ENTRANCES

ENergy TRANsitions from Coal and carbon: Effects on Societies

Gender Analysis Report

Comparative Analysis

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Contents

Index of Figures

Index of Tables

Abbreviations

C	Components
CCT	Coal and Carbon Territory
CEO	Chief Executive Officer
CET	Clean Energy Transition
D	Dynamics
EIGE	European Institute for Gender Equality
ENTRANCES	ENergyTRANsitions from Coal and carbon: Effects on Societies
EU	European Union
F	Factors
LMA	Labour Market Area
MAF	Multidimensional Analytic Framework
MITECO	Ministry for the Ecological Transition and the Demographic challenge
NUTS	Nomenclature of Territorial Units for Statistics
NGO	Non-governmental organisation
P	Patterns
PAR	Political Administrative Region
R&D	Research and Development
WECF	Women Engage for a Common Future
WP	Work Package

CHAPTER 1

INTRODUCTION

1Introduction

1.1 Overview

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 Horizon 2020 research and innovation programme. The project addresses 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 goal is to develop a theoretically-based and empirically-grounded understanding of cross-cutting issues related to social aspects of the clean-energy transition in European coal and carbon-intensive regions and formulate a set of recommendations able to tackle these issues. The project investigates the challenges facing carbon-intensive regions in transition hinging on the idea that the transition to clean energy should not be considered only as a technological change or an industrial shift but also as a complex and multidimensional process that affects the daily life of local communities. In this 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.

In ENTRANCES, gender is seen as a cross-cutting issue and essential variable that contributes to a better understanding of the principal socio-economic, socio-technical, socio-ecological, socio-cultural, socio-political, and socio-psychological challenges that coal and carbon-intensive regions in transition face. The integration of gender into the research design and analysis aims, on the one hand, to identify gender inequalities and gaps that need to be addressed in the phase-out process, and on the other hand, to reflect on the gendered social and power structures created by the existing coal system and how they might operate to support or obstruct the transition. Therefore, under WP 5, WECF has carried out a cross-case analysis of the differences between men and women regarding social roles and patterns, behaviours and attitudes in the framework of the ongoing decarbonisation process in the project regions. The analysis identifies

common features and differences across the case studies and systematically incorporates gender-specific factors in policy recommendations.

The overall objective of this report is to **analyse the gender dimensions and their interaction with other social dimensions in the transition** in coal and carbon-intensive regions and to formulate policy recommendations for achieving transformative change and a gender just transition. This report takes up the general research questions of the project and aligns them with the issue of gender. In particular, the following questions are considered throughout the report:

1. Which gender-related challenges are coal and carbon-intensive regions in transition facing?

2. Are women and men developing different coping strategies?

3. What are the regional transitional trajectories regarding gender?

4. What kinds of gender strategies and policies are needed in order to achieve success in terms of re-territorialisation?

The report is structured in seven chapters. While the first chapter provides an overview of the ENTRANCES project and the objective of this report, Chapter 2 presents relevant concepts and definitions and describes the methodological integration of gender into the project and analysis. Based on a comprehensive literature review, Chapter 3gives an overview of how gender has been investigated in recent research on transitions and presents some key approaches to the integration of gender into energy transition research. Chapter 4 presents the results of a contextual gender analysis conducted by WECF with the aim of providing an overview of general gender issues and disparities in the project regions. The fifth chapter presents the main findings of the gender-based analysis for each of the ENTRANCES components. Chapter 6 reviews challenges and related coping strategies by taking into account gender differences and impacts. Finally, Chapter 7 presents the conclusions and final remarks as well as policy recommendations for substantial and coherent integration of gender in shaping the transition.

CHAPTER 2

METHODOLOGICAL INTEGRATION OF THE GENDER DIMENSION

2. Methodological integration of the gender dimension

2.1 Key concepts and definitions

Considering not only technical but social aspects, such as gender, bears great potential to face the multiple challenges of the energy transition (Becker, Hummel, & Jahn, 2011). Analytical frameworks, such as a gender analysis, allow to harness this potential by identifying unequal power and resources distribution at an early stage and, consequently, identify potential actions to accelerate gender just transitions. In this context, some essential key concepts and definitions are introduced subsequently.

The difference between gender and sex is an important aspect to point out.**Sex** refers to a person's biological attributes, such as chromosomes or sexual anatomy and is usually assigned by birth (male/female/intersex)(Krieger, 2003; CIHR, 2020). **Gender**, on the other hand, is understood as a social construct, which is shaped by society's ideas of roles, responsibilities, behavior, attributes as well as (self-) identity of women, men and gender-diverse people (West & Zimmerman, 1987; CIHR, 2020; Wetterer, 2004). Gender is produced, learned, and maintained through social processes and can vary greatly across cultures and change over time. Therefore, when referring to gender, we consider three interrelated dimensions: (1) the social norms and practices that define the attitudes, roles and behaviours that are deemed appropriate for women, men and gender-diverse individuals; (2) the individual gender identity, which reflects an individual's perception, experience and presentation of their gender; and (3) the system of social relations that shapes social interactions in private and public settings and determines, for instance, the distribution of power and the access to and control over resources.

Gender does not exist in isolation but interacts with other categories such as age, class, race, religion, or migration status. The interconnection between those identity categories is known as **intersectionality,** a term introduced by Kimberlé Crenshaw (Demarginalizing the Intersection of Sex and Race. A Black Feminist Critique of Antidiscrimination Doctrine, Feminist Theory and Antiracist Politics, 1989) to describe how gender inequalities intersect and overlap with other social and economic inequalities to create unique experiences of privilege or disadvantage for a person or a group.Intersectionality indicates that a person can experience multiple accumulating forms of oppression simultaneously regarding their race, age, sexual orientation, gender

identity, (dis)ability, socio-economic status, religion, and others (Heffernan, Heidegger, Köhler, Stock, & Wiese, 2022).

In this sense, gender is a multidimensional and intersecting category of analysis that can be interpreted in different ways in research.First, gender can be seen as an analytical tool that allows to identify, describe, and understand the differences and inequalities among genders within a specific social, economic, and cultural context (Hofmeister & Katz, 2011; Kanning, Mölders, & Hofmeist, 2016). It, moreover, allows to identify the different perceptions that individuals have of themselves (Harding, 1986). Gender as a ***difference category*** is commonly operationalized and empirically evaluated by collecting and interpreting sex-disaggregated data. In the context of coal phase-out, the difference category sheds light on the differential impacts of the transition on different genders and new opportunities emerging for women and men as a result of the energy transition(Kanning, Mölders, & Hofmeist, 2016). Disaggregation of data by sex (or if possible, by gender) is essential in any gender analysis and especially useful in the construction of economic and social indicators. Nevertheless, analysing gender solely based on the difference category might lead to misconceptions as it does not reflect on the social relations and power dynamics causing inequalities (EIGE, Gender Mainstreaming , 2022) and it neglects the intersection of gender with other characteristics and identities, such as age or race.

Therefore, the **structural category** is another perspective to analyse gender. While the difference category focuses on individuals, the structural category emphasizes the differences, inequalities and discrimination produced and reproduced on a societal and structural level(Spitzner, Hummel, Stieß, Alber, & Röhr, 2019; Kanning, Mölders, & Hofmeist, 2016). When considering gender as a structural category, researchers investigate how social norms, beliefs, and institutional systems shape and maintain gender and power dynamics and hierarchies among people in private (household) and public settings. Furthermore, in the structural category, gender is investigated in relation to other characteristics of individuals that can exacerbate inequalities, such as race or age (intersectionality). In energy transition research particularly, this could mean that emerging employment sectors could change the traditional power dynamics between women and men in society(Kanning, Mölders, & Hofmeist, 2016). This effect could be amplified by producing decentralized energy in private households, typically a female connoted area (Mechlenborg & Gram-Hanssen, 2020).

A third category –**gender as a process**- is used specially to question the existence of only two sexes (male/female) or two genders (women/men), biologically as well as societally (Butler, 1990). It evaluates how the binary system is constantly created and reinforced through societal norms, beliefs and interactions (Lorber, 1994). Besides sex (*difference category*) and gender (*structural category*), another category is added, where the allocation of people, their actions and their (self-)identification does not fit the binary norm of women and men (queer) (Kanning, Mölders, & Hofmeist, 2016). Related to the energy transition, it can for example be questioned how transformation processes reproduce binary gender stereotypes and hierarchies or if new hybrid forms emerge which shift between separated societal spheres.

The authors of this report acknowledge the relevance of a non-binary approach to the analysis of the environmental and social challenges and to the achievement of social justice. Nevertheless, the analysis of gender as a process category is beyond the scope of the Entrances project and therefore is omitted from this analysis. In the scope of this project, the gender analysis is based on the difference as well as the structural category.

2.2 Methodological Framework

2.2.1 Limitations of gender mainstreaming and approaches adopted to overcome them

The ENTRANCES proposal foresaw that the gender dimension should be investigated by adopting a gender mainstreaming approach, i.e. through integrating gender as a cross-cutting element in each of the five analytical components of the Multidimensional Analytic Framework (MAF), i.e. the socio-cultural component, the socio-psychological component, the socio-economic component, the socio-political component and the socio-ecological and technical component. However, from the early of the project – while the MAF was being developed – it appeared clear that gender mainstreaming – while providing interesting information – alone, could not be enough to grasp the gender dimension in the transition of coal and carbon-intensive regions. The limitations of gender mainstreaming became even more clear during the application of the MAF, i.e., with the implementation of the 13 ENTRANCES case studies.

The main limitation of gender mainstreaming might be traced back to three intertwined points, illustrated below.

- **Scientific approaches were not originally conceived for gender research**. The MAF was developed with a pluralistic approach, thus incorporating different disciplinary lenses in a single framework, by keeping unaltered the core

epistemological, theoretical and methodological features of each method. One of the main limitations to gender mainstreaming was that the approaches that constituted the building blocks of each of the MAF components were not developed with a focus on gender differences. Albeit many of the factors investigated in the MAF were proven to be gender sensitive (see section 2.2.3), the approaches adopted to investigate them were not focused on the gender dimension. While in some cases, such as for the socio-psychological component, the production of gender-disaggregated data was rather simple, in other cases, some tensions between preserving the core value of the original methods and gender mainstreaming emerged. This issue, together with the resource/time constraints of the project (deepened by the difficulties of conducting field research during the Covid-19 pandemic), limited the extent and depth of the gender mainstreaming in the MAF.

- **Gender neutrality is dominant in societal interpretations**. Some of the MAF components, such as the socio-political component, relied on mapping the actual (conflicting) interpretations of the energy transition in coal and carbon-intensive regions. The discourses about the clean energy transition in clean and carbon-intensive regions have proven to lack gender-differentiated interpretations (e.g. about different impacts for men and women etc.). Thus, despite gender attributes being included in the method, the analysis of transition narratives provided us with little information about possible differences in inclusion/exclusion according to gender. This problem was deepened by the fact that women's voices are in minority among those discussing the clean energy transition.
- **Lack of available sources of gender-related knowledge**. Finally, some of the components relied on already available sources of knowledge. For instance, the socio-cultural and socio-ecological and technical components relied respectively on local key informants and key regional stakeholders. The lack of structured gender-related knowledge and understanding by most of the live sources consulted in the research limited the depth and extent of the mainstreaming of these components. This problem was deepened by the fact that in some case studies was difficult to engage equally women and men in the research activities. In the purposive selection of participants for focus groups and interviews, researchers were confronted with the fact that there is a significant gender gap in the number of women in positions to influence the transition, in the corporate sector as well as in the public energy sector and civil society initiatives (Clancy &

Feenstra, 2019). Similarly, due to scarce gender-disaggregated data, the extent and depth of gender mainstreaming were limited in the socio-economic component.

However, the research developed a strategy to integrate the information coming from gender mainstreaming – that albeit limited has anyhow produced a set of interesting evidence – with other approaches. While developing the MAF a gender-based literature review was developed. In parallel with the implementation of the case studies a "gender context analysis" was developed, investigating through desk research a set of gender-related issues in the 13 coal and carbon-intensive regions analysed in the project. After the completion of the case studies, a gender analysis of the challenges and coping strategies was implemented. Finally, when all the results of the four above-mentioned methods were produced, a set of key results were elaborated through collective data analysis. In summary, we combined five methodologies, which we present in the next sub-sections, and that mirrors the division in chapters of this report:

- Gender-based literature review (chapter 3)
- Gender context analysis (chapter 4)
- Gender mainstreaming (chapter 5)
- Gender analysis of challenges and coping strategies (chapter 6)
- Collective data analysis (chapter 7)

Despite the adverse context and the barriers met, by combining these four approaches, ENTRANCES managed to develop a fresh portrait of the gender-related dynamics in coal and carbon-intensive regions in transition.

2.2.2 Gender literature review

As part of the activities of the conceptual specification, a gender-focused scoping of the literature was conducted. This review aimed at integrating observations about gender-sensitivity of the scoping review conducted for the development of the five components. Additionally, the task leader conducted a review to map approaches to gender in transition research, providing information on current research agendas and potential research directions. Broadly speaking, research approaches in the gender and transition nexus can be grouped into four main issues: (1) the existence of a nexus between energy and gender; (2) gender mainstreaming in energy and climate justice approaches; (3) the gendered distribution of impacts and benefits of transitions; and (4) the existence of gendered power distributions that shape how the transition is governed.

