definition.* The deflection strategy consists in providing people impacted by technological change with compensatory goods in an attempt to deflect attention away from what is going on. *In the case study.* In the Sulcis case, the 300 million € of the Just Transition Fund can be interpreted as a way to deflect attention from the sacrifices that are requested from the local community in the transition toward green energy.

### **Technological Adjustment**

The analysis of the narratives and other documents collected for their interpretation, allowed us to identify two different strategies developed by the impact constituency in the process of technological adjustment. The strategies correspond to the factors identified in D1.2. and are described below.

**Counterdelegation.** *Definition:* Counterdelegation is an adjustment strategy that negotiates a small-scale modification of technology, as opposed to the deep and large-scale change proposed by technological regularisation. *In the case study:* The development of a “rift” infrastructure for gas transport is the main counterdelegation strategy against the island's total electrification proposed by the technological regularisation.

**Countersignification.** *Definition:* In technological adjustment, impact constituencies actively negotiate new meanings for the technological production processes, trying to orient changes, which are viewed as undermining their position and wellbeing, toward more fair and favourable outcomes. *In the case study:* Re-interpreting the gas infrastructure as the only viable solution for providing energy security, and more strategic value for their future exploitation to transport hydrogen, is an attempt to develop a countersignification of the transition process. This reflects the interest in the jobs in the coal power plant and the related industries, but also the immediate interests of the business community which has invested in the current economic and productive structure. This also is an attempt to achieve the historical infrastructural gap dividing Sardinia from the rest of Italy recognised and fixed.

### **Technological reconstitution**

The analysis of the narratives and other documents collected for their interpretation, allowed us to identify a strategy developed by the impact constituency in the process of technological reconstitution.

**Antisignification.** *Definition:* People whose status is invidiously affected by decarbonisation choose from a variety of potential responses. Beyond passivity, apathy, and resignation, they may attempt antisignification, in which they covertly substitute a myth or root paradigm that contradicts the mythos of transformation. It may have a form of presenting decarbonization as a concept from the outside. *In the case study:* this strategy is not developed yet, but the narrative of “energy slavery” can be considered the prelude to a full antisignification strategy.

#### **5.2.4 Gender dimension**

In the analysis of the narrative battles for the interpretation of the clean energy transition, no trace has been found of the discussion of the gender dimension. It is worth mentioning that the narratives are almost male-dominated, as only a few of the statements singled out in the research are made by women. However, a few key regional stakeholders are represented by women.

### **5.3 Assessment of the transformative capacities**

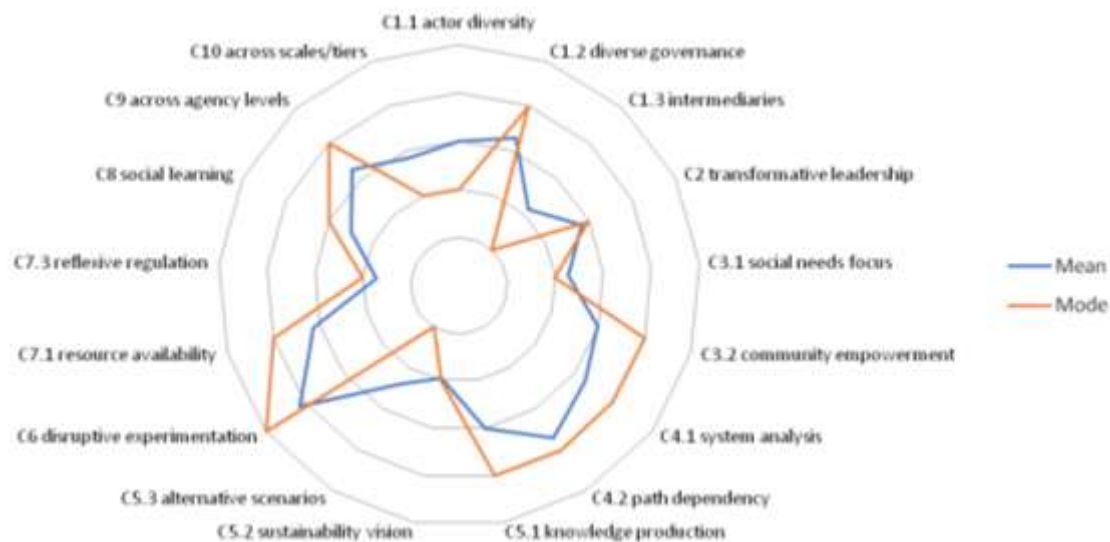
This section, based on the socio-ecological and technical component of the research, provides an overview of the capacity available in the case study region to shape its decarbonisation pathway. The focus on transformative capacity allows us to discern how far a region is actually able to deviate from its current (carbon-intensive) path toward sustainable outcomes. Transformative Capacities 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. In total 7 regional stakeholders were interviewed, representing public, private, third and civil society actors.

### 5.3.1 Summary of results

#### Overall Assessment

Figure 12 summarises respondents' assessments of components of transformative capacity in Sulcis. The chart presents both the mean and the mode of the responses received by the interviewed stakeholders.

**Figure 12–Mean and mode score of the TCs factors as assessed by Sardinian stakeholders**



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

The spider chart shows the average score obtained by the 17 factors and sub-factors of transformative capacity considered in the study. Overall, on average, 10 factors have been assessed with a medium score ( $3 \pm 0.5$ ), 5 with a low score ( $< 2.5$ ), and 2 with a high score ( $> 3.5$ ).

**Medium score factors.** If we look clockwise at the blue line in the chart in the proximity of the third ring (score=3) we find in the middle range scores the following factors: *C1.1. actor's diversity* ( $\mu$  3.0), *C1.2 diverse governance* ( $\mu$  3.3), C2 transformative leadership ( $\mu$  2.9), *C3.2. community empowerment* ( $\mu$  3.0), *C4.1. system analysis* ( $\mu$  3.3); *C5.1. knowledge production* ( $\mu$  3.0), *C7.1. resource availability* ( $\mu$  3.1), C8 social learning (2.5); *C9 across agency level* ( $\mu$  3.3); *C10 cross-scale tiers* ( $\mu$  2.9). In the above list, the factors stressed in italics are those in which the mode is quite different from the mean, indicating that the medium score obtained is the outcome of diversified views of the stakeholder, rather than of convergence of the answers on the medium scores of the scale. In other words, except for "C2 transformative leadership" and "C8 social learning", in all the other factors, the medium score is the outcome of a highly diversified view across the respondents.

**Low score factors.** The five factors that obtained a low score on average are C1.3. intermediaries ( $\mu$  2.1); C3.1. social needs focus ( $\mu$  2.3); C5.2. sustainability vision ( $\mu$  1.9); C5.3. alternative scenarios ( $\mu$  2.4); C7.3. reflexive regulation ( $\mu$  1.7). In all these factors the mode has the same value or a lower value than the average, confirming an overall agreement on the low score of these transformative capacity factors.

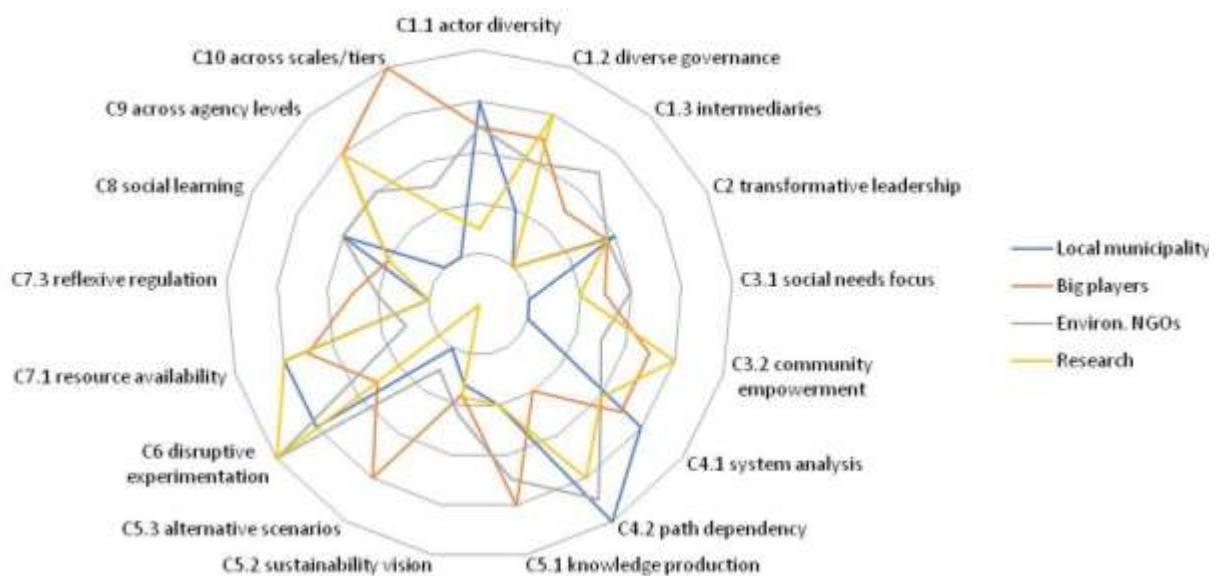
*High score factors.* Only two factors obtained a high score on average: C3.2. path dependency ( $\mu$  3.7) and C6 disruptive experimentation ( $\mu$  4.1). In both cases the modes are higher than the average values, confirming an overall agreement on the positive assessment of these two items.

This overview gives us the idea that there is a certain agreement among the stakeholders over nine factors: two of those that obtained a medium score on average; the five factors that obtained a low score on average and the two factors that obtained a high score on average. There is less intersubjective agreement over the remaining 8 factors that obtained a medium score (those in *italics* above).

### Diversity across stakeholder types

Figure 13 illustrates the assessment of transformative capacity by stakeholder groups. Four groups have been considered in this analysis: local municipality (1 interviewee); big players involved in the decarbonisation process (2 interviewees); NGOs (2 interviewees); research & academia (2 interviewees). As the groups are so small, these findings can only be treated as indicative.

**Figure 13—Mean score of the TCs as assessed by different stakeholder types**



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

As the figure shows, the picture is quite differentiated among the different stakeholder types. Some observations can be drawn from the chart. Firstly, it is worth noticing that "big players" assess some of the transformative capacity factors the opposite of the evaluation of the other stakeholders. This is the case for C4.2. path dependency, in which big players' representatives have a more negative view of the transformative capacity. This can be explained by the fact that citizens, in their views, are not aware of the holistic change implied by the transition, including a radical change in lifestyles. Big player's representatives have given a more positive assessment than the other stakeholder types of C5.3 alternative scenarios and C10 "coordination across scales". Moreover, it is worth mentioning that research and academia representatives provided a lower score on the involvement of different actors in the leadership of the transition (C1.1. actor's diversity). Finally, the representative of the local municipality showed a more negative view than all the other stakeholders on C9 "coordination across agency levels" and on C3 "social needs focus".



This might be explained by the perception that a low consideration has been given to the territorial actors and territorial social needs. NGO representatives show a rather moderate score without peaks.

In this respect, it is important to highlight that the above-mentioned groups might not be necessarily internally homogenous in their assessment of the Transformative Capacities. Interesting information can be drawn by calculating the average score of the assessment of each respondent across all the TCs, and comparing that to the already identified stakeholder types, as shown in the table below. The average score might be interpreted as a control variable expressing an overall orientation toward the capacities to steer the energy transition toward transformation.

**Table 8–Average assessment score (ASS) of the respondents**

Respondent code	Stakeholder type	ASS	Commitment
R01	NGO	3.4	Regional
R02	NGO	2.2	Territorial
R03	Research & Academia	2.6	Regional
R04	Research & Academia	2.6	Regional
R05	Big players	3.0	Regional
R06	Big players	2.7	Regional
R07	Local municipality	2.3	Territorial

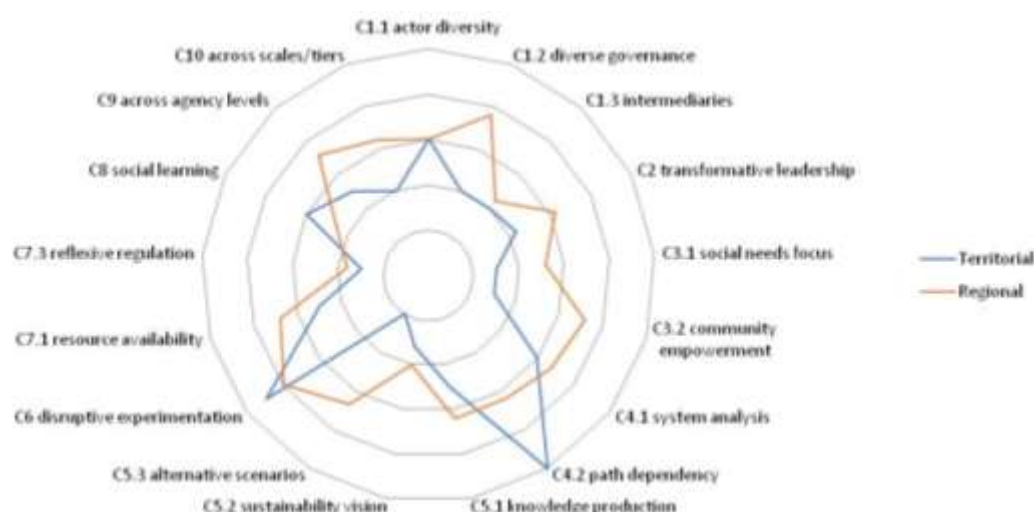
Source: ENTRANCES.

As the table shows, while most of the groups are quite homogeneous in their average score, the type "environmental NGOs" shows the highest and the lowest score among the interviewees.

### *Differences between regional and territorial stakeholders*

Before moving to the qualitative analysis it is worth exploring another attribute of the respondents: the main area of their commitment, distinguishing a regional commitment (a commitment in the regional policy arena) from a territorial commitment (a commitment related to the CET in a specific territory). Table 8 above shows how the respondents distribute across the two groups. The average assessment across the different TCs of the two groups is shown in the picture below.

**Figure 14– Mean score of the TCs with a regional or territorial commitment**



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



The territorially committed stakeholders gave a lower score to several factors: C1.2. diverse governance, C2 transformative leadership, C3.1. social needs focus, C3.2 community empowerment, C5.3 alternative scenarios, C7.1 resource availability, C9 cross-agency levels and C10 across scale/tiers. A relevantly lower assessment of these capacities by stakeholders committed to a specific territory may be interpreted as the perception of a low degree of inclusion of the territories either in the procedural or the distributive dimensions of the CET. The qualitative analysis that follows will deepen this point, among others.

### 5.3.2 Interpretation

#### *Governance and Agency*

##### *C1. Inclusive and multiform governance*

*Actor diversity.* There are a lot of diverse actors in Sardinia interested in and involved in the energy transition process. These actors include groups of citizens, civil society organisations, environmental NGOs, trade unions, municipalities, universities and research centres, businesses, energy companies and utilities, infrastructure providers, and, obviously the regional and national government. However, while all these actors are active in the public debate or by promoting individual initiatives, the number of actors included and the degree of their inclusion in CET governance has diminished over time. Sardinia has experienced a shift from a regional-driven process informed by a rather significant consultation process in the 2010s (with the development of the PEARS), to a nationally driven process with only a few big players (mostly energy and infrastructure companies) properly involved and other players (e.g., trade unions, local authorities, etc.) only marginally involved in 2021-2022 (during the drafting of the Government decree on the energy transition of Sardinia). On one side, this shift reflects a shift in the international context from locally driven transitions (Kyoto agenda 20-20-20) to nationally centralised transitions, after Paris Agreement, the European Green Deal, and the National Coal Phase-out policy across Europe. Equally, according to both the interviews and the results of the text research, the shift also is due to Sardinia Region losing the initiative in exercising its authority on the energy issue on the island. This resulted not only in a low capacity to include regional voices in the development of the Government Decree on the Sardinia Energy Transition but also in a low degree of participation of the region itself in the process.

*Diverse governance.* From the information collected, it seems that the prevalent governance approach in the governance of the CET is a top-down approach mitigated by the consultation of some of the key stakeholders. Many of the interviewees go beyond this assessment, stressing that there is no regional governance of the energy transition process in Sardinia. According to the interviewees, such a lack of governance is symbolised by the lack of a regional energy authority.

*Intermediaries.* According to the interview results and text research, there are some actors in Sardinia acting as intermediaries in the Sardinian CET. Among them, a relevant role has been acknowledged by the interviewees at the University of Cagliari. Other stakeholders interpreting the role of intermediaries are NGOs, civil society organisations, local authorities other research centres. Despite the presence of several occasions of dialogue created by such intermediaries, there is broad agreement that, currently, such intermediaries are not influential in the energy transition process.

## *C2. Transformative leadership*

What emerges from the interviews, is that there is no shared understanding among the Sardinian stakeholders about who is leading the clean energy transition on the island. For some of the stakeholders, the CET is led by civil society, including NGOs, local municipalities, frontline communities, citizens, and research institutions. These actors, for a set of different reasons, are spontaneously taking steps towards the energy transition. However, this leadership appears to be fragmented and scattered in the region and it's not providing a vision or a plan at the regional level. A second interpretation sees the CET as driven by private actors, businesses and citizens that try to find a practical solution to the problems that arise, e.g., to contain energy prices. In this respect, private actors or citizens act as energy consumers and, consequently, find their interest in adopting sustainable solutions. Following this interpretation, only a part of the public administration is involved, while, paradoxically, public policymaking is not involved in the leadership of the CET. A third interpretation simply sees a lack of political leadership in the energy transition. Finally, some of the interviewees interpret the CET of Sardinia as led by the national government that acts and plans in agreement with a few key national or international companies of the energy sector operating in Sardinia.

As already expressed before, according to the researcher's view, the leadership of the CET shifted from Sardinia Region and the local triple helix stakeholders (businesses, research & academia and policymakers) to the national government and big players in the energy sector. In our view, this leadership has provided some proof of a transformative attitude, e.g., in promoting a radical and rapid change for Sardinia (the Sardinia Green Island vision), but lacked some other attitudes, such as the capacity to motivate and to involve others to action and a profound linkage with territorial dimension.

## *C3. Empowered and autonomous communities of practice*

The results of the research don't provide a clear indication of which communities of practices are diffused in Sardinia focused on the Clean Energy Transition. For sure, there is a rising community of practices on the development of energy communities, with different energy communities emerging in the regional territory, that are developing linkages with each other.

*Social needs focus.* According to the results of the in-depth interviews, there is a common agreement that the CET has the potential to respond to social needs. At the same time, there is the agreement that the CET as it is taking shape in Sardinia does not respond to such needs. In this respect, the results of the interviews show that while the current transitional plans respond to environmental needs, they are not responding to the pressing socio-economic needs of the territories, some of them suffering a profound social and demographic crisis. In particular, the current CET plans are not dealing with creating jobs and employment in the region and in the territories that will lose their jobs due to the coal phase-out. Moreover, the energy transition, so far, has not reduced energy costs. This lack of capacity is traced back to the lack of public policies orienting the CET toward fulfilling social needs. Among other issues, the interviewed stakeholders have highlighted that there is no analysis of the social needs in the territory, and consequently, it is difficult to orient the CET to address them. However, the interviewed stakeholders also stressed how some of the ongoing spontaneous experiments, such as the energy communities, are useful in creating a sense of community and ownership in territories that, otherwise felt to be left behind.

*Community empowerment and autonomy.* The research has shown that while some incentives and support for citizens and businesses to move towards a clean energy consumption path have been developed, there is a lack of public support for the community of practices or communities that are advancing in the energy transition, e.g., the energy communities. Nonetheless, it has been registered that communities in transition have access to and cooperate with regional stakeholders which offer concrete support in the development of their project. Among these stakeholders, the University of Cagliari has been often cited for its support to such communities of practices or other communities in transition. Local social capital is present in the region and it is a strong resource for community empowerment and autonomy.

### **Capacity Development Processes**

#### **C4. System(s) awareness and memory**

*System awareness and memory.* Despite the interviewed stakeholders expressing a positive assessment of the awareness of interdependencies in the Region, they also stated that this awareness does not flow into implementation in an integrated manner. Some of the interviewed stakeholders, state that citizens are not aware of the need to change lifestyles that come with the transition, while others state that the regional policymakers lack system awareness. As the analysis of the public debate has shown, there are conflicts and disputes on how a transformed system should work, with a portion of the population thinking that such change should be aligned with local social needs. Overall, the impression is that even the national government, which is pushing for a rapid transformation of the Sardinia region into a green island, lacks awareness of the social, ecological, and economic implications of this shift.

*Recognition of path dependencies.* Recognition of path dependency. There is a broad consensus among the interviewees that the regional stakeholders are aware that interdependencies between different spheres are a key obstacle to the CET. However, some of the interviewees highlight that the depth and the extent of these obstacles are not fully understood, as different actors, especially those less organised and operating at the territorial level (e.g., farmers, small trade unions, CSOs, etc.) have issues and problems that are not seen or fully understood by the actors operating at the regional level. The lack of a space for dialogue hinders a full understanding of such obstacles.

#### **C5. Sustainability foresight**

*Diversity and transdisciplinary co-production of knowledge.* The research has highlighted the following knowledge gaps. (i) A lack of knowledge of the social sciences. This kind of knowledge, according to the interviewees, would help to develop a governance system "from below" and increase the acceptance of the CET. (ii) A lack of knowledge of the needs and the situations of the plurality of territories in the region, including the industrial ones and those more exposed to the damages of the coal phase-out. (iii) An absence of knowledge from different social actors, especially the less organised or represented ones, as there is a lack of spaces for dialogue and because there is no common goal or strategy to which such knowledge may contribute. (iv) The regional system can rely on an extensive pool of technical knowledge. However, the regional system is lacking in the capacity to recognize and exploit it. (v) There is an absence of anticipatory knowledge, i.e., a knowledge that looks at the future rather than at the past.

*Collective vision for rapid sustainability change.* The interviewed stakeholders interpret this question in different ways. Some of them, refer to the vision developed by the Sardinia region; some others refer to the vision of the CET portrayed by the national government and by ENEL

(Sardinia Green Island); some others just stress that there is not a clear vision of the CET in the region. Overall, there is broad agreement that a vision is either absent or lacks clarity, is not collectively produced, and doesn't provide a clear orientation.

*Alternative scenarios and future pathways.* There have been some scenarios developed concerning the energy transition in Sardinia, those developed in the PEARS in the 2010s, and those developed by the RSE report in 2020. However, such scenarios are outdated for the EU climate neutrality target scheduled for 2050, and only partially connected with the more recent policies (the governmental decree of 2022). In summary, the current CET policies are only partially informed by future alternative scenarios.

#### *C6. Disruptive experimentation*

There is a broad agreement among the interviewed stakeholders that several experiments have been conducted concerning the CET. Among the actors more active in promoting these experiments the interviewees often mentioned the University of Cagliari, which is active both in developing its experiments and supporting experiments carried out by the civil society (e.g., local authorities) and by businesses active in the Region. The interviewees mentioned experimentations such as the establishment of energy communities, the development of tests on the electric system capacity, the experimentation of innovative PV panels with thermal storage, the development of a funding scheme for thermal storage in public buildings, the development of microgrids in public buildings, and some others. The stakeholders agree that there is widespread activism in experimenting in this field. Interestingly, one of the stakeholders mentions, that what is lacking, are social experiments. Such experiments, in that stakeholder's view, can be particularly useful for the industrial territories of Sulcis and Porto Torres, where the coal phase-out implies heavy social costs. In this regard, the stakeholder stated that social experiments can help the local population envisage what should come next and play an important role in creating trust toward the CET for the involved stakeholders.

#### *C7. Innovation embedding and coupling*

*Resource availability.* The research has not provided us with evidence about resource availability. What we know, is that this issue is perceived very differently by different stakeholders. Some of them, claim that all the initiatives of CET are self-promoted by local actors and that they are not supported by public funds. Some others claim that some resources are available, while sometimes the problem is that they are not used.

*Reflexive regulation.* The interviewed stakeholders agree on the lack of regulations or rules supporting the transition. Among the issues highlighted, there is a lack of effective individuation of the areas allowed to develop PV or RE instalments; the lack of ratification of a regional law on energy communities; the unclarity of the normative framework; the approval of a governmental decree that is not in line with the needs in the territories.

### **Relational Factors**

#### *C8. Reflexivity and social learning*

The research has shown that there is no established mechanism aimed at monitoring, reflecting and learning about the clean energy transition. Two issues emerged from the interviews that are worth mentioning here. Firstly, there is a lack of institutional space for such learning. The interviewees stressed how the establishment of a regional energy agency would have been the

natural space for reflexivity and for promoting social learning. Secondly, the interviewees stressed that there is some monitoring mechanism, but they are only formal or outdated and with no capacity to provide useful feedback to the regional system. Undoubtedly, there are some informal poles of reflection and learning, but such poles are not anchored to institutional actions and policies, and they are not exploited systemically.

#### *C9. Cooperation across human agency levels*

The research has shown that the stakeholders have different perceptions about this point. However, by combining the information collected during the in-depth interviews, different critical aspects can be highlighted concerning working across agency levels. The first critical aspect is the absence of official dialogue opportunities aimed at aligning the positions of the actors toward common strategic objectives. A second critical point is that there is a huge fragmentation of local territorial realities, where cooperation is not pursued even in small territorial communities. For example, 50 proposals have been submitted by different actors to be funded by the JTF in Sulcis, but such proposals are not the outcome of a common reflection, but just of ideas of individual municipalities or groups. Another relevant aspect is the resistance shown by some territorial actors and groups to be involved in CET actions promoted by institutional actors. The latter aspect is also connected with the polarisation of the debate (see Para 5.2) and the absence of attempts to find constructive or creative syntheses, also due to the passive and defensive positions of regional decision-makers. Despite these critical aspects, the research has also shown that actions across different agency levels take place for single initiatives carried out at the territorial level, where local authorities, companies, universities, CSOs and citizens collaborate fruitfully.