2.2.3 Gender mainstreaming in the 5 components

The ENTRANCES project perceives gender as one of the key aspects to consider in shaping a just transition. Therefore, the consortium made efforts to include gender in all research strands (conceptual, empirical, and co-creative).By means of the Multidimensional Analytical Framework (MAF) the overall project investigates five research *components,* which consist of the socio-economic & technical, socio-ecological, socio-cultural, socio-political and socio-psychological dimensions of change. 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 1.

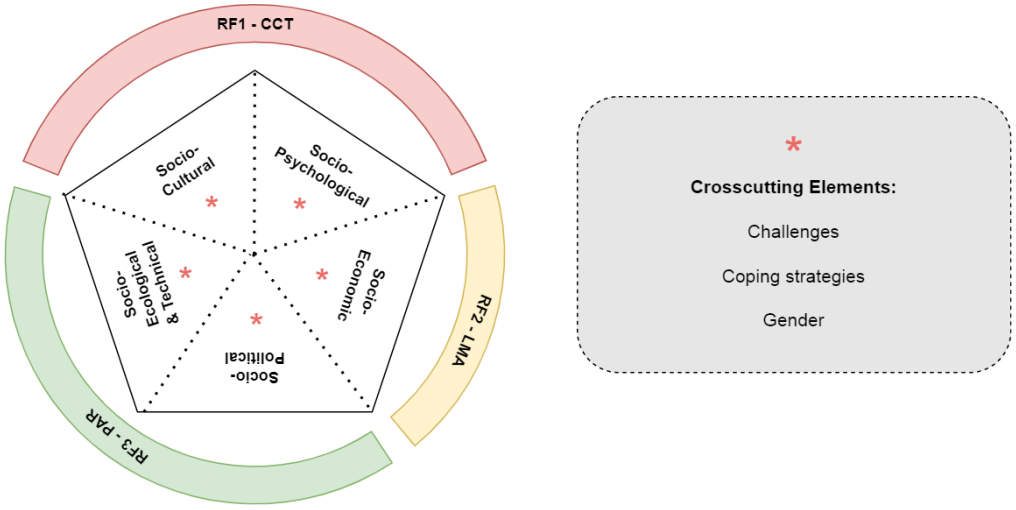

Figure 1: Overview of the Multidimensional Analytic Framework: research foci, components and crosscutting elements

Each component consists of multiple *factors* which can be described as single phenomena/elements that contribute to determining the processes of change. Two further items of the MAF that can be considered in the research are *dynamics*, which refer to trends from the interaction of factors, and *patterns*, which refer to developments that can be seen in different places or times. Both items are also examined with a gender lens and can uncover gender relevant findings.

In the conceptual strand of the project, a gender-focused scoping review of the literature allowed to assess the gender sensitivity of the specified factors, dynamics, and patterns (see D1.2 Report on multi-dimensional key factors, dynamics and patterns) Consequently, out of 62 specified factors, 47 factors were assessed as gender sensitive,

as shown in Table 1. This initial activity was based on the recognition that the different situations in the regions are not neutral processes but have different implications on women and men.

Table 1: Assessment of gender-sensitive factors

Component	Total number of factors	Number of factors assessed as gender-sensitive
Socio-psychological[1]	15	15
Socio-cultural	19	13
Socio-ecologic and socio-technical	10	9
Socio-political	8	5
Socio-economic	10	5
Total	**62**	**47**

Activities within the conceptual strand also considered the integration of gender-sensitive data collection. In this context, gender as a selection criterion was taken into consideration for both random (as in the survey) and purposive selection (focus groups and interviews). In the case of purposive selection, researchers were encouraged to attempt to include participants able to provide expertise on gender issues in the regions. Moreover, the role of gender in the analysis of relations, power dynamics and narratives was emphasised. Table 2 summarizes the main gender considerations for each research component.

Table 2: Main gender considerations for each research component

Component	Main method	Gender considerations for data collection
Socio-psychological component	Survey	• Disaggregated information on gender (additionally a non-binary category) • Inclusion of gender-sensitive socio-demographic variables
Socio-cultural component	Focus group	• Inclusion of gender and age criteria for selection of the participants • A specific question on gender-related impacts of "territorial stress" was addressed for each of the five areas of change analysed

[1]The factor grid of the component was modified after the delivery of D1.2 to include two additional factors: economic optimism (as part of the decarbonization impacts construct) and life satisfaction.

		(i.e. migrations, financial flows, technological change, spread of ideologies, global change in the natural environment) • Attention to gender-sensitive moderation aiming to balance interventions
Socio-ecologic and socio-technical component	Interview	• Attempt to ensure balanced gender representativity in the selection of interviewees • Inclusion of gender expert organizations in the stakeholder selection grid
Socio-political component	Text research	• Coding grid with gender-sensitive codes, e.g., to identify issues of exclusion from access to the benefits of decarbonisation • Inclusion of informal statements from NGOs in the field of gender as possible sources for the analysis • Information of the gender of the speaker
Socio-economic component	Quantitative socio-economic model	• Gender-disaggregated population data

2.2.4 Gender context analysis

Complementing the state-of-the-art analysis of the ENTRANCES project case studies, a context analysis has been conducted to provide a general understanding of the gender relations in these areas. The primary intent was to contribute a backdrop for each case study, by describing local gender dynamics and, where appropriate, by comparing these relations against the broader national context in order to identify eventual discrepancies that could point to endogenous challenges. Ensuring the comparability among the case studies was hence not a main concern. Nevertheless, the concepts of interest are consistent across cases; their operationalization, on the other hand, varies with the case scale, specific features, and with the availability of data[2]. Eight socio-economic areas were selected and analysed with relevant indicators. These are: population movements, particularly outmigration; economic structure; productive and reproductive roles of

[2]For more information related to the indicators chosen, case and units of analysis, operationalization, and methods, kindly refer to the full Analysis, Annex 1.

women and men; access and control of resources; education; health; political and civic participation; and women's and girls' rights.

2.2.5 Gender-based analysis of challenges and coping strategies

The 13 case studies delivered by ENTRANCES singled out a set of 56 challenges and131 related coping strategies. The challenges were identified and described reflecting the perception of the local community about which are the current challenges faced; further information was collected about the coping strategies adopted to cope with these challenges. This set of information was analysed from a gender perspective by the research team. The analysis was thus aimed to assess: (a) whether and to what extent the challenges and coping strategies were framed by the local community taking into account gender differences; (b) how the challenges and coping strategies differently impact men and women. To develop the analysis we undertook the following steps: (i) challenges and coping strategies of each case were synthesised in a spreadsheet; (ii) observations about gender done by each case study team were reported; (iii) further observation on point (a) and (b) above were elaborated through relying on all the other research results (literature review, context analysis and gender mainstreaming); (iv) through a semantic analysis similar challenges in different regions were clustered; (v) a set of 12 recurring challenges was singled out; (vi) each challenge was summarised and point (a) and (b) were highlighted and reported in chapter 6 of this report.

2.2.6 Collective data analysis

All the evidence collected through the previous methods – i.e. literature review, context analysis, gender mainstreaming and challenges analysis – were analysed at the group level. The group involved all the teams involved in this task, composed of 8 people belonging to different organisations and based in different countries. Collective data analysis has been articulated in four steps: (a) preparation, (b) workshop discussion, (c) co-writing, and (d) final review. (a) In the preparation, each and all of the participants reviewed the compiled results of the four previous methods and singled out a set of emerging themes. (b) A workshop was organised to discuss key messages. During the workshop, the themes singled out by the participants were presented. A discussion led to identifying the recurring and more relevant themes emerging from the qualitative data analysed. Once the key messages were singled out a final discussion was held to merge them into a single interpretative framework. (c) Following the workshop, a phase of co-writing started. Based on the key messages previously identified a first draft was

provided by the Task leader. The other participants then integrated the draft working and interacting in file-sharing mode. (d) When a full text was produced this text was finally reviewed by the participants.

2.3 Activities

For the implementation of the above-mentioned methods, a series of activities have been implemented throughout the lifespan of the project. The activities are shortly summarised below.

- *Scoping review of the literature*. The gender-based literature review included the analysis of more than 100 texts, including papers, policy reports, and previous case studies. A set of 47 key texts were selected and analysed in depth. An interim document was drafted to summarise the results.

- *Gender Context Analysis*. Information on gender in the 13 case study regions was gathered through desk research. Moreover, a data collection activity was conducted for developing the gender context analysis. The data were collected by accessing European databases and national databases in the 9 countries where the case studies are based.

- *Gender mainstreaming*. Gender mainstreaming was conducted through a series of activities including a capacity-building session on gender mainstreaming in research addressed to the project partners; a set of bilateral meetings conducted to discuss the gender dimension in each of the five components; an analysis of the factors identified in each component and the integration of the missing gender-related aspects based on results coming from the literature; a gender mainstreaming check-up, devoted to checking whether the conceptual specification and methodological guidelines and protocols have taken appropriately into account the gender dimension and suggesting integration and amendments.

- *Gender analysis of challenges and coping strategies*: Included the review of the 13 case study reports; the development of a spreadsheet summarising all the challenges and coping strategies identified; two dedicated meetings with all the team partners to analyse and discuss the results.

- *Collective data analysis* included multiple rounds of review of the results produced; the development of an internal seminar; the implementation of co-writing sessions.

- *Reporting*. The work described above has produced the current deliverable and the Context-based analysis that is annexed to this document.

CHAPTER 3

LITERATURE REVIEW: GENDER IN RESEARCH ON ENERGY TRANSITIONS

3Literature review: Gender in research on energy transitions

3.1 Introduction

Recently, researchers have shown an increased interest in the human aspects of sustainability transitions. This stems from the acknowledgement that transitions cannot be seen as merely technical and economic processes, but as multidimensional and multi-actor processes, which are determined by social, political, and cultural systems and have a profound impact on society. Particularly, in energy transitions research there is an increasing concern on the ethics and justice dimensions of the transition as "[e]nergy transitions not only reorganize energy production and consumption, they also redistribute power, wealth, risk, vulnerability, resilience, etc." (Miller, 2014, p. 2).

Gender, as a fundamental category of social organization and a key dimension of societal transformation (Kronsell, 2013), emerges in this context as a crucial issue to understand and address the uneven impacts of transitions on individuals and to ensure that inequalities and injustices are not (re)produced. Nevertheless, research on gender issues in the frame of transitions is still scarce. Only few contributions have explicitly integrated gender studies and feminist theories into their analysis of the transition.

This section of the report provides an overview of how gender has been investigated in recent research on transitions and present some key approaches to the integration of gender into energy transition research. Four main approaches are explored:

1. The existence of a nexus between energy and gender that illustrates the need to include gender perspectives into energy research and policymaking
2. The inclusion of gender issues in transition processes as a matter of justice
3. The gendered distribution of impacts and benefits of transitions
4. The existence of gendered power distributions that shape how the transition is governed.

3.2 The energy-gender nexus

Reflecting on the mutual interdependencies between gender and energy constitutes the starting point for the incorporation of gender analysis in social research on energy transitions. Recent literature on the topic has mainly focused on disparities in the access

and consumption of energy services between women and men at the household level(Feenstra & Özerol, Energy justice as a search light for gender-energy nexus: Towards a conceptual framework, 2021), with special attention to the Global South(Fraune, 2018; Feenstra, Women Engendering the Just Energy Transition, 2022). However, there is incipient research on the gender-energy nexus in industrialised countries that is shedding light on three major issues:

- The existence of energy poverty in the Global North and its relation to gender disparities such as income and wealth gaps or the gendered distribution of care work(Clancy & Feenstra, Women, Gender Equality and the Energy Transition in the EU, 2019; Clancy & Feenstra, A View from the North: Gender and Energy Poverty in the European Union, 2020)
- Gender inequalities in employment in the energy sector, affecting the whole value chain of both the traditional and the renewable energy sector(Clancy & Feenstra, Women, Gender Equality and the Energy Transition in the EU, 2019; IRENA, 2019)
- Gendered participation and power in the energy decision-making and transition governance, emphasizing underrepresentation of women(Clancy & Feenstra, Women, Gender Equality and the Energy Transition in the EU, 2019; Kronsell, 2013; Feenstra, Women Engendering the Just Energy Transition, 2022; Bell, Daggett, & Labuski, 2020)

In particular, the latter aspect has gained relevance in the context of decarbonization and energy transition as questions about the justice component of the transition are emerging. Analysing energy transitions with a gender lens is essential to understand and address the distributional effects of the transition and to ensure fair and inclusive processes.

3.3 The energy justice approach

Although environmental activists and groups have been talking about the need for justice in environmental, climate and energy policy since the 1970s, it is only recently that a solid theoretical framework around energy justice has begun to develop(Feenstra & Özerol, Energy justice as a search light for gender-energy nexus: Towards a conceptual framework, 2021; McCauley, et al., 2019; Jenkins, Sovacool, & McCauley, Humanizing sociotechnical transitions through energy justice: An ethical framework for global

transformative change, 2018). The idea of energy justice coined by Sovacool and Dworkinas“a global energy system that fairly disseminates both the benefits and costs of energy services, and one that has representative and impartial energy decision-making”(Global Energy Justice: Problems, principles, and practices, 2014, p. 5) has since become a conceptual, analytical, and decision-making tool(Sovacool & Dworkin, 2014; Sovacool, Burke, Baker, Kumar Kotikalapudi, & Wlokas, 2017). In the context of the ongoing decarbonisation, the energy justice approach helps to elucidate a broad set of issues for the planning and implementation of policies concerning distribution, recognition, and fair procedures (Piggot, Boyland, Down, & Raluca Torre, 2019).