#### *C10. Cooperation across political-administrative levels*

About the cooperation across political and administrative levels, the research has offered a quite clear picture. The first observation done by the interviewees is that there is good coordination between the European level and the national level. A second observation is that the coordination between the national level and the regional level is weak. In this respect, it should be mentioned that, despite the autonomy of Sardinia in the energy field acknowledged by the constitution, the national government tends to take decisions beyond what the region wants, as it considers energy a national strategic issue. The Sardinia Region, in turn, showed a low willingness or capacity to contribute to planning the CET, but also a low degree of alignment with the governmental decisions. Finally, there is a weak dialogue and coordination between the regional and the territorial areas. Some of the interviewed stakeholders stated that local communities are not involved in plans and strategies and that the decisions are imposed on them "from above".

### **5.3.3 Gender dimension**

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

## **5.4 Conclusion**

The analysis of the narrative battles for the interpretation of the clean energy transition has shown a high degree of centralisation of the process, where national and European leaders have centralised key decisions and are driving the transition policy. The analysis of the Transformative Capacities has shown that, despite the presence of a diffused interest and proactive attitude toward the CET in Sardinia, there is a low degree of inclusiveness in the current policy-making

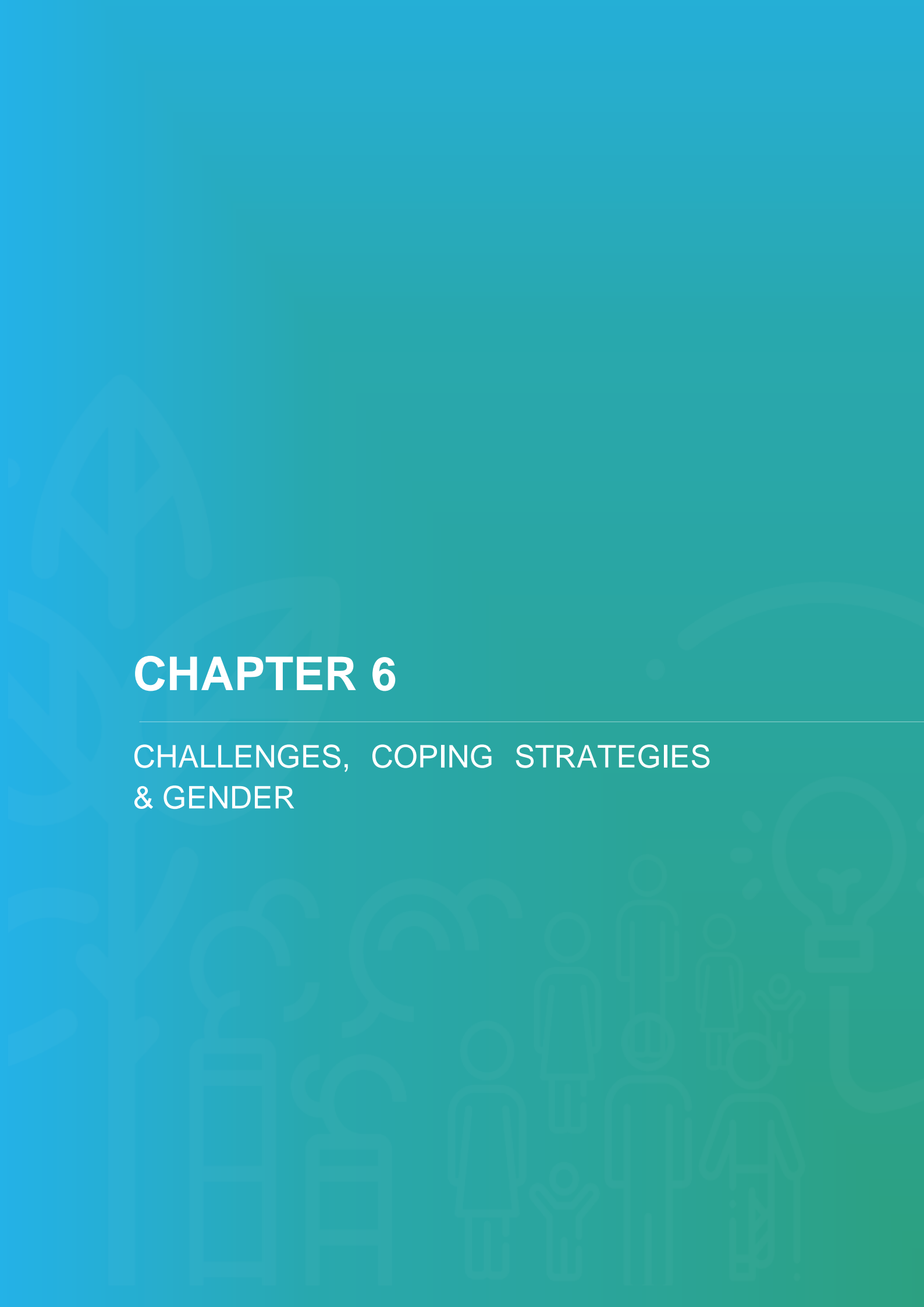
process. Without a clear vision, appropriate participation processes, and an inclusive vision, the CET risks being disentangled by the agency of the regional actors. Three main risks emerge from the analysis: (i) the risk of wasting the virtuous experiences and capacities developed in the regional system that is not properly inserted in a process of systemic change; (ii) the risk that – in the absence of adequate governance - private companies may benefit of the advantages offered by the transition without producing the expected advantages for (or even at the expenses of) the region; (iii) that the clean energy transition may become a further factor of de-territorialisation of the Sulcis territory rather than an occasion for re-territorialisation.



# CHAPTER 6

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## CHALLENGES, COPING STRATEGIES & GENDER



## 6 Challenges, coping strategies & gender

This chapter sketches and discusses the two main territorial challenges that, according to the case study results, are currently addressed by the Sulcis Coal and Carbon Territory (CCT). In this regard, we have singled out four main challenges for the territory: “Saving the metallurgic sector”, “Diversifying the local economy”, “Environmental restoration and conservation”, and “Overcoming peripheralisation”. We have drawn the first three challenges from the three main objectives of the Sulcis Plan, while the fourth challenge has been inferred from the research results and the interaction with local stakeholders. For each challenge, we present the challenge itself, the coping strategies adopted to deal with the challenge, and the gender aspects related to the challenge. The challenges will be then analysed horizontally and discussed based on the insight of the research presented in the previous chapters.

### 6.1 Challenge 1: Saving the metallurgic sector

#### 6.1.1 Challenge description

##### *Current situation*

The Sulcis CCT economy has been driven over the last 50 years by the non-ferrous metal industries and in particular by the industrial Pole of Portoscuso. The local aluminium industry is in a state of crisis as all the industrial activities involved have been either stopped, dramatically reduced or are currently at risk. The closure of two of the main companies operating in the sector has already led to an estimated loss of 3000 direct and 10000 indirect jobs, and other thousands of jobs are at stake with the planned phase-out of the Grazia Deledda Power Plant and with the current crisis of the PORTOVESME Srl due to rising energy prices. This crisis determined a dramatic social and economic situation within the territory. Among other effects, the economic and employment crisis is considered among the factors inducing people to leave the territory and a key factor for a reduced attractiveness of the territory for job-related immigration.

##### *Desired outcome*

The desired outcome is the re-launching of local industries with the capacity to create new employment opportunities in the area and to preserve the jobs that are at risk while preserving the “industrial vocation” of the territory.

#### 6.1.2 Coping strategies

##### *Public incentives for private investors*

The vision of this strategy is that it's up to the public actors, i.e., Sardinia Region and the Italian Government, to take charge of the crises and deliver solutions by incentivising private investors and ensuring that the investment will be long-lasting to save the jobs that are at risk and at least partially recover those that are lost. Among the actions pursued, there is more than a decade of workers' protests and struggles to produce a long-lasting negotiation with the Italian government and the Sardinia Region for support and incentives for the Aluminium companies, and ongoing plans and funds for re-activating the sector through LNG supply also to substitute the power generated from coal after the coal phase-out. More than a decade of negotiations allowed the creation of some favourable conditions for the investments, such as more favourable energy prices for carbon-intensive industries, and the plans for synergies between the Aluminium industries and

the Grazia Deledda Power Plant. Among the obstacles faced, there is the spread of an anti-industrial attitude of the local population; the increasing difficulties due to high costs of production in Sardinia compared to other locations; the predatory attitude of the international companies, which quit the territory when it is not profitable anymore; the increasing difficulties in delivering state support to the industries in a regime of fair concurrency in the European market; widespread conflicts on energy production and industrial investments in the area. Despite this strategy being one of the main points of the Sulcis Plan, and despite the support of the institutions, the two closed businesses have not restarted production yet.

### 6.1.3 Gender dimension

The current economic crisis has affected in different ways, women and men. As for men, most of the workers of the Portovesme industries are men, they so have been directly impacted by the crisis, losing their jobs, or stopped working with compensation or subside. The research has registered that some of the workers that lost their jobs decided to emigrate for finding new jobs while waiting for the situation to improve in Sulcis. This reportedly resulted in increased care work for women that remained in Sulcis with the family. The challenge, as far as we are concerned, has not been addressed from a meaningful gender perspective yet.

## 6.2 Challenge 2: Diversifying the local economy

### 6.2.1 Challenge description

#### *Current situation*

The dependency of the Sulcis CCT economy on the metallurgic industries is still very high. The crisis of this sector has shown the vulnerability and susceptibility of the territory to change in the energy and metal markets, as well as to national and international decisions.

#### *Desired outcome*

The desired outcome is that of diversifying the local economy and going beyond what has been called the “mono-economy”, thus making the territory more resilient and less exposed to the markets and national and supranational decision-making.

### 6.2.2 Coping strategies

#### *Promoting Tourism, Agriculture, Farming and Fisheries*

The vision of this strategy is that of territorial development based on a combination of tourism, agriculture, farming and fisheries. The territory is represented with many resources that should be better deployed, including built and natural environment, cultural heritage, mining heritage, food, fisheries, etc. Among the actions pursued, there is the establishment and development of the National Museum of Coal; a citizen mobilisation for using public available funds for the development of a touristic port for Sulcis (Porto Solki) to enhance pleasure boating tourism, proposals for improving mobility infrastructures and for eliminating polluting structures; the attempt to commercialise local food and wine productions. Among the obstacles faced there is the lack of accommodation facilities; poor transport infrastructure (both roads and trains) which almost isolates the territory; a weak territorial tourism system; lack of adequate training for local entrepreneurs; a gap in digital skills and infrastructure; portion of the territory are polluted and are forbidden to produce food; competition on limited resources with other more established tourist

areas in Sardinia; the closeness to Cagliari that makes Sulcis as a weekend residential area of the city dwellers; a stigma on Sulcis as an industrial and polluted creates a bad reputation for tourism.

### ***Making Sulcis a research and Innovation hub***

Another emerging vision is connected with a territorial development based on making Sulcis a research and innovation hub allowing it to experiment, commercialise and produce innovative products and materials. This vision is based on the idea that the coal mine infrastructure offers a unique opportunity for research and innovation, giving Sulcis a competitive advantage in the production of innovative products, technologies and materials. Action: This strategy is based on the ongoing conversion of the Nuraxi Figus coal mine to an R&I HUB. CARBOSULCIS, the regional-owned company that is the owner of the coal mine, is already working on several R&I projects that are already ongoing in the Nuraxi Figus coal mine (see the box below). Among the obstacles faced there is the lack of appropriate public support – also in financial terms – by public actors (for instance by Sardinia Region) to fulfil these plans. The political support for the project is also fading.

### **Box 2– The R&I projects under implementation in the Nuraxi Figus Coal mine**

The following projects are being developed by CARBOSULCIS in the Nuraxi Figus coal mine. The ARIA project conducted together with INGS (Istituto Nazionale di Fisica Nucleare del Gran Sasso) is devoted to cryogenic distillation for the production of isotopes for research and innovation purposes in the nuclear physics domain. Furthermore, ARIA will allow the experimentation and development of new technology for the subsequent large-scale production of stable isotopes of commercial interest, such as  $^{13}\text{C}$ ,  $^{15}\text{N}$ , e  $^{18}\text{O}$ , which are used for example in medicine and have a very important international market. Energy Storage (ES) project investigates how some already developed technologies (such as Underground Compressed Air Energy Storage, Flywheel Energy Storage System, and Chemical Potential Accumulation through Ammonia) can be exploited in a mining site to store the energy produced with renewables. FeDE project is a pilot project for experimenting with the use of a patented Process of "Desulphurization of Low-Medium Rank Coal" for the production of fertiliser and thus fostering local development in the area of agronomy research and innovation. Ulisse project, the coal mine, is used to experiment with geological storage of CO<sub>2</sub> techniques. The SPIRULINA project planned the construction, commissioning and testing of a photobioreactor for the cultivation of Spirulina algae, also because of the possible production and commercialisation of Spirulina Algae in the area. (Carbosulcis 2021).

### ***The development of a pole for shipbuilding and innovation***

This strategy is based on the vision of a local entrepreneur, who wants to deploy existing infrastructures and facilities (such as the port, and the nearby Portovesme industrial park), industrial synergies, and local competencies in the manufacturing sector, to develop a shipbuilding and innovation pole in the Portoscuso Port. In this vision, the pole offers significant direct and indirect employment opportunities and might be a key to fighting the occupational crisis in Sulcis. This strategy is committed to an endogenous development of the territory, thus in contrast with the reliance on international investments that has characterised the metallurgic sector in the last decades. The project wants to intercept the growing request worldwide for luxury boats, and the strategic position of the Sulcis territory in the Mediterranean Sea. The project foresees different activities: refit & repair of yacht boats, research, and innovation on green energies for boats, and touristic activities in the territory. Among the actions undertaken, there is a project presented to

INVITALIA (a public agency devoted to funding investment projects), plans for training of the workers (those receiving subsidies), and contact with national and international partners to fund the company. Among the obstacles faced, there is the plan to install an FRSU in the Portoscuso boat (to supply the EURALLUMINA company), which is a direct threat to the development of the pole.

### 6.2.3 Gender dimension

The diversification of the local economy may have a positive impact on women's employment opportunities both in the sectors of tourism, agriculture and fisheries and in the R&I sector. 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.

## 6.3 Challenge 3: Ecological remediation and conservation

### 6.3.1 Challenge description

#### *Current situation*

The Sulcis CCT is disseminated with “environmental scars” of its coal mining and industrial history. Many polluted and contaminated sites need environmental remediation interventions. Some parts of the coast are also contaminated and hazardous to health. The territory is also endowed with some ecological treasures that need to be conserved and valorised.

#### *Desired outcome*

The remediation of all the polluted sites and the conservation of biodiversity in the area.

### 6.3.2 Coping strategies

#### *Industrial and mining remediation*

Many interventions are in place to reclaim former industrial or mining sites in the area. Some of these interventions were managed in the past by individual municipalities while now the interventions are funded and implemented by a regional agency. Among the obstacles identified in the research, there are huge impasses on established and already funded remediation interventions and some conflicts over the remediation techniques.

#### *Environmental conservation*

Some actions have been undertaken to establish special areas both on the mainland, in the two islands of Calasetta and Sant'Antico and on the sea for the conservation of some species and ecosystems within the territory. Among the measures adopted, there is the establishment of nature2000 sites including both Special Conservation Zones and Special Protection Zones.

### 6.3.3 Gender dimension

We have not identified gender-specificities for this challenge.

## 6.4 Challenge 4: Combating peripheralisation

### 6.4.1 Challenge description

#### *Current situation*

The Sulcis CCT is perceived as “the periphery of the periphery” as it is in one of the most peripheral areas of Sardinia island which, in turn, is considered a periphery of Italy. The territory

lacks adequate transport infrastructures, including roads, trains and public transport. Besides the train Cagliari-Carbonia, the Sulcis CCT has a poor connection with the other centres in Sardinia. Moreover, Sulcis has a poor internal road and public transport network. On another note, the territory is also poorly and unstably connected with internet infrastructure, marking a digital divide with more connected zones in Sardinia and with the Italian mainland. This is also an obstacle to the competitiveness of local businesses in the digital market.

### *Desired outcome*

An increased connectedness of the territory both for transport and mobility and online.

## **6.4.2 Coping strategies**

### *Infrastructural intervention in Sant'Antioco*

This strategy was based on the vision to promote a large-scale touristic development of the Sant'Antioco island by improving the transport infrastructures and developing a new commercial port on the island. In this vision, such development is seen as a key to the development of the whole Sulcis area and for fighting its peripheralisation. Among the actions undertaken, there was the project to substitute the existing bridge connecting Sant'Antioco with the mainland with a new bigger bridge to be funded within the Sulcis Plan. However, a group of local actors opposed the project, including a committee of local citizens – Comitato Porto Solky – that was quickly followed by local environmental movements and by the Sant'Antioco citizens. Using official documents and collecting evidence, such a group of actors argued that the new bridge was a useless or even damaging project for the territory and denounced the lack of transparency in the decision-making process that led to the approval and funding of the project. With time, the opposition gained the support of the Sant'Antioco Municipality and the other municipalities of Sulcis, and in the end, the project was stopped by the Italian government. However, an alternative plan for the large-scale touristic development of the Sant'Antioco island was promoted by “Comitato Porto Solky”. Such an alternative plan foresees the use of the funds that were allocated for building the new bridge for the improvement of the existing road network in the Sulcis mainland, and the development of the new poly-functional port in Sant'Antioco (including the reclamation of the brownfield zones in the surrounding areas). Despite such an alternative plan being discussed with different stakeholders and authorities in the area, at the moment of writing this report, the plan is still only a proposal of the committee.

### *Improving the territorial transport network*

Another strategy is built on the vision of improving the internal transport network to make it easier, safer and more environmentally sustainable both for citizens and tourists to move through different areas within the territory. The actions undertaken in this strategy include a plan for improving the already existing road network, and the submission of project proposals for the development of the “South West Green Virtual Railway”, i.e. a system of electric buses connecting the different towns of the territory, to be funded with the Just Transition Fund (JTF). At the moment of drafting this report, the plan for improving the road network was not implemented yet, and there is no information available on whether the “South West Green Virtual Railway” proposal was approved or not.



### 6.4.3 Gender dimension

Even though it is well known that mobility is a gender-sensitive issue, we have not found traces of gender differentiation either in the formulation of the challenge or in the strategies devised to pursue it. However, it is worth noticing that such an issue should be better investigated as it was beyond the scope of the case study.

## 6.5 Cross-challenge analysis

Based on the analysis of the previous sections, the following key facts about the challenges, coping strategies and the gender dimension in the territory can be outlined.

- i) The challenges have been recognised by the local community since the formulation of the Sulcis Plan (Regione Sardegna, 2019a) and even before (Unione dei Comuni del Sulcis, 2007). The research has shown that there is widespread awareness of the above-mentioned challenges in the local community.
- ii) Several strategies have been developed and pursued to cope with the four challenges presented above, indicating that the challenges, not only have been identified but also addressed in the last 15 years.
- iii) To implement these strategies, a large amount of private and public financial resources have been deployed in terms of both developmental projects and investments. The social community is mobilised and engaged in the pursuit of the strategies as well.
- iv) However, almost all the strategies developed so far to achieve the challenges, have been slowed down, hindered or even obstructed and blocked by different kinds of strains, including endogenous and exogenous conflicts, impasses and situations of uncertainties.
- v) Despite the presence of a plan dedicated to the development of the Sulcis territory, i.e., the Sulcis Plan, there is a lack of coordination of the challenges toward clear and shared territorial objectives. The challenges and related coping strategies are often experienced in competition or even in conflict with each other.
- vi) Despite the steps undertaken so far and some results achieved, there is not a clear horizon on how and when such challenges will be solved. The fact that the challenges faced today by the CCT are approximately the same identified in the Sulcis plan that was drafted almost 10 years ago indicates a de-facto lack of progress in achieving the challenges.
- vii) The clean energy transition offers potential further resources (e.g., the JTF) and space for rethinking territorial development. However, the transition process as it is taking shape in Sardinia has not been implemented from a territorial perspective. While the planned intervention for the clean energy transition will contribute partially to some of the challenges, they are creating several additional strains and conflicts in the territory.
- viii) Based on the information collected in the research, all the challenges have been addressed with a gender-neutral perspective, thus making invisible the differentiated needs of men and women, as well as the different potential that men and women bring for territorial development.

## 6.6 Discussion

We started this report with the question “what are the challenges faced and the coping strategies adopted in Sulcis? In this chapter, we have highlighted four fundamental challenges for the Sulcis Coal and Carbon Territory: saving the metallurgic sector; diversifying the local economy; ecological remediation and conservation; combating peripheralisation. We have reported the main coping strategies adopted as well as the main obstacles faced in coping with these challenges. We have also elaborated on how and to what extent such challenges have progressed in the Sulcis CCT. This overview allows us to formulate some final questions for the case study:

*“Why, despite community commitment, resources availability and strategic planning, the situation of the Sulcis coal and carbon territory has not significantly improved over the last 15 years?”*

*“What role the clean energy transition is playing in the de/re-territorialisation of the Sulcis coal and carbon territory?”*

The research across different dimensions of change presented in this case study can help us to articulate some tentative – and certainly not exhaustive – answers to these questions. We will summarise such answers in the next sections.

### 6.6.1 Why Sulcis coal and carbon territory has not advanced in its challenges?

As a possible answer to this question, we present below a list of six factors hindering the agency of the local actor toward an effective territory-making practice. We present here below these factors as stand-alone points, but obviously, they are all linked to each other.

#### ***Territorial ambivalence unaddressed***

We have seen that the Sulcis CCT is characterised by an ambivalent interpretation of its territorial trajectory: on one side the territory is interpreted in continuity with its mining and industrial path, but, on the other side, there are also some signs of a widespread desire to perform a rupture in this trajectory and to move toward other kinds of territorial vocation. We have not registered any attempts to find a synthesis or even a compromise between the different visions of the territory. Rather, we have registered that this issue is often addressed as if a Gordian knot should be cut, where the local actors' statements swing from “we cannot bear further polluting industries” to “we cannot live only of tourism”. In our view, the ambivalence about what trajectory the territory should take is still latent, i.e., it has not been recognised, addressed and managed. This lack of acknowledgement of the co-presence of different claims for the territory's future is one of the main factors hindering communication and even blocking the development of an appropriate territory-oriented decision-making process.

#### ***Lack of institutional negotiation spaces***

The research has highlighted the lack of an institutional space where the territory, which is fragmented into several municipalities and divided into different interest groups, can discuss, negotiate and develop common visions and strategies to deal with its challenges. As we have seen in section 3.2, the reform of the province institution further exacerbated this problem, while some existing spaces, such as the Union of Municipalities of Sulcis, are weak and scarcely used.

### *Reliance on “outdated” governance practices*

Another factor is the lack of effectiveness of the established governance practices, based on multilateral dialogue among a pre-defined set of stakeholders, such as trade unions, companies, public institutions, etc. These actors seem no longer able to represent the multiplicity of viewpoints and needs of the citizens in the territory. In other terms, even when a negotiation space is created, e.g. with the Sulcis Plan, its objectives are not shared and its actions lead to profound and long-lasting conflicts. While the established practices of “territory making” seem to fail their task – i.e., creating convergence among citizens on territorial directions and priorities –, new practices of territorial governance have not been established yet.

### *Reliance and dependence on the central state*

We have seen how the Sulcis CCT has a well-rooted culture of reliance on external intervention by the state. The reliance on the state is twofold: in one way it has given the territory the capacity to mobilise relevant resources from the Italian government, on the other side it created a culture of dependence and inaction, as the solutions always came from the outside. This evidence coming from the analysis of stress (section 3.2.) is also confirmed by the survey (section 3.3.) that showed a relative dominance of passive responses over the active ones. The research has shown, that even the positive side of this dependence – i.e. the capacity to mobilise resources –, in the absence of an appropriate governance mechanism, can result in increased stress-strains in the territory, as the resources invested often lead to further long-lasting conflicts, impasses and dependences.

### *The symbolic trap*

The research has highlighted the important symbolic aspects of the territory (section 3.2) and a high sense of place identity widespread in the population (section 3.3.). We have seen as the territorial representation is at the same time very high – as Sulcis has a rich symbolic reservoir - and very low – as a strong territorial stigma is attached to Sulcis. Both extremes may lead to inaction. As for the idealised images, in the current situation of crisis, it is almost impossible to match such a high symbolic standard attached to the territory. As for stigma, an internal and external representation of the territory as irremediably detrimental or corrupted is certainly not an enabling environment for action. Countering territorial stigma and recontextualisation of the Sulcis positive symbols are both essential moves to exit the “symbolic trap” and mobilise local actors toward common territorial goals.

### *Gender neutral approach*

As we have seen the territorial challenges have not been addressed from a meaningful gender perspective, as they adopt a gender-neutral approach. Gender-neutral approaches (or gender blind) incorporate biases in favour of existing gender relations and therefore in most cases are implicitly centred on men models and do not appropriately consider the needs, orientations and potentialities of women. To enhance the contribution of both men and women to achieve the territorial challenges, it is thus pivotal to adopt a gender-sensitive approach.

The six points reported above, altogether, might be thought of as an additional challenge for the territory that, so far, has not been adequately addressed, i.e., **strengthening and updating the territorial organisation**. The points above highlight some criticalities as well as some possible strategies to cope with them.

### 6.6.2 What role is the clean energy transition playing in Sulcis de/re-territorialisation?

A set of key observations coming from the research can help us to understand how the clean energy transition is impacting the Sulcis Coal and Carbon Territory.