The distributional aspect of energy justice is concerned with emerging injustices in relation to the allocation of benefits and costs of energy production and consumption (Jenkins, McCauley, Heffron, Stephan, & Rehner, 2016a). Distributional justice answers the question of “who gets what, when and how” (Jenkins, Heffron, & McCauley, The Political Economy of Energy Justice: A Nuclear Energy Perspective, 2016b) and how these injustices can be solved. Procedural justice evaluates the participation and power of all interested groups in decision-making processes and attempts to identify the requirements for a fair process (Jenkins, Heffron, & McCauley, The Political Economy of Energy Justice: A Nuclear Energy Perspective, 2016b). Recognitional justice focuses on the groups that have been ignored (Jenkins, McCauley, Heffron, Stephan, & Rehner, 2016a) and not fairly represented.

As stated by Piggot et al (2019), the distributional aspect in the coal phasing out process addresses issues of financial losses and non-financial losses, such as culture or identity loss associated with the industry, and the kind of support needed by all affected groups to ensure that the existing unequal relations and distributions are not reproduced. Procedural justice, on the other hand, refers to the possibility of all actors to have a meaningful participation in decision-making processes (Piggot, Boyland, Down, & Raluca Torre, 2019; Ryder, 2018). The third tenet of energy justice, recognition, starts with the premise that the impacts of transition affect not only people working in the industry but a broad set of stakeholders, including, for example, groups with high vulnerability to economic shocks.

The interlinkages between energy justice and gender equality in the framework of the transition are evident here. Each of the tenets of energy justice allows for an account of gender (in)justice in energy systems and provides arguments for a conscious integration

of the needs and rights of men and women in energy policies(Feenstra & Özerol, Energy justice as a search light for gender-energy nexus: Towards a conceptual framework, 2021; Iwińska & Bukowska, 2022).

3.4 Differential gender impacts of coal transitions

Two comprehensive literature reviews account for the differential gender effects of coal transitions. On the one hand, after conducting a systematic mapping of relevant literature, Walk et al. (Strengthening Gender Justice in a Just Transition: A Research Agenda Based on a SystematicMap of Gender in Coal Transitions, 2021)reviewed a total of 73 studies reporting on gender impacts in historical coal transitions and examined the role of women in such processes[3]. On the other hand, Aung and Strambo (Distributional impacts of mining transitions: learning from the past, 2020) analysed 33 studies on coal mines closure and decline in order to identify uneven impact distributions and to formulate policy recommendations for the transition planning. They included gender and age differentiated impacts in the report.

Similar results were found in both studies. The results can be grouped into the following categories:

- **Labour market impacts:** While the loss of employment was mostly among men working directly in the coal industry, negative effects and losses are also felt in other sectors of the economy such as manufacturing or the service sector, traditionally dominated by women. In other cases, the transition represented an increase in terms of female employment. However, such employment gains tended to be in unskilled and lower-paid jobs compared to the mining sector (Braunger & Walk, 2022).
- **Social and community impacts:** Transitions have generally been followed by outmigration processes with gendered patterns, which in the long run restructured the social and economic infrastructure of the affected regions. Changes in the intensity of community activity were also identified. In particular, increased activism of women, mainly through organization in grassroots movements in both pro-mining and anti-mining movements, was observed.

[3]Those transitions were mainly driven by economic aspects and not by climate and energy policies as the current transition and therefore their impacts might widely differ of those in the current context.

- **Impacts on social identity:** Coal regions are generally associated with rigid role distribution among men and women and pronounced patriarchal identity. In other words, social structures and norms tend to reinforce traditional roles that place men as breadwinners and women as homemakers. The decline of mining might debilitate those traditional structures and redefined the role of women in the community.
- **Impacts at the household level:** Changes in labour market led to impacts on the gender division of care work at home. In many cases women faced a double burden as their participation in paid work activities did not reduce their responsibilities for care work.

3.5 Power and participation in the transition governance

Additional interesting contributions to the issue of gender in the transition are also being made from the governance perspective. Even though those contributions are closely related to the procedural and Recognitional dimensions of energy justice, they explore further dimensions and use a gender lens to identify and characterise possible path dependencies and lock-in situations.

By drawing on the concepts of governance landscapes, regimes and niches, Kronsell (2013)illustrates the relevance of gender in the governance of transitions towards low-carbon economy. She refers to the reproduction of existing (masculine) power landscapes in climate governance as governance processes occur in contexts characterised by the “dominance of masculinity norms that have constitutive power, to the extent that it becomes the normal, and is perceived as natural and given” (Kronsell, 2013, p. 3). Thus, transition policies and strategies fail to identify and actively address inequalities and could lead to path dependency (Kronsell, 2013). In this setting, gender-neutral policies, which assume that a good policy benefits all genders equally, become normative(Khamati-Njenga & Clancy, 2002).

Regarding power regimes, Kronsell (2013)explains that, because of unequal power relations and exchanges, in transition regimes –the network of actors with the ability to distribute resources through institutions and structures (Avelino & Rotmans, 2009), the views of a defined privileged group of actors (wealthy well-educated men, connected to the productive sector) tend to influence and guide how strategies and policies are developed.

The third level of analysis is *niches* or "the setting where innovations take place" (Kronsell, 2013, p. 2). This level deals directly with the issues of participation of a broad set of actors in decision-making spaces and deliberative democracy. Women have been traditionally underrepresented in policymaking and their role as agents of change has been systematically undermined. In this sense, in governing the transition it is key to ensure women's presence and substantial participation in deliberative processes in order to secure the legitimacy of the transition (Kronsell, 2013).

In a similar vein and using an *alternative pathway framework*, Lieu et al. (2020)explore and assess gender perspectives within the energy transition pathways of three countries: Spain, Kenya and Canada. According to them, the currently dominant pathway – mainstream pathway- still prioritizes high carbon energy technologies and gives little room for the inclusion of diverse voices, especially women's voices, in policymaking as power continue to be a male domain. Within this pathway, an "on stream" transition pathway includes also low-carbon technologies as a possibility. Gender neutrality or the use of the same criteria across genders in policy is the rule. A second pathway, denominated "off-stream pathway", challenges the mainstream pathway, and creates niches for low-carbon technologies. From a gender perspective, the off-stream pathway recognizes different gender roles and needs and integrates them into policies. The last pathway is called "transformative pathway" and relies on radical technological innovation and on the enablement of all genders to be agents of change (Lieu, Sorman, Johnson, Virla, & Resurrección, 2020).

The interplay of gendered landscapes, regimes and niches in transition governance demonstrates that gender sensitive policy making goes beyond the nominal inclusion of women in decision-making spaces. Dominant social norms (the masculine norm) and incumbent power regimes that distribute privileges and resources should also be evaluated (Kronsell, 2013) to ensure that women and all underrepresented groups are seen and valued as agents of change (Lieu, Sorman, Johnson, Virla, & Resurrección, 2020).

CHAPTER 4

SUMMARY OF CONTEXTUAL GENDER ANALYSIS

4 Summary of contextual gender analysis[4]

4.1 Introduction

Complementing the state-of-the-art analysis of the ENTRANCES project case studies, a context analysis has been conducted to provide a general understanding of the gender relations in these areas. WECF identified eight areas of the socio-economic context, with relevant indicators for each, where the impact of the decarbonization processes underway may be differentiated by gender. These are: population movements, particularly outmigration; economic structure; productive and reproductive roles of women and men; access and control of resources; education; health; political and civic participation; and women's rights. For this context analysis, data was gathered from various sources: Eurostat regional data, the European Social Survey (Round 9) multilevel data, the European Regional Gender Equality monitor, multiple national data repositories, national and regional reports. Understanding the state of the art of gender relations in these areas is meant to provide a background, on which the ENTRANCES gender analysis can draw on. These concepts will be described below along with the results and general trends that can be drawn from the context analysis of the 13 regions studied.

4.2 The regions in transition

4.2.1 Coal regions

Silesia, Poland

Silesia is located in South Poland, and it is the country main hard coal mining region and the largest hard coal mining area in the EU. There are 19 coal mines operating in the Coal and Carbon Territory (CCT) of the Silesia Province, which account for approximately 85% of the Polish hard coal production. In 2019, 74,500 people were working in hard coal mining in Silesia and approximately 4,000 in Lesser Poland. In addition, in the CCT there are four large coal-fired power plants and three large coal-fired heat plants. The process of the restructuring of the coal mining industry has been ongoing since Poland's economic reforms in 1989. The number of coal mines and labour force has decreased as result of the necessity to adapt to market conditions and the decrease in the demand for coal in the domestic economy. Ecologic and environmental

[4] This chapter summarises the findings of a detailed analysis conducted by Silvia Gugu at the request of WECF, in the framework of the project. For the full analysis, refer to Annex 1.

challenges in the region are mainly associated with poor air quality resulting from the use of hard coal for heating purposes.

Lusatia, Germany

Lusatia is a heterogeneous region that lies across the federal states of Brandenburg and Saxony and borders Poland and Czechia. Lusatia is one of the three regions in Germany undergoing a clean energy transition (CET) from lignite-fired power generation since 2020. The core of the region is the Lusatian mining area, the second largest of the German lignite coalfields and the largest in former East Germany. Lusatia used to be an important centre for lignite mining and energy production in the former German Democratic Republic (GDR), but the sector influence on the region's economic structure has declined considerably since the reunification of Germany. The reunification of Germany marks the beginning of a structural change in the region with consequences up to the present. Today's CET takes place in a region marked by demographic and economic challenges resulting from deindustrialisation and massive outmigration.

Rhineland, Germany

Rhineland is an area in Western Germany, located in the federal state of North Rhine-Westphalia in the city triangle between Cologne, Aachen and Düsseldorf. Rhineland is the largest lignite coal region in Germany. It accounts for about 50 % of the total extraction of lignite and 48 % of employment in the lignite industry in the country. The structural change implied by the phase-out of mining and power plant activities in the district until 2038 (enacted by Act to Reduce and End Coal-Fired Power Generation in 2020) poses significant challenges for the region such as the restructuration of the energy sector towards new clean energies and the need for new mobility strategies.

Central Germany

The region is located in the former territory of the German Democratic Republic (GDR) and was the most important lignite region in Germany until the 1970s. Today the region has the smallest number of employees in the lignite industry and lignite reserves among the three German coal regions. Central Germany has a relatively old population due to substantial out-migration of the young cohorts during the 1990s and 2000s. Like in Lusatia, the reunification process has shaped the socio-economic situation and identity of the region.

Jiu Valley, Romania

Jiu Valley is a micro-region in the South-Eastern part of Hunedoara County. From the administrative standpoint, it comprises seven localities in which coal mining has

represented a key economic sector. Until the early 1990s, the region was highly dependent on mining and about 60,000 inhabitants worked directly or indirectly in the mining industry. Since the fall of communism, the region has faced several phases of mine closures, leading to massive layoffs. There are currently four operational mines in the region. The CCT is facing a decline in economic activity, rising unemployment and high levels of out-migration.

Sulcis, Italy

The Sulcis region is located in the south-western part of Sardinia and comprises nine municipalities with a strong identification with coal mining dependence on carbon-intensive industries. The area was the site of Italy's only coal mine (which ceased production in 2015) and is home to one of the two main coal-fired power plants of Sardinia. Non-ferrous metal industries (aluminium)proliferated in the mid-sixties in the area and remain important employers in the region. Closure and seizure of those industries determined in the last 15 years the loss of around 3000 direct jobs. In the last two decades, the total population, the share of the working-age population, and the GDP per capita decreased in the region.

Upper Nitra, Slovakia

The geographical scope of the Upper Nitra Region are the districts of Partizánske and Prievidzalocated in the Slovak region of Trenčín. The region can be characterized as an industrial region. Yet, mining has been for decades the backbone of the whole economy of the region. However, in 2018 the central government made the decision to phase out coal mining and the mine the mine will be definitely closed after the end of subsidies in 2023. At present, the region's economy has been partially diversified by the advent of mechanical engineering, the production of car parts and the resumption of footwear and building materials production.

4.2.2 Carbon-intensive regions

Brindisi, Italy

Brindisi is a municipality in the region of Apulia in southern Italy. For almost thirty years, the two coal fired plants and all related industries have shaped the economy of Brindisi by creating new occupational opportunities and characterizing the sociocultural and socio-economic landscape of the CCT area. The closure of Brindisi power plant, at the end of 2012, and the phase-out of Brindisi south coal plant, planned by 2025 has already had a significant impact on employment in the region. The loss of jobs and income in the region has started to affect the standard of living in the region. Harbour activities and

ancillary businesses are closing due to falling demand. The lack of new opportunity jobs has accelerated the emigration of young people and brain drain from the region, which in turn has accelerated the ageing process, affecting the socio-economic fabric of Brindisi and the surrounding municipalities.