#### *Lack of a vision of energy transition for Sulcis*

A vision of the energy transition for Sulcis is simply missing. The research has shown that the more recent policy on the energy transition in Sardinia – i.e. the decree-law on energy in Sardinia – has been developed mostly at the national and regional level, without the effective participation of the territory. Paradoxically, the draft of a Territorial Just Transition Plan dedicated to Sulcis (foreseen by the EU Just Transition Fund) is being managed at the national and regional levels. Sulcis stakeholders have been asked in 2021 to submit some project proposals but without proper territorial consultation or a co-design process. The results have been that the territory has participated in submitting several projects in a fragmented and divided way, without a shared vision of the transition in the territory.

#### *Divisive effect on the territory*

The research has shown that the clean energy transition is forming new constituencies of actors. In such constituencies, the actors are divided into ideological or interest lines. Thus the transition is not producing an alignment of the actors within the Sulcis CCT to achieve common territorial goals but rather is further dividing them. It is worth noticing that the government decree on the energy transition in Sardinia sends contradictory messages for Sulcis, as it endorses the idea of Sardinia as a green “electrified” island but at the same time foresees investments for restarting some of the aluminium industries there (but with natural gas instead of coal). Not surprisingly, the measures associated with the clean energy transition have already produced profound conflicts at the territorial level (e.g. FRSU, offshore windfarms, etc.).

#### *Decreased autonomy*

We have shown that the clean energy transition is characterised by “centralisation” in the management of technology, as Sardinian energy production is conceived as more integrated with the Italian grid. This results in a decreased autonomy of the Sardinian energy system, but also a reduced autonomy of Sulcis in territorial economic and industrial strategies connected with energy production.

#### *Lack of retribution and asymmetric costs*

The focus on wind energy in the planned intervention in the clean energy transition does not foresee, at least from what is known so far, distributive advantages for those territories that will host the plants. Moreover, Sulcis will bear the cost of hosting the FRSU in Portoscuso which will supply also the Gulf of Cagliari.

The point above can be interpreted altogether as an additional challenge for the territory, that so far has remained unexpressed and unaddressed, i.e., the **development of an inclusive energy transition strategy for the territory**. This strategy to be effective should be inserted not only from a perspective of environmental sustainability and economic development but also in terms of territory-making.

## 6.7 Conclusion

After an overview and an analysis of the challenges faced by the Sulcis CCT, in this chapter, we have raised two fundamental questions. The first question is about why Sulcis has not significantly progressed in its challenges, despite the local commitment and the availability of resources. The second one is about what role the clean energy transition is playing in the de/re-territorialisation of Sulcis. To answer the first question, based on the research results, we have singled out a set of factors that hinder the activation or the effectiveness of a territorial action. Such factors, if reversed, may also be thought of as additional challenges that should be faced to activate a process of “territory-making”, in our view it is an essential condition for any future policy or plan of territorial development. To answer the second question, we have analysed some impacts that the clean energy transition is having or might have on the territory. It is clear, the clean energy transition is disjointed from the objectives of territory-making of the Sulcis CCT. We suggested that developing an inclusive energy transition strategy for the territory is a further challenge to be addressed by Sulcis.

# CHAPTER 7

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## CONCLUSIONS



## 7 Conclusions

This case study was dedicated to describing the situation of the Sulcis CCT in the dynamic context of the clean energy transition and related structural change. We have explored these issues by using multiple disciplinary lenses according to the ENTRANCES multidimensional analytic framework. We have analysed key phenomena such as stress-strain in the territorial organisation, place attachment and decarbonisation, structural change dynamics, political battles arising with the energy transition, and transformative capacities in the regional system toward the clean energy transition. Despite the complexity and intricacy of the Sulcis case, we hope that this case study might have highlighted some new facts and phenomena that can contribute to developing actions oriented toward territory-making in the Sulcis coal and carbon territory.

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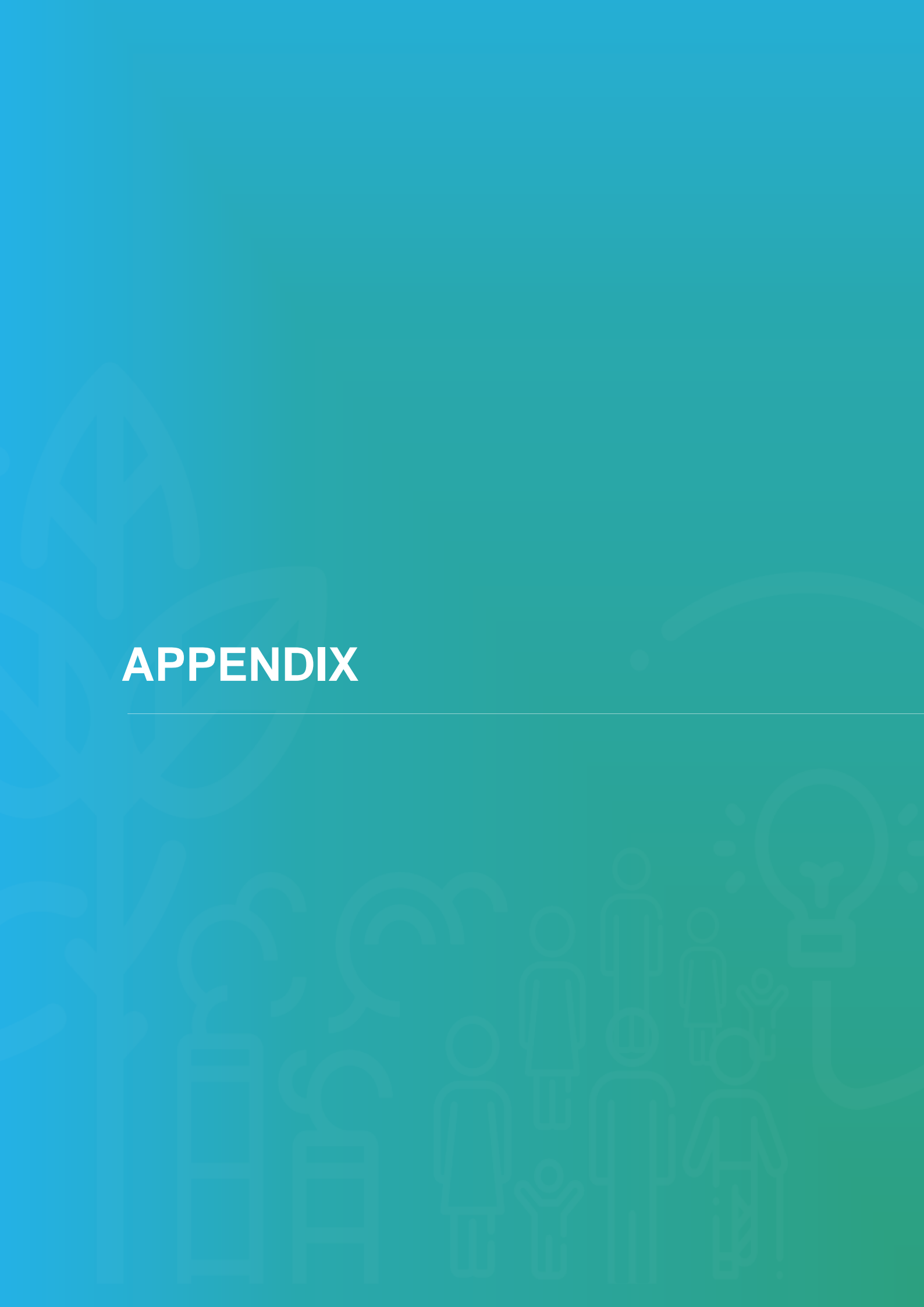
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# APPENDIX

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## Appendix

### Annexe 1: Regional Delineation

Table 9 – Case Delineation

CCT		NUTS 3 LMA		PAR	
111009	Carbonia	ITG2H	Sud Sardegna	ITG2	Sardegna
111057	Portoscuso				
111063	San Giovanni Suergiu				
111030	Gonnesa				
111071	Sant'Antioco				
111008	Calasetta				
111010	Carloforte				
111090	Tratalias				
111054	Perdaxius				

Source: own delineation.

Table 10 – Municipalities in CCT

Community	National Identifier	Area in km <sup>2</sup>	Population	Population Density
Calasetta	111008	31.1	2,819	90.8
Carbonia	111009	145.5	26,813	184.2
Carloforte	111010	51.1	5,996	117.3
Gonnesa	111030	48.1	4,834	100.6
Perdaxius	111054	29.5	1,371	46.5
Portoscuso	111057	38.1	4,958	130.2
San Giovanni Suergiu	111063	72.4	5,794	80.1
Sant'Antioco	111071	87.9	10,854	123.5
Tratalias	111090	31.0	1,034	33.4
Total	-	534.6	64,473	120.6

Note: Data refer to 2019.

Source: Istat and own calculations.



## Annexe2: NACE classification

Table 11– NACE Rev. 2 Classification

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

Source: Eurostat, 2008, p.47.

### Annexe 3: Description of the strain situations as mapped in June 2021

(Extract from the data processed in the socio-cultural component)

#### AS01: Conflict on the New Sant'Antioco Bridge

- **Type:** Endogenous Conflict
- **Rationale:** This strain situation is about a conflict regarding the building of a new additional bridge to connect the Sant'Antioco island with the "mother island" of Sardinia.
- **Description:** The strain situation is dated back to 2008 when, after a check, the existing bridge was allegedly declared as a precarious infrastructure. Monitoring devices were installed on the bridge, which had the effect of scaring the local population. In 2012 a first plan was developed to build a new bridge and demolish the existing one, with a cost that initially was estimated at 19 million €, but then turned out to be 57,5 million €. The amount of money was guaranteed by deviating some funds from the "transport" fund of the Sulcis Plan. The construction project was considered of national interest and assigned to the national road authority ANAS. Despite a part of the local population asking for an underground connection (instead of the new bridge) in 2016 the municipality of Sant'Antioco, approved the project for the building of the new bridge. In 2017 a committee of citizens gathered under the name of "Comitato Porto Solki" to oppose the building of the new bridge - considered useless and invasive of the natural and built environment - and for the adoption of the same money to develop an integrated intervention aimed at relaunching the touristic port of Sant'Antioco, and to improving the local mobility in the mainland. In the period 2017 - 2020, the Porto Solky Committee was heavily involved in informing the community and investigating and communicating with the various institutional entities. After additional tests, the existing bridge proved to be in good condition, and only a minor refurbishment intervention was needed. During this time, all the main environmental associations supported the committee. In 2019 the Municipality of Sant'Antico expresses its opinion against the new bridge and in 2020 a league of 19 municipalities in the area joined the protest. In May 2020 the opera was blocked by the Italian Ministry of Infrastructure. This was celebrated as an unprecedented victory by the local community. Despite that, at the time of writing this report, the funds available for improving the transport infrastructure in the area were still on hold. The strain situation started as an internal dispute (e.g. underground way VS new bridge), then became an external conflict (with the Sardinia Region and Italian government backing the project), and finally became an impasse (as funds are available but not used). However, the Strain Situation has been classified as an internal conflict, as it was generated and cultivated by divisions within the local population.
- **Factor(s):** F9 Top-down exogenous development projects
- **Geo-position:** Sant'Antioco.
- **Time-position:** 2008, when the "danger" related to the bridge was announced.
- **Sources:** Focus Group; AS01
- **Gender of the FG source:** Male

### 02: Debt of Carbonia City

- **Type:** Impasse / contradiction
- **Rationale:** The City of Carbonia is suffering the strain of a long-term debt contracted also in virtue of some infrastructural investments of the past.
- **Description:** A set of infrastructural investments was carried out in Carbonia City in the 2000s. Such investments, even though bringing new services to the city, also resulted in huge debt in the city budget, restraining its spending capacity, and forcing the city to re-negotiate the debts and extend their duration. Due to an Italian law that in 2012 introduced a new way of calculating the budget of the local administration, the problem of the city debts was confused and mixed with those of "budget deficit", giving rise to internal disputes within the city and among political parties (the law has been revised less controversially in 2019). The strain situation so is marked as an impasse but also gave rise to endogenous conflicts in the past.
- **Factor(s):** F13: Disinvestments
- **Geo-position:** Carbonia city.
- **Time-position:** 2000.
- **Sources:** Focus Group, AS02
- **Gender of the FG source:** Female

### 03: ARIA project impasse

- **Type:** Impasse/Contradiction
- **Rationale:** The strain situation regards the current impasse of the ARIA project, a project aimed at relaunching the use of the Nuraxi Figus coal mining site for R&I purposes (with high commercial potential).
- **Description:** The ARIA project is carried out by CARBOSULCIS together with INGS (Istituto Nazionale di Fisica Nucleare del Gran Sasso) and is devoted to cryogenic distillation for the production of isotopes for research and innovation purposes in the nuclear physics domain. The ARIA project is among the main projects developed for the conversion of the CARBOSULCIS from a coal mining site to a service provider company. The progress of the ARIA project, despite the high economic and employment potential of the project, is slowed down (or even blocked) for the lack of investments in the CARBOSULCIS company (which is publicly funded as it is owned by the Sardinia Region). The number of employees of CARBOSULCIS is in contraction while extra investments in human resources and technologies are needed to proceed. The outcome is a retarded start of production (which was originally expected to start in 2020).
- **Factor:** F13: Disinvestment
- **Geo-position:** The Nuraxi Figus coal mine.
- **Time-position:** 2019.
- **Sources:** Focus Group, AS03
- **Gender of the FG source:** Female