Krakow Metropolitan Area (KMA), Poland

The Kraków Metropolitan Area (KMA) is a functional region comprising a large city and the neighbouring complex of settlement units. It is located in the south of Poland and is the largest tourist area in this region. The region is one of the most polluted regions in Poland and Europe in terms of air quality. Due to its geographic location in a basin, the location of industrial plants within the KMA and the predominant heating methods in housing (classless coal and wood-fired boilers), Krakow has suffered from air quality problems for decades.

A Coruña, Spain

A Coruña is a small province in the autonomous community of Galicia, in north-western Spain. It is home to the largest coal-fired power plant in Spain, La Central de As Pontes**,** with an installed capacity of more than 1400 MW. The owner of the thermal power plant, ENDESA, formally requested the closure of the thermal power plant in December 2019 and the Ministry for Ecological Transition and Demographic Challenge of the central government of Spain has approved its request, paving the way for the definitive closure of the thermal power plant. La Central thermal power plant was the main source of income and employment in the region. Its closure will create a vacuum in the economic sphere of the region, which will be difficult to fill with proposed alternative green energy projects. The loss of jobs and income, first by the closure of the mines and then by the announcement of the closure of the thermal power plant, has started to affect the standard of living in the region.

Upper Styria, Austria

Upper Styria is a historic steel producing region in a mountainous area in the province of Styria. The region of Upper Styria has long been shaped by mining and production of metals. The most important factories of the multinational steel producer Voestalpine are in the region, which makes the company a major player in the labour market. Iron and Steel industry is the most significant carbon emitter in the CCT. The steel industry is today an innovative and flourishing business, but it faces the difficult task of decarbonising its production processes and securing its huge energy requirements.

Stavanger, Norway

Stavanger is a port city in south-western Norway. In 1969 oil was discovered in the North Sea and Stavanger was chosen to be the onshore centre for the oil industry in the Norwegian sector of the North Sea. This has resulted in a period of hectic growth in Stavanger and its three neighbour municipalities (Sandnes, Sola and Randaberg). Today, the business structure of the region is dominated by oil and gas-related activities, i.e., the Stavanger/Sandnes urban area houses about 35 oil and gas companies and 400+ oil service and technology companies. The oil companies, and a large number of subcontractors, have more than 45,000 employees.Oil and gas have had (and continue to have) a profound impact on the Norwegian economy, employment, industry, and culture.

South Wales, United Kingdom

South Wales case study focuses on Port Talbot and contiguous areas, which forms part of the municipality of Neath Port Talbot County Borough Council, one of the 22 Local Authorities in Wales.The dependence of the Port Talbot economy on the steel plant is well-documented, as is the significance of the Port Talbot plant to steelmakingin Wales and the UK. Port Talbot has a long legacy of metal working. Currently, the remaining steel plant directly employs some 4,000 workers (out of 24,000 steel industry jobsacross the UK). It is estimated that a further 3-4,000 agency and contract workers are employed at the plant and that up to another 4,000 jobs in the Port Talbot area might indirectly rely on the steel works. The area has been identified as a carbon-dependent territory owing to the energy-intensity of the steel making process and the contribution made to CO2 emissions. It is estimated that around 47% of 2018 industrial emissions in Wales emanated from the CCT area, with 15% of overall emissions in Wales emanating from the Tata steel plant.

4.3 Summary of Conclusions and Trends

4.3.1 Outmigration

Migration is a gendered phenomenon, and it gives an account of the different opportunities that a region offers to its inhabitants. According to a literature review undertaken by WECF, young women who decide to migrate tend to leave home more permanently and earlier than young men, that is, primarily in their youth, before starting a family. In the absence of policies that ensure favourable conditions for women to stay in an area, outmigration may result in an increase in the share of single, unmarried, individuals with a knock-on effect on reproduction in the area. For this study, outmigration

is defined as the propensity of men and women to move out of the case study area, and it is explored through the share of women and men that engaged in paid work in other countries, as shown in Table 3.

Table 3: Description of the category "demographics and migration"

Category	Concept	Indicators
Demographics and migration	Population movement	Share of respondents who were engaged in paid work in another country, period more than 6 months last 10 years, by sex (ESS, 2018, 2016)

Although the gendered outmigration patterns differ among the various regions of the project,if the number of persons engaged in work abroad is measured, there is overall a higher outmigration share of men than of women. In Upper Styria, Silesia, and Central Germany, women are noticeably less working abroad than their male counterparts, and less than the country's average of women's outmigration. In Upper Styria, there are almost four times more men than women working abroad. An exception is Wales where 11.39% of women have worked abroad compared to only 2.37% of men, which contrasts with both the ENTRANCES regions' trends and the Great-Britain trend.

A notable phenomenon is the sharp population decline in the Jiu Valley, Romania, following the mines closures at the end of the 1990s. Consequently, many parents quit the country to look for work abroad: 2.51% of pupils in schools are left behind in the Jiu Valley County, having at least one parent working abroad. 57% of them had their father, 29% their mother and 14% both parents out of the country. Single mothers or mothers who are the main family provider are most likely to leave their children in the country to go to work abroad: they represent 73,3% of the single parents who leave their child behind(Ministerul Educatiei, 2020).

4.3.2 Economic structure

WECF's literature review revealed that, while the negative effects of economic restructuring in the decarbonization process are felt predominantly by males who are over-represented in coal and carbon-intensive industries, there are negative spill overs to female workers. To explore the existing gender occupation segregation in the project regions, WECF selected the following indicators, as displayed in Table 4:

Table 4: Description of the category "economic structure"

Category	Concepts	Indicators
Economic structure	Regional economic activities by labour force Economic Restructuring Employment disparities	Employment rates by sex, age, full-time/part-time, professional status Employment rates by sex, age, educational attainment level, country of birth R&D personnel by sex

In general, in mining/ industry-cantered areas women and men tend to work in different sectors. Indeed, while the industry and construction sectors are both male-dominated, the social, manufacturing and service sectors are largely female-dominated. Beyond that, the public sector employs more women while the private one employs predominantly men. Upon losing their mining/ industry jobs, men may start substituting women in service and manufacturing jobs. For example, in Silesia, 43% of the men work in the industry sector, whereas women make up only 9% of the mining sector employees, almost exclusively in the administration.

Second, if economic decline installs in the region, a reduction in gender pay gaps may rather signal reduced average wages and hide differently structured employment disparities. Overall, women's relative share of household earnings may actually decline. Indeed, across all regions women are overrepresented in low-paid, part-time jobs and underrepresented in higher levels of the hierarchy. In Rhineland, 47% of women have a part-time job albeit this is the case for only 11% of men. Only in the Jiu Valley do men and women work in equal share in both manufacturing and part-time jobs.

Finally, although it decreases with higher levels of education, the gender employment gap is significant across all regions: in the EU, the employment rate of women (aged 20-64) is 11 percentage points lower than that of men. For instance, in Silesia this gap reaches a 21.7point difference between the employment rates of men and women.

4.3.3 Productive and reproductive roles

The gender distribution of paid and unpaid work remains one of the clearest indicators of gender inequality. Despite overall improvements in recent decades, women and men are far from spending equal amounts of time in paid and unpaid work. To illustrate the concepts of participation in productive and reproductive roles and childcare, data related to the average number of usual weekly hours of work in main job by sex and age and

the time spent caring for children, grandchildren, older people or people with disabilities were collected. The concepts and indicators used are shown in Table 5.

Table 5: Description of the category "productive and reproductive roles"

Category	Concepts	Indicators
Productive and reproductive roles	Participation in productive and reproductive roles Childcare	Average number of usual weekly hours of work in main job by sex and age Time spent caring for children, grandchildren, older people or people with disabilities

When it comes to the effects of labour changes due to the decline of coal and carbon intensive sectors, evidence shows that if men cannot replace their lost jobs, women in the same household may have to take on more paid work. In contexts where women are also primary caretakers and there is a lack of care infrastructure, taking up more paid work can lead to overburdening them.

In the case of the ENTRANCES regions, there is clear evidence of a stark gender asymmetry regarding the distribution of domestic workloads in all the studied regions. Women spend systematically more time than men on productive unpaid activities(Eurostat, 2019)[5], which include caring (for children, elderly, and disabled people) and household chores. In contexts where there is a lack of public services and care infrastructure (kindergarten, nursery, after-school) and where women are the primary caretakers, taking up more paid work will lead to overburdening them. For instance, in the Jiu Valley, with the EU's widest and still increasing gender gap, women spend 46% of their time on unpaid care activities while men spend 25% of their time on it. Across places, the difficulties of being responsible for both domestic and paid work have a heavy impact on both women's work choices and child-bearing decisions and lead to a decreased level of participation in civic, cultural, and political life.

This differentiated structure of reproductive and productive work among women and men is partly the consequence of patriarchal norms and stereotypes, that both shape and are sustained by it. For example, employers in Romania prefer to employ men with lower levels of education over women with the same or higher levels of education; in Sardinia

[5] When activities such as food preparation, cleaning dwelling, laundry, ironing, gardening, construction and repairs, shopping and services, childcare, and house management are done as main or secondary activities without pay for the own household or for another household, they constitute unpaid work.

31,4% of people aged 18-74 believe that it is more important for men than for women to be successful at work and 19,3% consider that men are less suited to take care of household chores.

4.3.4 Education

WECF's literature review emphasized that education statistics are key in designing an efficient and just energy transition policy. A gap between the educational achievement of young male and female populations and their employment rates is indicative of the adequacy of the educational offer in relation to the labour market, as well as of potential biases or challenges to the equal participation of men and women in employment. The concepts and indicators of the category "education" are displayed in Table 6.

Table 6: Description of the category "education"

Category	Concepts	Indicators
Education	Educational attainment	Graduates of tertiary education (% 25-64 population) by sex
	Access to education	People participating in formal or non-formal education and training (% 25 -64 population)
		Early leavers from education and training by sex (% aged 18-24)
		Young people neither in employment nor in education and training by sex (% aged 15-29)

Although the share of women graduating from tertiary education is higher than that of men (in all regions except for Styria), women are over-represented among those who are neither in employment nor in education or training (age 15-29). The gap between both genders ranges from 0.4 points in Stavanger up to 11.60 points in the Jiu Valley and is sometimes even higher at the national level.

In the Jiu Valley, this gap is similar to the nation-wide average. Such numbers should be examined in conjunction with the propensity for human trafficking in and out of Romania, especially of vulnerable, left-behind young girls. Romanian minor victims — with girls being over-represented in this category — make up to 40 % of the victims of sexual exploitation in Europe. In recent years, a tendency of increasing numbers of underage victims has been reported by an NGO (Juhász & Pap, 2018).

4.3.5 Access and control of resources

Prior research reviewed by WECF indicates that the decarbonization associated with economic restructuring may provide different access for men and women to financial resources, decision-making, and overall participation in a more modern economy. The concepts and indicators used for the description of the category “access and control of resources” are shown in Table 7. For example, it is noted that while the renewable energy sector attracts more women than the fossil fuel industries, female employees are still a minority and work mainly in administrative and low-paid jobs (IRENA, 2019).

Table 7: Description of the category "access and control of resources"

Category	Concepts	Indicators
Access and control of resources	Money Access to management positions Internet use	Mean monthly earnings in PPS by sex/ GPG Responsible for supervising other employees by sex Allowed to influence policy decisions about activities of organization by sex Proportion of individuals using internet by sex – (Indicator not always available at NUTS 2 level)

4.3.6 Health – substance dependency

Prior studies reviewed by WECF showed that when employment and livelihood quality decrease in communities reliant on coal or carbon-intensive industries, the risks of mental health problems, substance abuse, and physical abuse increase. The concepts and indicators investigated for the category “health” are displayed in Table 8.

Table 8: Description of the category "health"

Category	Concepts	Indicators
Health	Mental health	Share of hospital discharges related to mental and behavioural disorders due to use of alcohol and due to psychoactive substance use, day cases

Alcohol consumption is much more common than the use of psychoactive substances and is often considered a tradition, especially in the mining sector. Alcohol and psychoactive substances-related problems for both men and women are much higher than country averages in every region, except for the Jiu Valley and Brindisi. Across all regions, alcohol and psychoactive substances-related problems are systematically at

least twice more prevalent among men than women for every indicator (mental and behavioural disorders, hospitalisations, alcoholic liver disease). Men are 11 times more represented in alcohol-related hospitalisations than women in the Jiu Valley, and they suffer the consequences of alcohol 5 to 6 times more than women in Brindisi.

In Silesia, men represent 77% of the alcohol-addicted patients, but 77% of the co-dependents are women. Alcoholic co-dependency is a type of dysfunctional relationship where the co-dependent is relying on another person struggling with alcoholism. The co-dependents are often diagnosed with acute stress-reaction or post-traumatic stress disorder. Another concerning phenomenon in Silesia is harmful drinking addictions among teenagers where girls are overrepresented (69% of patients). Only in Norway does the health situation seem to be noticeably better than in the 12 other regions, as the country's average stands well below the EU one.