#### 04: Geomining Park Unfulfilled

- **Type:** Impasse/contradiction
- **Rationale:** This strain is related to the situation of the impasse at the Regional Geomining Park. Designed by the Region as a key tool for post-mining territorial development strategy, such a Park never fulfilled its role with a history of conflicts, mismanagement and lack of strategic capacities.
- **Description:** Established in 2001 the Sardinia geomining park was a strategy pursued to deal with the collapse of the traditional mining sector. The objectives included the enhancement of immense real estate assets (over 1500 buildings and thousands of hectares of land), the reclamation of areas compromised by mining and the creation of tourist and commercial activities in disused mining sites. Despite these objectives and the funding received, the park's history has been characterised by mismanagement - often leading to putting it under an external administration -, wrong or not consequent investments, and a lack of cooperation with the municipalities that are owners of the buildings and sites. Besides some successes, the park never could start work in line with the expectations.
- **Factor:** F09: Top-down exogenous development projects
- **Geo-position:** the whole Sulcis area.
- **Time-position:** 2001, when the Park was established.
- **Sources:** Focus Group, AS04, AS05
- **Gender of the FG source:** Male

#### 05: Disinvestments in the aluminium industry

- **Type:** Exogenous conflict
- **Rationale:** This strain situation is related to the private disinvestments from the aluminium industries in Portovesme which led to broad and long-lasting conflicts in the coal and carbon territory.
- **Description:** In the years between 2009-2012 there were huge disinvestments in the industries of Portoscuso which led to the loss of 3,000 direct jobs and 10,000 indirect jobs. This closure is related to the interruption of the production of the Alcoa of Portovesme (2012-2014) and Eurallumina (2009) as an effect of the economic crisis and with the motivation of the lack of competitiveness of the plants. The closure of the plants resulted in several years of labour strikes and negotiations with both the companies and the Italian government.
- **Factor(s):** F13: Disinvestments
- **Geo-position:** Portovesme Industrial Park.
- **Time-position:** symbolic date: 2009 when Eurallumina stopped production.
- **Sources:** Focus Group
- **Gender of the FG source:** Male

### ⚡06: Uncertainty generated by the coal phase-out decision

- **Type:** Dependence/Uncertainty
- **Rationale:** The territory is suffering from a situation of uncertainty due to the decision of the Italian Government to phase out coal which puts at risk a high number of local jobs and jeopardises the former investment plans in the area.
- **Description:** The decision of phasing out coal by 2025, taken by the Italian government, had the effect of putting in danger the very existence of the ENEL Grazia Deledda Coal Power Plant, thus constituting a threat to the 450 workers of the power plant (and 1200 jobs in total, considering indirect losses). Moreover, this decision jeopardised the investments that were planned for further developing the Power Plant to produce steam for re-launching the Eurallumina industry in the Portovesme industrial park (see ⚡29). The plan for a synergy between the power plant and EURALLUMINA was the outcome of a long and painful process of negotiation and institutional work at all levels (including workers, trade unions and the Regional Government), and could contribute to the development of new jobs. The very core of the strain situation is that the decision of phasing out coal was not accompanied by a clear plan of what should happen next to the workers and to the territory of Sulcis where the power plant and the workers are based. This cast the territory in a situation of uncertainty and dependence on the decisions of external actors.
- **Factor(s):** F15: Global environmentalism
- **Geo-position:** in Portovesme industrial park, where the coal-fired power plant is located;
- **Time-position:** 2017, when the Italian government announced the coal phase-out.
- **Sources:** Focus Group
- **Gender of the FG source:** Male

### ⚡07: Conflict on incentivising local biomass production

- **Type:** Endogenous conflict
- **Rationale:** This strain situation is related to a conflict between the national government and the regional government about incentivising the production of biomasses in Sardinia.
- **Description:** The Ministry of Environment asked ENEL to develop a feasibility study for a plan aimed at improving the power generation capacity from biomass of the Grazia Deledda Power Plant. Such a feasibility study was also related to exploring how to compensate for the loss in power generation of the Sulcis Power Plant after the coal phase-out. A condition for the plan was the increase of biomass generation in Sardinia, as currently, the biomass incinerator of the power plant is fuelled by biomasses cultivated in other Italian regions. The Sardinia region was supposed to be the key actor in promoting such an increase but, after a series of meetings with all the involved departments, the Region declared its unavailability to support such a development plan.
- **Factor(s):** F09: Top-down exogenous development projects
- **Geo-position:** Portovesme, where the ENEL power plant is based.
- **Time-position:** 2010.
- **Sources:** Focus Group
- **Gender of the FG source:** Female

### 08: Conflicts on biorefinery investment plans

- **Type:** Endogenous conflict
- **Rationale:** An investment plan to develop a biorefinery in the Portovesme Industrial Area sparked a set of widespread conflicts within the territory.
- **Description:** During the first half of the 2010s Mossi & Ghisolfi, an international company in the Chemical sector planned to build a biorefinery in the Portovesme industrial area (as well as in two other locations in Italy). Such a refinery was based on an innovative technology that allowed the production of biofuel from non-food bio-materials, notably from canes. This plan foresaw a huge investment, that would have been covered with public funds, i.e. by the Sulcis Plan. Such an investment promised to develop new direct jobs in the biorefinery, indirect jobs in agriculture, and secondary use of the steam produced by the Grazia Deledda Power Plant (thus providing a further reason to maintain the power plant ongoing). Despite this potential, the Plan was highly criticized by a part of the public opinion and by some key local and regional actors, giving rise to public disputes and conflicts. Among the critics, there were the biorefinery would have destroyed the wild cane fields (thus impacting the landscape), that it was a threat to local agriculture (as the cane could substitute local production), and that the number of biomasses needed would have drained almost all the local water, and finally that the biorefinery risked to produce further pollution and it risked to push Sulcis into a new mono-economy. The plan was highly divisive, as the conflict included a conflict between different environmental groups (some in favour and some against); between the industrial and the agricultural sector (including also conflict within different compartments of the trade unions); conflict between the municipalities of "basso Sulcis" - more focused on agriculture - and those that we defined as CCT - dependent on industry (and historically from coal mining).
- **Factor(s):** F11: Exogenous private investments; F15: Global environmentalism
- **Geo-position:** Portovesme Industrial Area, where the development of the biorefinery was planned.
- **Time position:** In 2014 it was announced an agreement to fund the biorefinery with the Sulcis Plan.
- **Sources:** Focus Group, AS10, AS11
- **Gender of the FG source:** Female

### 09: Uncertainty about the Territorial Just Transition Plan (TJTP)

- **Type:** Dependence/Uncertainty
- **Rationale:** This strain situation is related to the uncertainty on how the project and plans developed by local actors will be taken into account for the formulation of the TJTP for Sulcis, which is being developed by the Italian Government.
- **Description:** In the spring of 2021, a call to submit local projects for the Territorial Just Transition Plan was launched by the Italian Ministry for the South. This call was not publicized properly as only some of the local actors were aware of this opportunity. 23 projects were developed by local actors in Sulcis, including civil society organisations, groups of citizens, local municipalities, trade unions and businesses. The strain situation is based on the fact that, despite the high excitement about the proposals formulated and the high expectations on the opportunity raised by the JTF, local stakeholders have no control



(and even no information) about the decision-making process, and over whether the project developed will be taken into account in the Territorial Just Transition Plan. Such a plan will be formulated by a private consultancy and will be approved by a national commission established by the Italian government (as the plan includes also Taranto city in Puglia). The strain is aggravated by the fact that such a situation of uncertainty and dependence is similar to that experienced with the Sulcis Plan during the 2010s.

- **Factor(s):** F09: Top-down exogenous development projects
- **Geo-position:** The whole Sulcis area.
- **Time-position:** 2021, when the projects of the civil society were collected.
- **Sources:** Focus Group, AS06
- **Gender of the FG source:** Male

#### 10: Gap in the digitisation of regional services

- **Type:** Impasse / Contradiction
- **Rationale:** This strain situation is related to contradictions in the digitalisation of regional administrative services, which turns into malfunctioning and creates strain for the local SMEs.
- **Description:** The digitisation of services is in contrast with the malfunctioning of the regional portal and poor training of the personnel. Moreover, some of the digitalized services are suddenly pushed back to the pre-digital format. These contradictions and impasse at the regional level create a strain for SMEs in the Sulcis area.
- **Factor(s):** F16: Digital divide
- **Geo-position:** the whole Sulcis area
- **Time-position:** not applicable.
- **Sources:** Focus Group
- **Gender of the FG source:** Female

#### 11: Lack of update of the training system

- **Type:** Impasse / Contradiction
- **Rationale:** An impasse in the regional training system updates results in a lack of competencies for new types of markets (e.g. digital market).
- **Description:** There is internal resistance to updating the regional training system and opening it to new professions, such as those of the digital market. Some of the key choices related to the training system are aimed at keeping the status quo of the training organisation more focused on traditional professions (tourism operator, barman, hairdresser, etc.) rather than favour local or territorial development. This impasse is detrimental for Sulcis, as this is an industrial territory particularly exposed to loss of jobs due to automation and globalisation, and thus it is a territory that strongly needs the competencies for shifting toward new market areas and sectors.
- **Factor(s):** F16: Digital divide; F17: Automation
- **Geo-position:** the whole Sulcis area
- **Time-position:** symbolic date: 2012 with the referendum on Province abolition
- **Sources:** Focus Group
- **Gender of the FG source:** Male

### 12: Administrative bottleneck of investments

- **Type:** Uncertainty / Dependence
- **Rationale:** The authorization procedure of some investments is slowed down and even blocked by the shortage and lack of capacities of the regional personnel.
- **Description:** Shortage and inadequacy of the regional personnel directly impact investments and construction sites that are ready to start, creating delays and a state of uncertainty for the investors. This type of organisational problem has also been identified among the critical aspects in the implementation of the Sulcis Plan, in which was noted that the times declared in the notice for the processing of business proposals are exceeded by a few times, in some cases up to ten times.
- **Factor(s):** F11: Exogenous private investments
- **Geo-position:** The whole Sulcis area.
- **Time-position:** symbolic date: 2012 with the start of the Sulcis plan.
- **Sources:** Focus Group, AS07
- **Gender of the FG source:** Female

### 13: Dependence on external investments for broadband infrastructures

- **Type:** Uncertainty / Dependence
- **Rationale:** There is a delay in digital infrastructures - such as broadband, which put the Sulcis territory in a situation of dependence on external investments.
- **Description:** There is a huge digital divide in the area, with a lack of adequate communication infrastructures, which put the territory in a condition of fragility. The investments needed to fill this gap cannot be done by individual municipalities or by the province, there is a dependency on the central government. There is some progress, but such progress only concerns the central part of Carbonia, while peripheral areas are cut away. This problem is also affecting productive sites, such as the former coal mine of Serbariu, where the National Museum of Coal and Sotacarbo are located, which currently use private internet radio connections. There are some plans for improving the situation but it is uncertain whether and when such plans will be implemented, and this is a source of strain for the territory.
- **Factor(s):** F16: Digital divide
- **Geo-position:** the whole Sulcis area;
- **Time-position:** not applicable.
- **Sources:** Focus Group
- **Gender of the FG source:** Male

### 14: Impasse in the tourism sector

- **Type:** Impasse / contradiction
- **Rationale:** Despite the resources and the attraction of the area, there is a lack of a territorial tourism system that can be configured as an impasse due to latent internal conflicts.
- **Description:** The tourism sector is fragmented across the different cities in the area which don't communicate with each other. There is the paradox that museums cooperate at the

international level but hardly cooperate at the local level. There is also a lack of competencies in tourism and a lack of networking as tourism is interpreted in a bureaucratic way (i.e. only the tourist sector) and it is not considered more holistically, considering also the synergies with other sectors (food, industry, etc.). This strain was exacerbated by the suppression of the Carbonia – Iglesias province.