4.3.7 Civic and political participation

Research indicates that individual agency within energy transitions is also gendered. Women have fewer opportunities to influence policymaking and therefore to ensure that just transitions incorporate their point of view. In addition, it may be more difficult for women than for men to gain access to union structures. To explore the women's representation and participation in decision-making spaces, the following indicators, shown in Table 9, were reviewed:

Table 9: Description of the category "civic and political participation"

Category	Concepts	Indicators
Civic and political participation	Representation in the public sector Institutional political participation Non-institutional political participation	Share of members of Regional Assemblies / Executives by sex Share of members of local/municipal councils by sex Share of adult respondents that voted last national election by sex Left-right scale orientation Member of trade union or similar organization, by sex

In almost all the 13 case studies, the share of male members in regional assemblies, regional executives as well as in the local/municipal councils is significantly higher than women: only in 2 out of the 70 local, regional, and national instances do women represent an equal or higher share of the members (Lusatia' and Coruña's regional assemblies).

Likewise, at both regional and national levels, more men than women are or have been a member of a trade union or another non-institutional political organisation. This trend has reversed over time: in the past, women in these regions used to be more numerous in trade unions than women on the national average.

The share of men and women who voted in the last national elections is generally equal. However, in some cases (e.g., Germany) women did show up to vote in higher numbers than men. No clear tendency for right/left scale orientation in women's votes can be drawn due to limited data availability and differences between studied regions/countries.

4.3.8 Women's and girls' rights

The loss of employment and livelihoods in communities that relied on the coal or carbon-intensive industries, along with the reconfiguration of productive and reproductive roles can lead to increased rates of domestic violence, the abuse of women and their children, and gender discrimination. The concepts and indicators reviewed for the category "women's and girls' rights" are displayed in Table 10.

Table 10: Description of the category "women's and girls' rights"

Category	Concepts	Indicators
Women's and girls' rights	Gender-based violence Prevalence of underage mothers Gender discrimination	Live births by age group of the mothers and NUTS 3 region Share of respondents who feel that gender influences the decision to recruit, by sex

Throughout the regions, women represent usually around 70% of the victims of domestic violence. Although the trend is usually decreasing, some regions see an increase in the amount of domestic violence. In Brindisi, the number of women who signalled being victims of domestic violence has doubled within a year in 2020, possibly related to the Covid-19 lockdowns.

The prevalence of live births to mothers under 20 years is disparate across the regions: it ranges from less than 1% of the total number of births (Sulcis) to 8.91% in Jiu Valley. These numbers can be explained because of a lack (or prohibition) of sex and reproductive health education in schools and restrictions on the right to abortion.

Finally, gender discrimination at work is also felt differently between women and men. Except for Central Germany, women tend to believe more than men that gender influences the decision to recruit. In A Coruña, if less than 24% of men agree with this statement, it represents more than 35% of the women interviewed. Across all regions men are more satisfied than women with their net pay, the latter being more likely (between 3 and 21 points more than men are) to think of their net pay as unfairly low.

CHAPTER 5

GENDER-RELATED DATA IN THE CASE STUDIES

5. Gender-related data in the case studies

5.1 Socio-psychological component

The socio-psychological component studies the socio-psychological impacts of the closure of coal mines and carbon-intensive industrial units, i.e., the decarbonisation process, on the lives of individuals living in the Coal and Carbon Territory (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 may turn out in a dissatisfactory relationship with the territory.

In the component, the focus on individual responses to uncertainties and challenges posed by the closure of mines and coal-based industrial units allows for the observation of gender differences or similarities and their interaction with other intersectional variables such as age or educational level. To do so, the survey included a question about sex/gender and other socio-demographic variables and the samples were intended to reflect the demographic diversity of each region. The question on gender included a third category for gender identity, aiming to capture the experiences of those who do not identify themselves as either male or female. However, no answers for the third category were collected and therefore it is omitted from the analysis.

When measuring and interpreting gender differences for each of the component factors, it is important to bear in mind that gender roles, norms and practices interact to shape differentially women's and men's experiences and responses to changes and adversity. In other words, it is necessary to acknowledge that individual's responses might be influenced by gender-socialized characteristics. Moreover, the results of any gender-based analysis must be read within the broader socio-cultural context as a particular setting poses different expectations, opportunities and rewards to women and men (Cook, 1990).

The literature review carried out at WP1 showed that gender differences might be found for all constructs, moderators, perceptions of decarbonization impacts and coping strategies. For instance, some studies show that gender can be a predictor of place attachment as it influences significant social relationships. In particular, women are more likely to develop and preserve social bonds in their residence area(Rollero & De Picolli, 2010). Similarly, gender remains an interesting lens when analysing stress propensity

and responses to stress as social expectations and norms might influence both exposure of and responses to stress (Calvarese, 2015).

This section of the report compares women's and men's responses to the socio-psychological survey in each of the CCT. Given the small simple in some case studies, the empirical results reported herein should be interpreted with caution.

5.1.1 Description of the sample

In the socio-psychological component, a total of 2,888 survey responses were collected. However, the sample sizes varied widely among the case studies. In terms of gender, the case studies have nearly equally sized subgroups (men and women) and intended to mirror the gender distribution of the regions. Table 11 shows the number of respondents disaggregated by gender and by region.

Table 11: Number of respondents by region

	Case Study	Men(N)	Women(N)	Total	Sharemen (%)	Sharewomen (%)
Coal regions	**Silesia**	107	117	224	47.8%	52.2%
	Lusatia	50	37	87	57.5%	42.5%
	Rhineland	33	35	68	48.5%	51.5%
	Central Germany	34	60	94	36.2%	63.8%
	Jiu Valley	53	73	126	42.1%	57.9%
	Sulcis	191	195	386	49.5%	50.5%
	Upper Nitra	150	320	470	31.9%	68.1%
Carbon intensive regions	**Brindisi**	63	33	96	65.6%	34.4%
	Krakow MA	110	124	234	47.0%	53.0%
	A Coruña	237	269	506	46.8%	53.2%
	Upper Styria	35	27	62	56.5%	43.5%
	Stavanger	265	218	483	54.9%	45.1%
	South Wales	26	26	52	50.0%	50.0%
	Total	**1,354**	**1,534**	**2,888**	**46.9%**	**53.1%**

The share of female respondents is considerably higher than that of male respondents in Upper Nitra (68.1%) and Central Germany (63.8%). Conversely, men are overrepresented in the sample of Brindisi, accounting for 65.6% of the respondents.

Due to the sampling procedure, participants' distribution across age groups is concentrated in the ranges 31-45 years and 46-65 years for both males and females.

67% of the total respondents are in these age ranges. Central Germany and Upper Styria present a different distribution from the rest of the case studies. Respondents in Central Germany are mainly in the upper age span (53% of the men and 55% of the women). This composition should be reflected in the analysis of the survey as results might affected by the predominance of this age group in the sample. For example, a high share of elderly retired and widowed women in Central Germany do not engage in the local communities and likelihood that they still have an active network of friends is also low, which might be an explanation for low scores in social bonding.

The opposite is true in Upper Styria, where young people (16-30 years) represent 50% of the sample. Figure 2and Figure 3show the age distribution by gender for all the regions.

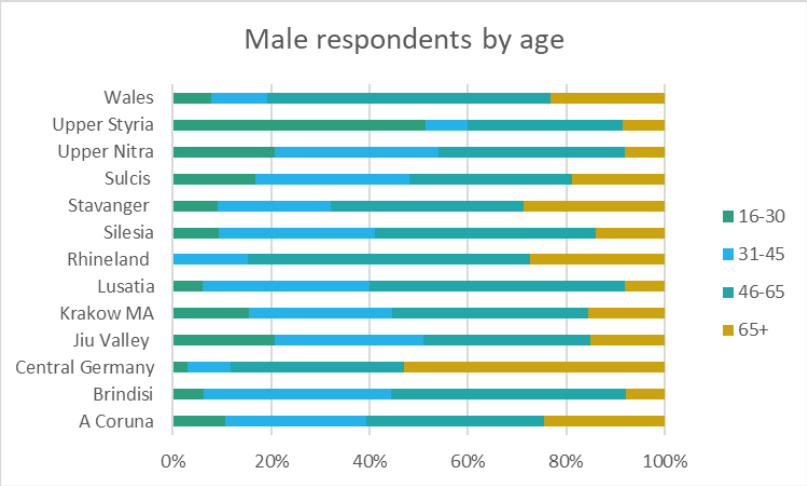

Figure 2: Male age distribution by region

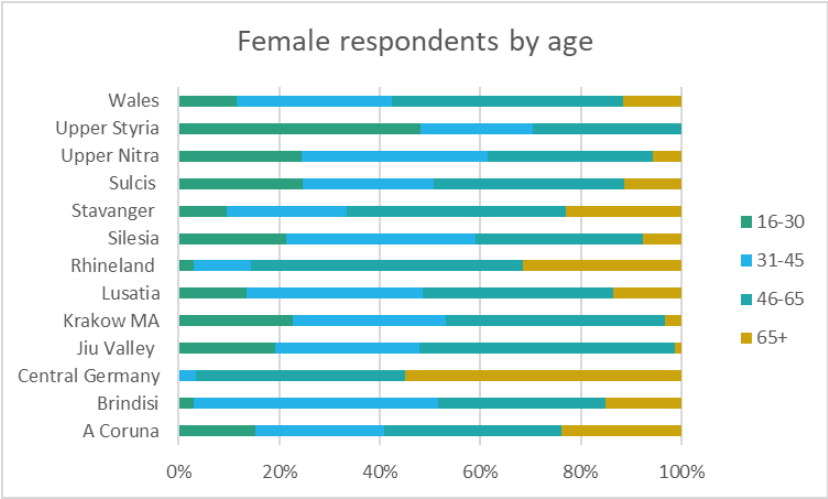

Figure 3: Female age distribution by region

In relation to education, 58% of all female respondents and 59% of all male respondents answered to have tertiary/professional education. The secondary education level was reported by 35% of both male and female respondents. In reference to the employment situation and sector of occupation, while more women than men reported to be employed in the service and public sectors, more men than women indicated to be employed in the agriculture and industry sectors. The majority of those who specified to be unemployed or inactive are women (62%). Figure 4summarises those results.

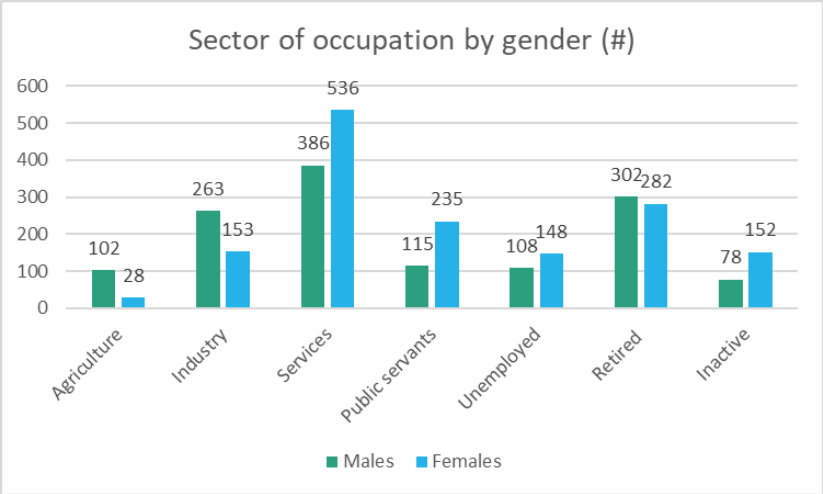

Figure 4: Number of employed in the sector by gender

5.1.2 Differences in the socio-psychological component

The socio-psychological component aims at creating new knowledge about the impact of different decarbonisation policies implemented in the CCT on people's socio-psychological well-being and their coping strategies to deal with the transition. Therefore, this section of the gender-based analysis investigates if such impacts and coping strategies differ between women and men in the project regions. For this purpose, statistical analysis was performed by using the P-value and significance levels were set at the 95% level.

Overall, there are few statistically significant differences between men and women in all study regions. Except for the "Nostalgia" factor, all the component factors showed statistically significant differences in at least one case. In total, 35 statistically significant differences were found among all regions and factors. No statistically significant differences between women and men were identified in **Rhineland, Jiu Valley,** and **Upper Styria**. In the Rhineland case, the only factor coming close to conventional

confidence intervals for statistical significance was perceived stress, in which women have somewhat higher scores than men.

Place attachment

Place attachment refers to the ways in which people connect to places, and the effects of such bonds in identity development, place-making, perception, and practice(Low & Altman, 1992). In the socio-psychological component, place attachment has been measured through 4 factors: place dependence, place identity, place rootedness, and social bonding. Gender differences in place attachment related factors were found in five regions. The results obtained are summarised inTable 12: Statistically significant gender differences in place attachment related factorsTable 12.

Table 12: Statistically significant gender differences in place attachment related factors

Type of region	Case study	Statistically Significant factor	Men Mean	Women Mean	P-value
Coal regions	Sulcis	Place dependence	3.36	3.04	0.005
		Place rootedness	3.58	3.44	0.03
	Upper Nitra	Place dependence	3.40	3.13	0.003
		Place identity	4.09	3.95	0.033
Carbon-intensive regions	Brindisi	Place dependence	3.49	2.99	0.042
	A Coruña	Place dependence	3.52	3.78	0.006
		Place identity	4.21	4.43	0.005
		Social bonding	3.42	3.61	0.043
	Stavanger	Place identity	4.14	4.32	0.015
		Place rootedness	3.90	4.04	0.011
	Wales	Place dependence	2.56	3.37	0.007
		Place rootedness	3.29	3.89	0.005

Women's and men's place attachment vary among regions. Despite relatively low scores, men in Sulcis, Upper Nitra and Brindisi find more frequently that their territory allows them to meet their individual needs and achieve their goals, which translates into

greater place dependence compared to women in the respective region. The same relation is found regarding place rootedness in Sulcis and place identity in Upper Nitra.

The opposite effect was found in A Coruña, Stavanger, and Wales (carbon-intensive regions), where women have higher levels of place attachment compared to men. In the case of A Coruña, the determinants of women's greater place attachment are social bonding, place identity and place dependence. Place rootedness contributes to women's higher place attachment in Stavanger and Wales. Women in Stavanger also have higher levels of place identity in comparison to the men in the region.

The underlying gender relations leading to such differences are beyond the scope of this report. The results should be evaluated in relation to the local cultural context in order to see how gender roles, norms and practices are influencing the level of attachment. Moreover, the available data does not allow to conclude whether place attachment is associated with motivation for change or, on the contrary, with interest in preserving the status-quo.

Moderators

In the conceptual framework of ENTRANCES, moderators are defined as factors that are expected to mitigate the negative effect of decarbonisation policies on the local population. Two moderators were measured in the survey: resilience and optimism. Statistically significant differences between women and men were found in three regions. Whilst women in Lusatia and Wales indicated higher levels of optimism, men in Krakow reported higher resilience compared to women in the region. Table 13shows the results of the conducted analysis.

Table 13: Statistically significant gender differences in moderators

Type of region	Case study	Statistically significant factor	Men Mean	Women Mean	P-value
Coal Regions	Lusatia	Optimism	3.66	4.023	0.013
Carbon-intensive regions	Krakow MA	Resilience	3.648	3.46	0.032
	Wales	Optimism	3.17	3.94	0.006

Perceived decarbonisation impacts

The construct "decarbonization impacts" measures the extent to which respondents perceive the decarbonization process as a threat and includes all risks and vulnerabilities created by the process. The construct was measured through 5 factors: perceived

economic hardship, perceived stress, perceived fairness, economic optimism, and nostalgia. Statistically significant differences between women and men were found in 5 regions. The results are summarized in Table 14 below:

Table 14: Statistically significant gender differences in perceived decarbonisation impacts

Type of region	Case study	Statistically Significant factor	Men Mean	Women Mean	P-value
Coal Regions	Sulcis	Economic hardship	2.882	3.08	0.03
		Economic optimism	2.338	2.615	0.004
		Perceived fairness	2.89	3.128	0.006
Carbon-intensive regions	Brindisi	Economic optimism	2.615	3	0.041
	Krakow MA	Economic hardship	2.938	3.268	0.003
		Individual perceived stress	2.697	2.864	0.042
	Stavanger	Perceived fairness	2.764	3.146	0
	Wales	Economic optimism	2.01	2.615	0.01
		Individual perceived stress	3.012	2.531	0.03

In the case of Sulcis, women are slightly more concerned and uncertain about the economic situation than men. Similar results were found in Krakow, where in addition to higher levels of concern about economic hardship, women report higher levels of stress. The latter result contrasts with that of Wales where perceived stress is higher among men.

Levels of optimism in the regions are in general low. Nevertheless, women expressed more often that they expect positive economic outcomes as a result of the decarbonisation process. This statistically significant difference was found in 3 cases: Brindisi, Sulcis and Wales. Women's perception of the fairness of the decarbonisation process is additionally slightly higher than that of men in Sulcis and Stavanger.

Coping strategies

The socio-psychological component assesses also the strategies adopted by the people in the CCT to deal with the perceived impacts of the decarbonisation process. Those strategies include the intention to relocate, personal reinvention, support, submission (passive response) as well as resistance and protest. Table 15summarizes statistically significant differences in coping mechanisms between men and women.

Table 15: Statistically significant gender differences in coping strategies

Type of region	Case study	Statistically Significant factor	Men Mean	Women Mean	P-value
Coal Regions	Silesia	Personal reinvention	2.417	2.638	0.038
	Central Germany	Submission	3.147	3.667	0.037
	Sulcis	Submission	3.322	3.074	0
	Upper Nitra	Support	3.443	3.147	0.004
Carbon-intensive regions	Stavanger	Resistance and protest	2.467	2.164	0.001
		Support	3.06	3.491	0
	Wales	Intention to relocate	2.375	1.856	0.044
		Support	3.923	3.096	0.016

Regardless of gender, the intention to relocate is rather very low in all regions investigated in the project. When considering gender, only South Wales shows statistically significant differences, as men have a higher intention to leave their region. In this region, male respondents were more likely to report that they could not be happy living in Port Talbot for the rest of their lives and that there is not much of a future for them in Port Talbot, therefore being also more likely to report that they are actively searching for new places to live and work.

Similarly, despite generally low levels of resistance and protest, men in Stavanger are more prompt to express a confrontative reaction to the transition. This contrasts with women's higher levels of support in the region. These differences show that men perhaps are more willing to act out in response to changes they deem unfair, unnecessary or changes that threaten their way of living. Women, on the other hand, seem to rely more on support to deal with negative influences in their lives, perhaps supporting each other or seeking out support in their environment.

Altogether, the most prevalent coping strategies in the regions are submission to and support of the transition. Statistically significant gender differences regarding support

were found in three cases. In Stavanger, women express a higher level of support to the transition, while men do so in Upper Nitra and Wales. Submission levels are considerably higher among women in Central Germany and among men in Sulcis. Results in central Germany might be influenced by the sample composition: retired women have lower incentives to not submit to the energy transition.

Life satisfaction

Life satisfaction is a construct that aims to evaluate the sense of personal fulfilment of the respondents. Excluding Krakow and Silesia, people in the investigated regions expressed rather high levels of life satisfaction. Without accounting for gender differences, the highest levels of life satisfaction are reported in Central Germany (4.13) and Rhineland (4.07).

When considering gender, significantly different levels of life satisfaction were observed in three regions. Table 16presents the results. Women in A Coruña and Upper Nitra are more satisfied with their lives than men in the respective region. Conversely, men in Sulcis reported higher levels of life satisfaction.

Table 16: Statistically significant gender differences in life satisfaction

Type of region	Case study	Statistically Significant factor	Men Mean	Women Mean	P-value
Coal Regions	Sulcis	Life satisfaction	3.379	3.194	0.04
	Upper Nitra	Life satisfaction	3.047	3.223	0.029
Carbon-intensive regions	A Coruña	Life satisfaction	3.507	3.641	0.05

5.2 Socio-cultural component

The socio-cultural component studies how different types of changes are creating stress in the structure of the territorial organisation. It focuses on those stress-strains that may trigger deterritorialisation well as re-territorialisation dynamics. The territorial challenges faced by coal and carbon-intensive regions are not seen as merely caused by the decarbonisation process, but rather as the result of other multiple ongoing transformations (e.g., digitalisation, migrations, etc.) that determine situations of socio-cultural stress at the territorial level. Particular attention has been paid to a set of processes connected to globalisation, i.e. global flows of people, images, technologies,

natural elements, ideologies, and money (ethnoscapes, mediascapes, financescapes, ideoscapes, technoscapes, naturescapes).

Socio cultural systems are inherently gendered. They are determined by power relationships exercised between individuals and institutions, and in turn sustain gender norms and carry persistent inequalities between genders. Additionally, as norms are malleable social constructs, changes in the structure of the society and in stress factors will have repercussions on gender norms and inequalities and impact men and women differently. Hence, gender social norms are multidimensional by nature and are deeply entrenched within the six "scapes" of the socio-cultural component: ethno-, finance-, techno-, nature-, media- and ideoscapes.

This section of the report analyses the different impacts and possible risks or opportunities that the socio-cultural stress factors affecting the territorial system have on and provide for women and men. The analysis is based on the information collected through focus groups in the project regions. The focus groups aimed at participatory mapping the "strain situations" (i.e. conflicts, impasses, etc.) and related impacts of the CCT. The resulting reports include information about the collective perception of differentiated impacts of territorial stress for men and women.

5.2.1 Gender in the focus groups composition

The focus group composition of all regions is shown in Table 17and

Table 18. Gender disparities can be noticed in the composition of the focus groups, with women representing 44% of the participants in coal regions and 34% in coal-intensive regions. Nonetheless, it is important to mention that the criterion established for the focus group was that at least 3 women and 3 men should be included in a focus group composed by 6-8 people. While in some case studies this target was met, others recruited a smaller number of people but kept an appropriate gender balance. In a few cases the criterion of gender balance could not be met. In A Coruña and Sulcis, this imbalance stems from women's last-minute cancellations, explicitly due to family responsibilities.

Table 17: Gender composition of the focus groups in coal regions

Coal region	Male Participants (in #)	Female Participants (#)	Male Participants (%)	Female Participants (%)
Silesia	4	4	50,0%	50,0%

Lusatia	3	6	33,3%	66,7%
Rhineland	3	2	60,0%	40,0%
Central Germany	2	2	50,0%	50,0%
Jiu Valley	4	2	66,7%	33,3%
Sulcis	6	3	66,7%	33,3%
Upper Nitra	5	3	62,5%	37,5%
TOTAL	27	22	55,10%	44,90%

Table 18: Gender composition of the focus group in carbon-intensive regions

Carbon-intensive region	Male Participants (#)	Female Participants (#)	Male Participants (%)	Female Participants (%)
Brindisi	7	1	87,5%	12,5%
Krakow	4	3	57,1%	42,9%
A Coruña	6	2	75%	25%
Upper Styria*	3	3	50%	50%
Stavanger	2	2	50%	50%
South Wales	1	1	50%	50%
Total	23	12	65,71%	34,29%

Considering that the selected methodology focused on the collectively produced information and situations mapping and not on recording and analysing the interactions between the participants, an analysis of the potentially gendered dynamics in the group is beyond the scope of this report. Nonetheless, it should be borne in mind that, in some cases, overrepresentation of men might have hindered women's ability to speak out on issues specific to them. Men's concerns can be considered neutral and universal when women-specific ones can easily be disregarded and viewed as part of the private or domestic realm, especially in a context where women are alone or in a minority(Acker, 1990; Junko Yanagisako & Fishburne Collier, 1987; McKeon, 2006).

Another information to trace back was the differential contribution of men and women to the identification of the strain situations. Classifying the strain situations according to the gender of the participant who brought it up as a topic was possible in eight(out of thirteen)case studies. In the cases in which the gender of the source was not provided, the lack of is information is explained as the result of the use of methodologies that do

not allow the identification of the gender of the source (such as anonymized cards to bring up the topics for discussion) or the dynamics in the smallest groups.

Overall, focus groups participants brought up 269 strains. For the cases where gender was specified (44%),102 were brought up by men and 48 by women, accounting for 38% and 18% of the brought-up situations, respectively. The available data shows that 36.27% of the strains related to ideoscapes were referred to by men, while only in 8.42% of the cases it was by women (the rest being either not specified or mentioned by both). A higher participation of men was also detectable in the situations related financescapes, naturescapes and technoscapes. Only in the situations related to ethnoscapes, there were more strains brought up by women than by men. Due to the missing data for some studies, these figures cannot be asserted definitely but they provide some indicative information when it comes to specific scapes.

5.2.2 Gender differentiated impacts

Gender differentiated impacts assess how certain situations or issues affect women and men differently. Therefore, the strains and impacts mentioned by the focus groups were analysed in order to identify similarities and differences among regions regarding gender differentiated impacts. It was further investigated if those issues were described as gender differentiated by the focus groups or not. In general, despite questions about gender differentiated impacts were addressed in the focus group for each of the six areas of change analysed (e.g. ethnoscapes, finanscapes, technoscapes-, naturescapes-, mediascapes andideoscapes), only a few impacts have been identified as differential for what concerns gender (in four of them no gender differentiated impacts might be found). In this respect, it should be considered that the key informants participating in the focus group were not gender experts. Another consideration is that the lack of systemic information about gender differentiated impact may reflect the gender-neutral or gender-blind approach dominating local discourses and knowledge in the regions. For instance, in the case of Central Germany, despite mentioning a higher female out-migration in the region, focus group participants refused to call this situation a case of gender-differentiated impacts. This might reflect a certain resistance to thinking in terms of gender in the region.

However, the information collected, give us a series of clue of how different changes and related stress affect differently men and women.

Ethnoscapes

Some interesting information were singled out on gender differentiated impacts related to ethnoscapes (population movements). In Lusatia, participants worried about the inverted age pyramid. Due to the disproportionate participation of women in the youth outmigration in the 1990s and 2000s, there is a decreasing proportion of younger women and an increasing proportion of older women in the population, who specially affected by isolation and economic poverty. The question of demographic change is also of concern in Sulcis, where young women's outmigration rates are greater than those of men, and in Central Germany, where the demographic structure was impacted in the long run by the high outmigration rate of women after the fall of the Berlin Wall. In Stavanger, it was highlighted that before the age of 30 women are more mobile than men (possibly in search of education) but afterwards the dynamic is inverted (men are possibly in search of jobs).

The focus groups also gave some clue about why women show a higher outmigration rate than men. In some regions they point out to better performance of women in education. Interestingly, participants in Upper Styria mentioned that one of the reasons to move away is the conservative, traditional and close-minded atmosphere of the region, which could even more relevant for women's choice of outmigration. Conservative mind-sets tend to reproduce and emphasize gender-based discrimination and traditionally assigned gender roles, which limit especially, but not only, women's choices.