- **Factor(s):** F13: Disinvestments; F15: Global environmentalism
- **Geo-position:** The whole Sulcis area.
- **Time-position:** symbolic date: 2012 with the suppression of the Carbonia-Iglesias province
- **Sources:** Focus Group
- **Gender of the FG source:** Male

#### 15: Conflicts with surrounding areas on Tourism development

- **Type:** Exogenous conflict
- **Rationale:** The strain situation is related to a conflict with the surrounding territories which acts against the development of tourism structures and infrastructures in Sulcis.
- **Description:** This conflict is generated by competition over limited resources. Some examples were provided during the FG. One of them is related to a proposal advanced by the trade Union in Sulcis in 2013 - after the organisation of a huge demonstration - to entitle to Sulcis the recently developed train station of the Elmas Airport (now it is named after Cagliari). This proposal generated a conflict within the trade union between the Cagliari and the Sulcis sections. Another example was provided regarding the competition and conflict existing about the development of tourism structures. It was reported how in the past, the judiciary centre of power in Cagliari, acted with "hostility" towards some attempts to develop important touristic areas close to the Sulcis area.
- **Factor(s):** F09: Top-down exogenous development projects; F11: Exogenous private investments
- **Geo-position:** the whole Sulcis area.
- **Time-position:** not applicable.
- **Sources:** Focus Group
- **Gender of the FG source:** Male

#### 16: Conflicts related to circular migration

- **Type:** Endogenous conflict
- **Rationale:** Recurrently since the 50s up to today, on the occasion of employment crises, a portion of the population emigrates, and then comes back, creating socio-cultural and economic conflicts between migrants and the resident population.
- **Description:** There have been two different flows of outmigration and later return migration: one in the 1950s, with return migration in the 1980s and 1990s; And one at the beginning of the 2010s, with a relatively recent return migration. These two waves of circular migration created strains at different levels: within the families before the decision to leave; in the social life of those that are left home; when the returnees come back and find "a different place"; on the retirement wage of the resident that is shared with the returnees.
- **Factor(s):** F01: Youth Outmigration; F04: Return migration

- **Geo-position:** Carbonia which is particularly exposed to both outmigration and return migration
- **Time-position:** 1950s when the first mass emigration started.
- **Sources:** Focus Group
- **Gender of the FG source:** Both

#### ≈17: Conflicts on the siting of a Floating Storage Regasification Unit (FSRU) in Portoscuso

- **Type:** Exogenous conflict
- **Rationale:** Conflicts between the local community and industrial interest are sparking with the plan of locating an FSRU in the Portoscuso port.
- **Description:** This conflict has different sides. On one side, the plan of siting the FSRU in Portoscuso goes against the former plan which foresaw locating it in Cagliari (both options foresee a transport infrastructure between the two poles). So this conflict is a high-level conflict, between different political parties which were at the government at a different moment in time, and between poles of industrial and territorial interest, which involves also the SNAM (the giant developer of natural gas infrastructures involved in the plan controlled by the Italian government). On the other side, the current decision of locating it in Portoscuso sparked the protest and a conflict with the local community, and in particular with the Portoscuso municipality and some local environmental groups. The conflicts are based on the fact that the Portoscuso port is a small port within the city, and it is not fit with a regasification plant, which is a highly hazardous plant. Some other arguments against the siting in the port, are related to an alleged incompatibility with other development plans, such as that of developing a nautic pole in Portovesme. The provision of gas to the area (wherever the FSRU is based) is a strategic asset for the development of the planned Euralluminia gas plant (see the specific strain situation ≈29) and for the eventual conversion of the ENEL power plant to gas.
- **Factor(s):** F11: Exogenous private investments
- **Geo-position:** Portovesme, where the FSRU will be sited.
- **Time-position:** 2019.
- **Sources:** Focus Group
- **Gender of the FG source:** Male

#### ≈18: Conflicts with "populist" environmental movements

- **Type:** Endogenous conflict
- **Rationale:** Some ideologically-driven environmental movements raise conflicts about development interventions, land remediation, and everyday territorial management.
- **Description:** Some "populist" environmental movement recurrently uses some ideological stance to spread fake or inaccurate news to spark fear in the local population. Examples are related to the FSRU (see strain situation) or to the Compass - a local weapon industry (in Iglesiente territory therefore not included as a strain situation in this report). This strain situation is also related to planned remediation interventions in which a lack of determination of public institutions is accompanied by conflicts raised by ideologised environmental movements, which oftentimes, are totally against any solution. This is configured also as a recurring situation of intervention proposal / territorial defence. This is

not only related to extraordinary events or interventions, but also the regular management of the territory such as deforestation, slope erosion, or tree cutting.

- **Factor(s):** F15: Global environmentalism
- **Geo-position:** in the whole Sulcis area
- **Time-position:** not available.
- **Sources:** Focus Group
- **Gender of the FG source:** Male

#### 19: Conflict upon the province institution

- **Type:** Endogenous conflict
- **Rationale:** A populist ideology of "reform" fought for the abolition of intermediate provinces, and this led to a lack of political and territorial representation for Sulcis.
- **Description:** In 2012 a referendum promoted by the Reformer of Sardinia party abolished the Carbonia and Iglesias province (along with all the other provinces of the region). This decision turned out to collapse the provincial system that guaranteed a form of sovereignty of the territory. The referendum led to the establishment of a big "South Sardinia Province" (in which the Sulcis area is included) and to the Metropolitan City of Cagliari, which now absorbs most of the resources. The ideology was driven by the idea of provinces as a place where "the caste" spent public money. The decision was followed by the weakening of the province institution (which lost a directly elected assembly) in the whole of Italy in 2016. The loss of the province meant, among other things, the dismantlement of the province tourist system and the province training system and left the territory in a condition of dependency on regional decisions, and thus a loss of sovereignty and territorial services.
- **Factor(s):** F06: Urban-centred ideology; F14: So-called "populism"
- **Geo-position:** in the whole Sulcis area
- **Time-position:** symbolic data: the 2012 referendum on the abolition of the Provinces.
- **Sources:** Focus Group, AS09
- **Gender of the FG source:** Male

#### 20: Conflict sparked by the "people of VAT number"

- **Type:** Endogenous conflict
- **Rationale:** The strain situation relates to the conflict that the so-called "people of VAT number" started as a response to the debts incurred during the economic crises in the 2010s.
- **Description:** In the 2010s after the closure or resizing of the industries in Sulcis (Alcoa, Eurallumina, Carbosulcis, etc.), especially after the closure of ALCOA, the SMEs of the area also indirectly suffered from these closures. These businesses behaved as if the closure was only temporary, i.e. they do not implement structural changes in their business, and in the following years, they contracted high debts. When it was clear that Italy could recover a part of the ALCOA profits, the so-called "people of VAT number" started a conflict to recover money, as they were among those damaged by the closure of ALCOA, even though indirectly. The movement was led by a populist ideology and collected heterogeneous kinds of businesses. The movement carried out a huge conflict protesting against various institutions, the province the region and the Italian government. The

movement was somehow in conflict with the industry workers (who were already subsidised with unemployment benefits). The conflict culminated in 2012 when Italian government representatives went to Sulcis to sign the Piano Sulcis. That day was marked by violent protests, with different poles, the workers of the industries on one side and the people of VAT number on the other side (somehow united this time against the government). On that day, two Italian ministers had to run away with a helicopter. The protest obtained the establishment of “Urban Free Zones”, which gave an advantageous tax opportunity for local businesses. This intervention regarded all the areas, whatever the business activity (including sectors not interested in the closure of Alcoa such as pharma shops). Despite this result, about half of the money recovered is still not used today, as the tax benefit, to be used, requires that the business activities are running (while many of them failed or dramatically reduced their activities). The use of the resources, framed in the Sulcis plan, was criticized as it was not a strategic investment. A portion of the resources not used was spent to save the SOTACARBO (a public-owned firm by Regione Sardinia and ENEA) through a recapitalisation of the business.

- **Factor(s):** F10: Public Transfer and Subsidies; F14: So-called “populism”
- **Geo-position:** The strain situation concerned the whole Sulcis area.
- **Time position:** In 2012 when ALCOA announced the closure of the plants in Sulcis.
- **Sources:** Focus Group
- **Gender of the FG source:** Male

#### 21: Conflict on land remediation of "Area 5"

- **Type:** Endogenous conflict
- **Rationale:** A conflict is ongoing between ENEL and the Portoscuso Municipality on the method used for land reclamation in the so-called "Area 5" in Portovesme industrial park.
- **Description:** The area defined as "Area 5" was an area within the Portovesme industrial park that was dedicated to collecting coal ash, and that nowadays has such ash partially covered by land coming from the coal mining basin. The area was given by the Portoscuso municipality to the society of the coal mine in 1961, and starting from 1965 the area has been owned by ENEL and was used to store the ash of the Grazia Deledda Power Plant up to 1989. In 1991 an intervention of remediation was implemented by ENEL, and the area was covered with materials coming from the coal mine. Recent controls have verified that the area contains polluting materials and consequently, an additional remediation intervention was planned. The planned intervention is based on confinement methods, meaning that the polluted materials will be confined locally, instead of being transported elsewhere. Starting from 2017, this intervention raised a conflict between ENEL, which wants to pursue the remediation intervention through this technique (by hiring a specialised firm), and the municipality of Portoscuso which is against this solution.
- **Factor(s):** F13: Disinvestments; F15: Global environmentalism
- **Geo-position:** Portovesme Industrial Area, where “Area 5” is placed.
- **Time-position:** 2017
- **Sources:** Focus Group, AS12
- **Gender of the FG source:** Female



## 22: Conflict on the Coaquaddus Therms

- **Type:** Exogenous conflict
- **Rationale:** A conflict is sparking between Sant'Antioco municipality and citizens and a private investor who is planning to build a thermal centre nearby the immaculate Coaquaddus beach.
- **Description:** A private investor is planning to build a thermal centre on Sant'Antioco island, just nearby the Coaquaddus beach, which is the last immaculate beach on Sant'Antioco island. The administration of Sant'Antioco, groups of citizens and environmental movements are fighting against this investment, as it is considered to contrast with the local landscape and related regulations. Some other arguments against this plan are that other sites have been already identified and dedicated for thermal use on the Sant'Antioco island. It is worth mentioning that a similar plan (promoted by the same business) was developed in the 2010s and was rejected through an administrative act of the Sardinia Region in 2012. At that time, the rejection of the Sardinia Region was contested by the developers, but the rejection was confirmed by a full-scale judiciary iter (with both regional and state courts confirming the validity of such an administrative resolution).
- **Factor(s):** F11: Exogenous private investments
- **Geo-position:** Sant'Antioco.
- **Time-position:** 2011, when the debate on the Coacaddus Therms first started.
- **Sources:** Focus Group, AS08
- **Gender of the FG source:** Male

## 23: Impasse on ex-Seamag reclamation

- **Type:** Impasse / contradiction
- **Rationale:** Despite the availability of funds, the reclamation of the former Seamag area, which is sited at the entrance of Sant'Antioco, are on hold since 1990.
- **Description:** In 1990 10 billion Lira (5 million Euros) were stocked for a reclamation of the former Seamag area. In 1990 the reclamation was given to a private-public mixed company which resulted in to use of the money irregularly. The intervention was then blocked and despite several attempts to relaunch the reclamation, the regional funds - which now have increased to 7,7 million Euros, are still on hold.
- **Factor(s):** F13: Disinvestments
- **Geo-position:** Sant'Antioco.
- **Time-position:** 1990.
- **Sources:** Focus Group
- **Gender of the FG source:** Male

## 24: Impasse on “sa Punta de s’Aliga” (adjacent Seamag) area reclamation

- **Type:** Impasse / contradiction
- **Rationale:** Despite the availability of funds, the reclamation of the former Sardamag area is still on hold since the 1990s.
- **Description:** The funds for the reclamation of the Seamag area are available since the '90s but they have not been used yet. Now a reclamation plan has been developed by the IGEA (the regional company for the reclamation of mining and industrial sites), nevertheless,

there is also an internal contradiction: the plan is focused just on the area owned by the Seamag (15ha) while the "active area" requiring a reclamation is in a total of 60 ha, as it includes the surrounding area (which was not owned by the Seamag, but that was affected by its activity). So, paradoxically, even if the plan would be finally implemented, it will not solve the problem of the area, as most of the polluted land will not be interested in the planned reclamation intervention.

- **Factor(s):** F13: Disinvestments
- **Geo-position:** Sant'Antioco.
- **Time-position:** 1990.
- **Sources:** Focus Group
- **Gender of the FG source:** Male

#### 25: Material heritage unexploited

- **Type:** Impasse / contradiction
- **Rationale:** The material heritage of former mining and industrial activities is unexploited despite their potential high value and profitability in terms of land reuse.
- **Description:** Some examples of unexploited assets are the availability of 60000sm to be built in the "Palma Scave" area - an area that is deteriorated but not polluted, and the Santa Caterina area, a former electric power plant dismissed in the '60s and still unused.
- **Factor(s):** F13: Disinvestments
- **Geo-position:** the whole Sulcis area.
- **Time-position:** not applicable.
- **Sources:** Focus Group
- **Gender of the FG source:** Male

#### 26: Dependence on national bureaucracy under EU scrutiny

- **Type:** Uncertainty / Dependence
- **Rationale:** The local economy is dependent on state support and at the same time is under the scrutiny of the EU for ensuring fair competition in the single market. Thus local economy is also highly dependent on the efficacy of the Italian bureaucracy.
- **Description:** In recent years, two bureaucratic errors of the national government had severe consequences on the local economy in Sulcis. The first one was a wrong communication of national support to the coal mine, which gave start to a double infraction procedure by the European Commission, and then caused the closure of the activities of the Nuraxi Figus coal mine and the consequent conversion of the CARBOSULCIS into a service provider. A similar situation happened when the Italian government presented late the communication of the administrative law on competitiveness which interested the energy prices in 2012.
- **Factor(s):** F10: Public Transfer and Subsidies
- **Geo-position:** the Nuraxi Figus coal mine.
- **Time-position:** symbolic date: 2012 when the EU started the infraction procedure for the national support of coal mining activities.
- **Sources:** Focus Group
- **Gender of the FG source:** Female

### 27: Political Dependence from Cagliari

- **Type:** Uncertainty / Dependence
- **Rationale:** The redefinition of the "provinces" in Sardinia and the resizing of the Province institution means a loss of sovereignty for Sulcis and consequent dependence on administrative and political centres whose interests are not aligned with those of the territory.
- **Description:** Over the last 10 years there has been a subtraction of sovereignty, the decision-making process has centralized the decision-making capacity mainly in the Regional capital cities, and this also has effects, not directly on services, but consequently on services, but because they are managed according to interests which are not functional to this territory. This process is also connected with the loss of power of Province Institutions and also with the reconfiguration of the South Sardinia province (where Sulcis is inserted).
- **Geo-position:** in the whole Sulcis area
- **Time-position:** symbolic data: the 2012 referendum on the abolition of the Provinces.
- **Factor(s):** F06: Urban Centered Ideology
- **Sources:** Focus Group
- **Gender of the FG source:** not applicable

### 28: Conflict on Offshore wind park

- **Type:** Exogenous conflict
- **Rationale:** This strain situation is related to a conflict raised on the development of an offshore wind park on the coast of Sulcis.
- **Description:** In 2020, Ichnusa Wind Power Srl, a Milanese energy company, presented a project to the Italian Ministry of Environment, for the construction of an offshore wind power plant, with 42 "wind towers", 265 meters high, on a marine surface of 49 thousand square meters, about 35 kilometres from the coast of the island of San Pietro and Sulcis. When the news was made public, a legal and public battle started. The plan was criticised and publicly denounced by the mayors of the seven coastal municipalities impacted by the infrastructure, and by some local environmental groups (Italia Nostra Sardegna and Gruppo di Intervento Giuridico). For these actors, the building of such a wind park was intrusive to the landscape, put in danger the route of the tuna – one of the traditional economic activities of the area –, and was not sustainable in the long run (as off-shore wind parks are exposed to fast erosion and loss of efficiency in time). Moreover, another reason against such a plan was that the plan would not have either an economic impact on the territory or an advantage on the regional energy system (which already produces much more energy than it uses). Finally, the wind park was expected to jeopardise previous plans of setting up a marine oasis in the area. On the other end, some other environmental groups (Legambiente, WWF) supported the project as they see it as a step forward in the direction of the energy transition. Moreover, they contested the argument of the other side as ideological and lacking real proof (e.g. the wind park was considered a zero impact on the landscape as it is placed far from the shores). In April 2021, the procedure for releasing the maritime state property concessions was put on hold by the Italian authorities, meaning at least a temporary win for those against the wind park.

- **Factor(s):** F10: Public Transfer and Subsidies; F11: Exogenous private investments
- **Geo-position:** 35km ashore on the Portoscuso coast.
- **Time-position:** 2020, when a scoping procedure for the investment was submitted to the Italian Ministry of the Environment.
- **Sources:** Focus Group, AS13, AS14
- **Gender of the FG source:** not applicable

#### ≈29: Conflict on Eurallumina power plant

- **Type:** Endogenous conflict
- **Rationale:** A conflict is ongoing on the plan of developing a new gas thermal power plant for relaunching the activities of the Eurallumina industrial plant.
- **Description:** EURALLUMINA is a company based in Portovesme that transformed Bauxite into Alumina – which is the first fundamental link in the chain of Aluminium production. The company stopped its activities in 2009, due to an increase in the cost of the fuel needed to generate the steam, a cost increase in Bauxite and a decrease in Alumina prices. To cope with the new situation a series of plans were developed to fit with the new market conditions and to restart the production process. A plan to develop a dedicated coal-fired co-generation plant was discarded in favour of developing a steam pipeline from the nearby Grazia Deledda Power Plant. When the coal phase-out decision was taken, this plan was in turn abandoned, in favour of developing a new gas power plant for steam generation. Such a new power plant will be fuelled by the national gas network, which will be guaranteed in Sardinia by a virtual pipeline, which in turn will be based on a Floating Storage Regasification Unit (FSRU) to be placed in Portovesme (see ≈17, see also the Report on the Socio-Political Component). The plan was formalised in 2021 and now a conflict is ongoing on the development of such a plant. Some local and regional environmental groups moved against the new power plant, which is considered a further source of pollution in an already compromised area. Those opposing the development of the power plant also denounce that, the restart of the activities of EURALLUMINA, will mean further development of the hill where the red mugs are stored and contained, and further pollution of the already damaged coastal and land water in the area. Finally, the EURALLUMINA activities are seen by those opposing the development of such a new power plant, as an activity that has proven to be scarcely productive and thus it does not ensure development and employment in the territory. On the other hand, for those supporting the power plant, the re-opening of Eurallumina means new jobs and a full occupation for the workers of Eurallumina that have been receiving subsidies for over a decade. The conflict on EURALLUMINA re-opening today mirrors a similar conflict related to the previous re-opening plans.
- **Factor(s):** F11: Exogenous private investments; F15: Global environmentalism
- **Geo-position:** Portovesme Industrial Area.
- **Time-position:** 2013 when the Regional Council expressed their favour to build the new power plant.
- **Sources:** Focus Group, AS16, AS17, AS18.
- **Gender of the FG source:** Male

## Annexe 4: List of stress vectors and recurrent strains in Sulcis

Table 12 – List of stress vectors and main kind of stress-strain generated

~	Stress vector	Stress-strain	
01	Disinvestment from non-ferrous metal industries	Conflicts & Disputes	Financescapes
02	Public disinvestments	Impasses & Contradictions	
03	Investment in renewable energy production	Conflicts & Disputes	
04	Investments in accommodation facilities	Conflicts & Disputes	
05	Development project for restarting aluminium industries	Conflicts & Disputes	
06	Development project for transitioning from coal mining	Impasses & Contradictions	
07	Development projects on other territorial interventions	Dependence & Uncertainty	
08	Transfers for sustaining mining and industrial activities	Dependence & Uncertainty	
09	Subsidies for compensating losses	Dependence & Uncertainty	
10	Top-down climate-oriented policies and regulations	Dependence & Uncertainty	Ideoscapes
11	Local environmentalism	Conflicts & Disputes	
12	Depowering of the province institution	Dependence & Uncertainty	
13	Reform populism	Conflicts & Disputes	
14	Digitalisation of bureaucracy	Impasses & Contradictions	Tech.
15	Market digitalisation	Impasses & Contradictions	

**Table 13– List of recurrent forms of strain in Sulcis**

✱	Recurring forms of strain
01	Conflicts between environmental protection and development projects
02	Conflicts between permanent work and independent workers
03	Conflicts of interests between the CCT and “Low Sulcis”
04	Conflicts with aluminium and energy companies
05	Conflicts with the national and regional governments
06	Conflicts between Sulcis and Cagliari
07	Impasses on reclamation and reuse of former mining or industrial sites or landfills
08	Impasses in the development and updating of a territorial system
09	Impasses in public spending of local municipalities
10	Dependence on national decisions concerning the energy transition
11	Dependence on the Sardinia Region
12	Dependence on national or international companies



## Annexe 5: Codebook

The following statements and counterstatements have been identified and coded during the text research. Each statement is presented with its ID number, with code adopted to mark recurring statements, with the related narrative, the type of statement and the number of occurrences in the texts analysed.

**Table 14– The codebook of the text analysis in Sulcis**

ID N.	Recurring statement code	Narrative	Statement type	N.
<b>S01</b>	Sardegna as a favourable context for electrification	Green Island	Transition statement	7
<b>S02</b>	Electrification is a necessity	Green Island	Transition statement	5
<b>S03</b>	Gas energy is an outdated technology	Green Island	Transition statement	6
<b>S04</b>	It is urgent to move toward clean energy	Green Island	Transition statement	4
<b>S05</b>	Electrification ensures energy security	Green Island	Transition statement	10
<b>S06</b>	Electrification generates green jobs	Green Island	Distributive Justice	7
<b>S07</b>	Electrification means improvement in health and increased quality of life	Green Island	Distributive Justice	3
<b>S08</b>	Electrification means improved attractivity and economic growth	Green Island	Distributive Justice	6
<b>S09</b>	Electrification means economic benefits for the final users	Green Island	Distributive Justice	7
<b>S10</b>	Electrification leads to benefits for the natural environment	Green Island	Distributive Justice	10
<b>C01</b>	"Today's pain, tomorrow's gain"	Green Island	Distributive Justice	3
<b>C02</b>	High costs of gas in the long run	Green island	Distributive Justice	5
<b>S11</b>	Electrification is needed to comply with the European and International commitments	Green Island	Procedural justice	11
<b>S12</b>	Sardinians are for electrification: a poll says	Green Island	Procedural Justice	4
<b>S13</b>	Fossil fuel lobbies hinder electrification	Green Island	Procedural Justice	3
<b>S14</b>	Electrification gives value to Sardinia's natural resources (wind and sun)	Green Island	Recognition Justice	6
<b>S15</b>	Sardinia as a green leader on a global scale	Green Island	Recognition Justice	14
<b>C03</b>	Electrification implies only a minor impact on the landscape	Green Island	Recognition Justice	5
<b>S16</b>	Electrification should rely on small-scale production and energy communities	Green Comm.	Transition Statement	8
<b>S17</b>	The risk of deregulation and predatory behaviour by RE energy enterprises	Green Comm.	Procedural Justice	8
<b>S18</b>	Gas infrastructures have a strategic value	Terr. Equality	Transition Statement	10
<b>S19</b>	Gas supply and gas infrastructure are needed for the energy security of Sardinia	Terr. Equality	Transition Statement	16
<b>S20</b>	Electrification plans lack transitional strategies	Terr. Equality	Transition Statement	9
<b>S21</b>	The virtual pipeline has hidden social, economic, and environmental costs	Terr. Equality	Distributive Justice	13

ID N.	Recurring statement code	Narrative	Statement type	N.
<b>S22</b>	Gas infrastructures as a means for fair regional development	Terr. Equality	Distributive Justice	5
<b>S23</b>	Gas infrastructures respond to basic needs	Terr. Equality	Distributive Justice	2
<b>S24</b>	Virtual pipeline means an unfair territorial distribution of benefits in Sardinia	Terr. Equality	Distributive Justice	6
<b>C04</b>	Electrification is unlikely to produce green jobs	Terr. Equality	Distributive Justice	4
<b>S25</b>	Electrification reflects national interests, not regional interests	Terr. Equality	Distributive Justice	16
<b>C05</b>	Electrification plans do not explain how to compensate for losses	Terr. Equality	Distributive Justice	3
<b>S26</b>	Lack of inclusiveness of transition plans	Terr. Equality	Procedural Justice	25
<b>S27</b>	Uncertainty about the ongoing transition plans based on the island's electrification	Terr. Equality	Procedural Justice	7
<b>S28</b>	Electrification plans are in contrast with previous decisions	Terr. Equality	Procedural Justice	8
<b>S29</b>	Lack of governance of the energy transition process	Terr. Equality	Procedural Justice	13
<b>S30</b>	Lack of transparency in CET plans	Terr. Equality	Procedural Justice	17
<b>S31</b>	Not developing gas infrastructure means an unfair competition	Terr. Equality	Distributive Justice	10
<b>S32</b>	Not developing gas infrastructure means strengthening territorial inequality	Terr. Equality	Recognition Justice	15
<b>S33</b>	Not developing gas means dependence on national production	Terr. Equality	Recognition Justice	7
<b>S34</b>	The Electrification makes Sardinia a sacrifice zone	Energy Slavery	Distributive Justice	5
<b>S35</b>	Electrification plans favour RE lobbies	Energy Slavery	Distributive Justice	3
<b>S36</b>	The costs of electrification will be paid by Sardinian citizens	Energy Slavery	Distributive Justice	3
<b>S37</b>	Electrification is unconstitutional	Energy Slavery	Procedural Justice	18
<b>S38</b>	Electrification follows a secret plan already decided by lobbies	Energy Slavery	Procedural Justice	17
<b>S39</b>	Electrification means energy slavery	Energy Slavery	Recognition Justice	10
<b>S40</b>	Electrification means the robbery of natural resources	Energy Slavery	Recognition Justice	9
<b>S41</b>	Electrification is a colonial war on Sardinia	Energy Slavery	Recognition Justice	6
<b>S42</b>	Electrification means landscape pollution	Energy Slavery	Recognition Justice	12
<b>S43</b>	Transition processes are discriminatory against Sardinians	Energy Slavery	Recognition Justice	6
<b>S44</b>	Fake compromise on gas	Energy Slavery	Recognition Justice	3
<b>S45</b>	Overproduction of clean energy	Energy Slavery	Recognition Justice	3
<b>S46</b>	Design constituency statement	All	Constituency Statement	23
<b>S47</b>	Impact constituency statement	All	Constituency Statement	30



# ENTRANCES

Energy TRANSitions from Coal and carbon: Effects on Societies