It is plausible to think that at least some of the dynamics illustrated above might apply to other regions as outmigration was mentioned by most of the case studies, even though not in a gender related manner (see chapter 6).

Another recurring trend amongst some regions is the relocation of (mainly male) workers after the closure of companies operating in the coal and carbon-intensive industry. In Sulcis, the aluminium industry crisis in the 2010s sparked temporary migration for the former workers (mostly men) who tried to find jobs elsewhere. Consequently, the care workload of women who stayed in Sulcis with the rest of the family significantly increased.

Finanscapes

Overall, the economic structure was the topic most mentioned by the focus groups in relation to gender. Among all regions the economic structure is very gendered. Women and men work in different sectors, and at different levels of the hierarchy. The regions of Upper Styria and Lusatia are characterized by higher income among male skilled

workers, which reflects the large gap that exists between men's and women's wages and positions. Although the wages in Upper Styria are amongst the highest in the country, the gender pay gap is higher than the national average: women earn 19.8% less than their male counterparts. A great part of the local male population is employed in the industrial sector. As stated by one participant regarding work disparities, "women are affected in a completely different way; it is still mostly the case that men work full-time, and women work part-time".

In all regions women predominantly work in the public, care, and social services sectors, while the majority of men is employed in industry, construction or transport sectors. In Sulcis, for instance, work positions in the personal care sector, where most workers are women, are often undeclared. Consequently, those women do not have access to work security and stability, to some social services, and this also jeopardizes their future pension. On the other hand, youth and women's unemployment is increasing dramatically in the region.

In contrast, in Lusatia, women struggle to find jobs appropriate to their qualifications and aspirations, which leads to shortages of labour in female-dominated professions. Moreover, women participants mentioned the challenges that young mothers and mothers-to-be face when trying to balance their professional and domestic responsibilities, hindering their career development.

In A Coruña, employment opportunities are perceived differently between genders: while male-dominated jobs in mines and power plants are decreasing, women are gaining opportunities in the emerging service sector, where women are competing on an equal footing with men for high-tech jobs. As result, the gender gap in employment opportunities has greatly diminished. Moreover, former employees of the mining and power sector have moved to the service sector. In this matter, it is crucial to keep in mind that this sector has been female dominated in the last decades, and therefore the emerging competition with former industry male workers might result in a negative impact for women looking for work.

Impacts of disinvestment in the mining sector on gender roles were identified in the cases of Jiu Valley and Silesia. In the Jiu Valley focus group, the participants noted that the overall workload of many women was increased by the layoffs in the mining industry as they had to look for new employment while still carrying out unpaid care responsibilities. This is to say that the traditional distribution of unpaid work at home in "miners' families (in which the man used to receive a salary large enough to support the financial needs

of the whole family, while the wife was in charge of the household) was not altered by the changes in productive roles. In Silesia, according to the focus groups, the role of women is evolving from a traditional family where the men are working and the women stay at home. Participants claimed that the restructuring of the mining industry has accelerated change, leading women to become more independent by getting a paid job. In turn, the education and productive work of women has changed the position of the man in the family.

Drastic budget cuts and austerity policies leading to, for example, the closure (or further relocation) of kindergartens, schools, or nursing homes (as expressed in the cases of Lusatia, Upper Styria, and Upper Nitra) primarily affect women as they are economically more dependent on welfare payments than men and be can overburden with extra unpaid reproductive work that is not supported by the state.

Discussions about the energy industry sector were prominent within the focus groups, but considerations on differentiated gender impacts resulting from the male dominance of the sector were rarely made. Issues such as the lack (or in contrast, the concentration) of investment in industrial sectors, labour leasing, increased automation of the production or the need to requalify the industry employees have different consequences on women and men. Moreover, as acknowledged in Stavanger, South Wales, and Lusatia, the workers losing their jobs in the industry had particularly well-paid positions. As the workers being mentioned are predominantly men (the few women working in the industry are over-represented at the bottom of the hierarchy and in administrative positions), it is important to consider that the tensions between the industry sector and other economic sector, or between well-paid workers and others, can also reflect tensions between genders due to accentuated pay gaps.

Lack of access to resources also appears as a main concern affecting differently women and men. In Upper Styria, participants highlighted that elderly women are more affected by poverty and low mobility, particularly in rural areas. Similarly, in Lusatia participants noted the high old-age dependency ratio of the region and how elderly women end up particularly affected by social isolation and economic poverty. Indeed, "this is aggravated by infrastructural cut-backs, which have intersectional impacts on women and low-income segments of the population in terms of mobility, access to care, and participation in social life".

Ideoscapes

When relating to the ideoscapes, underrepresentation of women in decision-making instances were mentioned as a strain situation in some regions. Distributing subsidies prioritising certain industries above others and other political decisions are not a neutral process. The systematic underrepresentation of women in all decision-making instances and at all levels (national, regional, local) hinders the visibility of women-specific needs and biases decision-making in favour of men. Related to that, several participants mentioned how decisions taken at national and regional levels, with very few women, hinder the energy transition. Only participants of the Lusatia focus group mentioned explicitly the underrepresentation of women in decision-making instances, resulting in the structural neglect of women's voices. Although they are overburdened, gender representatives and organisations exist in every district and seek to promote women's roles as assets. In Upper Styria, even though there are more women's groups among older women than young ones, older women are excluded from societal participation due to their socio-economic deprivation. Moreover, in this case study, the existence of patriarchal ideas and structures, even among young people, was mentioned as a potential barrier for women's empowerment.

A recurring issue among focus groups is the tension between pro-environmental groups, sometimes qualified as "populist" and "ideological", and most of the local, older population that is being stigmatised because they are linked to harmful industries. In general, women and girls are more aware of climate change, more active in fighting it, and more supportive of green policies in contrast to men (EIGE, Review of the Implementation in the EU of area K of the Beijing Platform for Action: Women and the Environment Gender Equality and Climate Change, 2012). Therefore, this intergenerational tension is likely to also reflect a tension between genders. Finally, it has been noted that civic and political participation in areas of socio-economic deprivation (historically dominated by households with men employed in the industry) is much lower. This probably also reflects a gender gap in participation: where men work in the industry, women often stay at home and therefore have less of a political say.

Technoscapes

In general, strain situations related to the factors of the technoscapes (digital divide and automation) were not perceived as producing gender differentiated impacts or generating potential risks or opportunities for one gender. However, automation and digitalisation as well as the skills required for these processes are seen as key to the economic restructuring and human development in the regions. The challenges

emerging from these processes are further analysed from a gender perspective in the sixth chapter of this report.

Mediascapes
Like in the technoscape, strain situations related to the mediascape were not perceived as producing gender differentiated impacts in the focus groups.

5.3 Socio-ecologic and socio-technical component

The socio-ecological and technical component is a joint component that uses socio-ecological and socio-technical systems-thinking to assess the transformative capacity available in case study regions, focusing on the respective regional economic development system involved in shaping their decarbonisation pathways. In the context of ENTRANCES, transformative capacity is understood 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 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.

The overall transformative capacity was evaluated with 10 factors, whereas 9 factors have been categorized as gender sensitive. Transformative capacity is strongly influenced by the governance of the regional decarbonisation or CET in question. Three components of a category ‘governance and agency’ 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 necessary preconditions for the transformability of a system: there needs to be connectivity and responsiveness built into governance, effective leadership needs to be able to bring people together around a vision, and actors need to be empowered to experiment and innovate. These three attributes must be developed by stakeholders in capacity development processes to enhance their transformative potential, including an 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)(Wolfram, Conceptualizing urban transformative capacity: A framework for research and policy, 2016; Wolfram, Assessing transformative capacity for sustainable urban regeneration: a comparative study of three South Korean cities, 2019).

Semi-structured interviews were conducted in the focus regions with interview partners out of the public sector, the business sector, civil society sector and the third sector (e.g. trade unions, research institutions). The interviews did not include questions specifically addressing gender issues regarding transformative capacity. Thus, the analysis of this component does not measure gender differentiated impacts, but rather presents the assessment and perceptions of the interviewees based on their gender. Moreover, it is fundamental to acknowledge that sector affiliation might have a greater influence on the stakeholder responses. Therefore, the results here presented need to be interpreted with caution.

5.3.1 Gender composition of the sample

Interviews were conducted with a high gender disparity. In 10 out of 13 regions this pattern is recognized as the predominantly male stakeholders participated in the interviews. Only in Silesia, with a ratio of two to one of female to mal, women were overrepresented in the group of interviewees. Gender balance was achieved in the cases Jiu Valley and Upper Nitra. Overall, women represented approximately a third (respectively 35.1%)in coal regions and a fifth of the interviewees (respectively 18.4%) in carbon-intensive regions.

This is a rather expected outcome as it reflects the underrepresentation of women in high and decision-making positions in several sectors, particularly in energy-related sectors. This is reflected, for example, in the sectoral distribution of respondents, with the majority of women representing civil society organisations (11 women) and most men coming from the public sector (23 men). As sector affiliation is also seen as a fundamental driver

of the assessment of transformative capacity, the results should be interpreted with caution.

Moreover, despite the efforts of the research teams, ensuring women's participation proved to be challenging. This was mainly explained as the result of time constrains. In the cases of Stavanger and Upper Styria, where no woman was interviewed, the research teams reported that invited women refused to participate due to lack of time or little knowledge of the issues to be discussed. Table 19 and Table 20 provide an overview of the composition in the coal and carbon intensive regions.

Table 19: Gender composition of the interviews in coal regions

Coal region	Men (#)	Women (#)	Men (%)	Women (%)
Silesia	2	4	33.3%	66.7%
Lusatia	12	6	66.7%	33.3%
Rhineland	10	2	83.3%	16.7%
Central Germany	9	2	81.8%	18.2%
Jiu Valley	5	5	50.0%	50.0%
Sulcis	5	2	71.4%	28.6%
Upper Nitra	5	5	50.0%	50.0%
TOTAL	48	26	64.9%	35.1%

Table 20: Gender composition of the interviews in carbon-intensive regions

Carbon-intensive region	Men (#)	Women (#)	Men (%)	Women (%)
Brindisi	10	2	83.3%	16.7%
Krakow	4	3	57.1%	42.9%
A Coruña	15	5	75.0%	25.0%
Upper Styria*	8	0	100.0%	0.0%
Stavanger	5	0	100.0%	0.0%
South Wales	7	1	87.5%	12.5%
Total	49	11	81.7%	18.3%

In general, interviewees did not mention or specifically address gender-related issues regarding transformative capacity.

5.3.2 *Differences in the assessment of transformative capacity between women and men*

This section presents the different perception of women and men concerning transformative capacity assessment of each region. For Upper Styria and Stavanger no gender differences in transformative capacity can be analysed as the interviewed stakeholders were only men. Similarly, the participation of only one woman in the interviews in the region of South Wales limits the analysis. Besides gender differences, the related sector of the interviewees was considered. In total there are four sectors, namely the public sector (sector A), business sector (sector B), civil society (sector C) and third sector (sector D), which comprises trade unions, scientific and research entities as well as NGOs.

Silesia

Uniquely in Silesia, the sample is composed of more women (4 interviewees) than men (2 interviewees). Women in the sample represented sector A, C and D while both men came belong to sector D. Overall, the transformative capacity assessment of women is higher than the assessment of men, as shown in Figure 5.

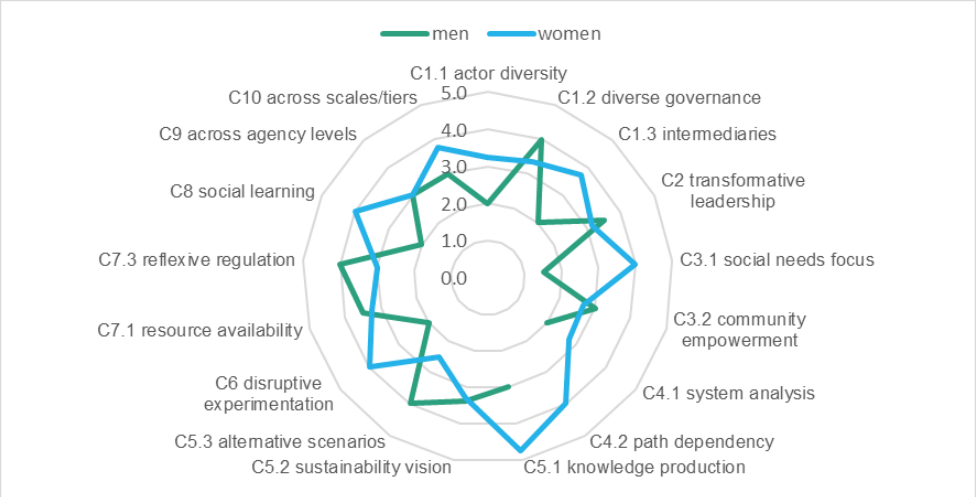

Figure 5: Silesia Transformative capacity assessment by gender

Women see especially a higher transformative capacity in stakeholder involvement (C1.1), effective intermediation (C1.3) and social needs focus (C3.1). Moreover, they perceive broader diversity of knowledge (C5.1) and greater experimenting with novel solutions to social needs (C6) as well as higher social learning (C8) in the region as important aspects. Men, in contrast, focus on more alternative pathways to reach

sustainability goals (C5.3) and a higher transformative capacity due to implemented regulations (C7.3) for sustainable change to support the regional transition. Regarding the involvement of stakeholders (C.1.1), one interviewee pointed explicitly to the exclusion of some groups that might be tremendously affected by the transformation, such as young and elderly people as well as energy poor residents. Considering that women are disproportionally affected by energy poverty due to lower average income, it is possible to infer that they are a majority among those excluded.

Both, women and men, mentioned mainly the role of NGOs as intermediaries (C1.3). Men consider that the focus on social needs (C3.1) is low as in their view the needs of the mining sector are not taken into account. A lower rating of knowledge production (C5.1) by men was explained by one interviewee recognizing a big difference between the existence of many academic programs but very little implementation and impacts from it. Novel Solutions (C6) were seen by female interviewees mainly implemented through private and energy companies and new available technologies. Despite general low scores for social learning (C8) in comparison with other factors, women evaluated this higher than men. A comparison of the given assessment to the recognition of path dependences (C4.1 and C4.2) in the region is not possible due to unavailability of data.

Lusatia

Figure 6shows mixed results regarding the gender differences in the assessment of transformative capacity in Lusatia. In general, all interviewees rated the transformative capacity low. Nevertheless, female interviewees assessed the awareness of stakeholders regarding interdependencies of the different aspects of the transition (C4.2) higher than men. In this matter, male interviewees pointed out that the region lacks a strategic orientation towards a transformative agenda, which could be seen as basis for the recognition of path dependencies. Male interviewees assessed the empowerment of the community (C3.2) significantly higher than women. One female interviewee pointed out missing support, participation and grassroots orientation for stakeholders. Furthermore, men, especially from the public sector, assesses significantly higher the process of collectively producing sustainability visions (C5.2). To explain the low rating of this aspect, and key aspects such as the distribution of economic benefits or the cultural and regional positioning of Lusatia are omitted. Regarding the composition, it can be stated that most of the male interviewees came from the sector A, while the majority of women worked in sector C.

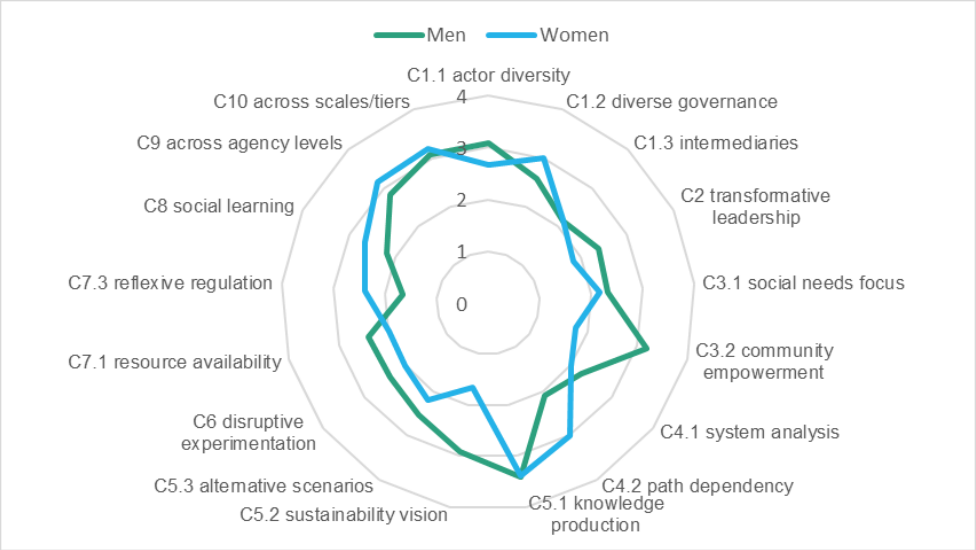

Figure 6: Lusatia Transformative capacity assessment by gender

Rhineland

Figure 7 shows the gender differences in transformative capacity in Rhineland. Several data points regarding the assessment of women are missing. This can partially be explained by the composition ratio of the sample of 10 men to only 2 women. The interviewed women perceived the focus on social needs (C3.1), empowerment of the community (C3.2) and the availability of resources for the transition (C7.1) higher than men. Regarding the social needs (C3.1*)* the focus was on the measures taken to address job losses due to the coal phase-out, which have an impact on men in the first place. Male interviewees especially perceived a higher diversity at the governance of the transition (C1.2), higher knowledge generation of the stakeholders (C5.1) and a greater experimentation for novel solutions (C6) than women.

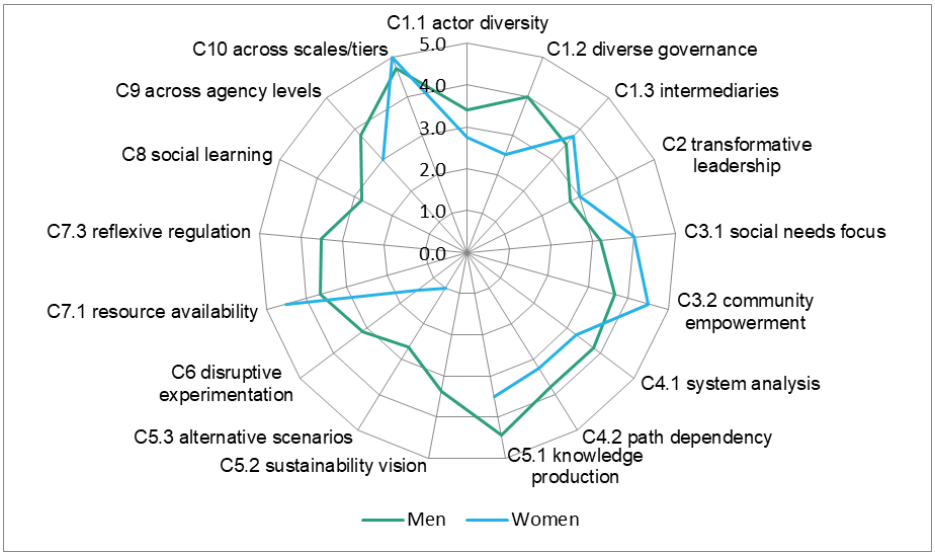

Figure 7: Rhineland_ Transformative capacity assessment by gender

Central Germany

Figure 8shows that the interviewed men in Central Germany rated transformative capacity more positively than women did. This is particularly determined by a higher valuation of diversity at the governance of the transition (C1.2), effective intermediation between these actors (C1.3) as well as transformative leadership (C2). However, several participants mentioned that the term “intermediaries” caused comprehension problems. Further on, male interviewees perceived that actors in the region have a high level of understanding of the system (C4.1) and rated the effective involvement of actors at different scales (C9) and the existence of a sustainability vision (C5.2) significantly higher than women. Sector C representatives, which one of the two female interviewees belonged to, rated the latter factor, C5.2, particularly low, arguing that there is no far-reaching sustainability vision in place. A significant higher assessment of female interviewees can only be seen for the focus on social needs (C3.1).

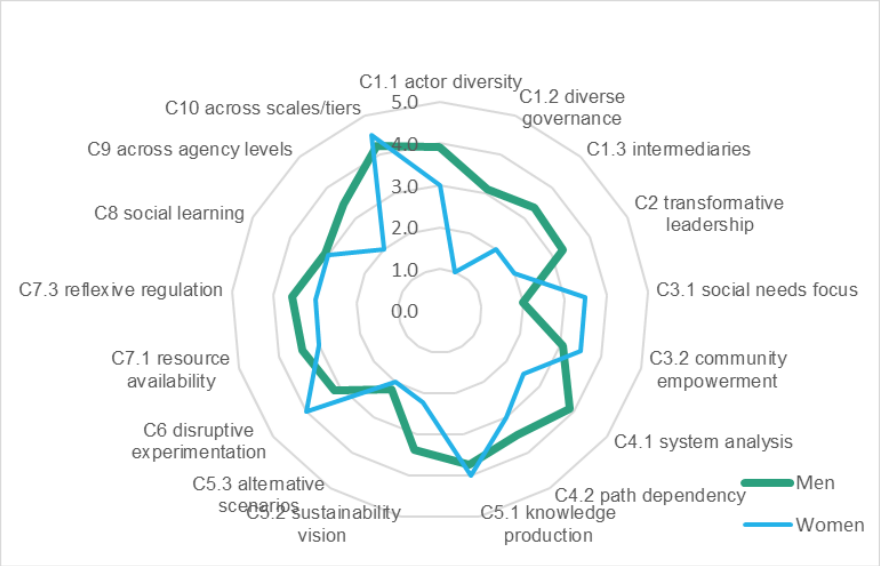

Figure 8: Central Germany Transformative capacity assessment by gender

Jiu Valley

Figure 9 gives an overview of the gender differentiated assessment of transformative capacity in Jiu Valley. The overall picture in Jiu Valley is that women rated the transformative capacity more positively than men did. This is mainly determined by higher ratings of the effectiveness of intermediaries for the transition (C1.3), the focus on the communities' social needs (C3.1) and reflexive regulations supporting the transition (C7.3). For the latter aspect, it was mentioned that the pressure from the European Union on the national authorities towards the creation of an appropriate regulatory framework is a key driver. The group of interviewees was gender balanced.

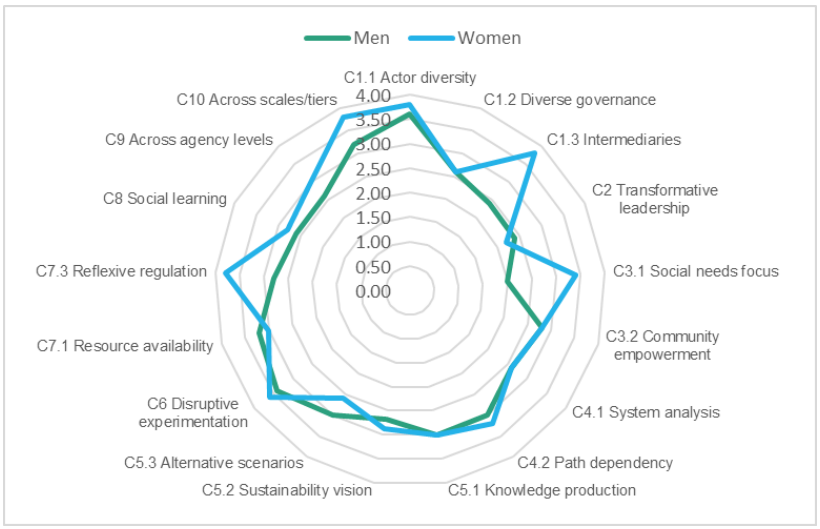

Figure 9: Jiu Valley Transformative capacity assessment by gender

Sulcis

Figure 10 gives an overview of the gender differentiated transformative capacity assessment in Sulcis. The overall picture shows a significantly higher assessment of the transformative capacity by women in the region of Sulcis. As exception, the understanding of the actors for interdependencies of the different aspects of the transition (C4.2) was rated noticeable higher by men than by women. To explain the low rating given to this factor, one of the female interviewees argued that, in general, the citizens are not aware of the holistic change that the transition entails and how it changes lifestyles in a radical way. The two female interviewees assessed the diversity of the actors (C1.1), the transformative leadership (C2) and the knowledge production (C5.1) significantly higher than men. Regarding actor diversity, women observed that many actors are active in the public debate on the CET and that the energy transition is a process involving all societal actors.

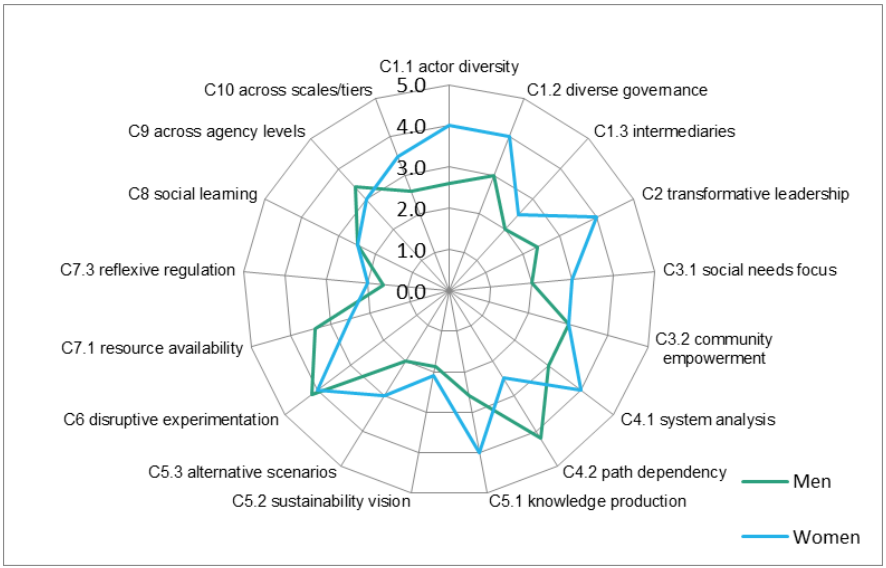

Figure 10: Sulcis Transformative capacity assessment by gender

Upper Nitra

Figure 10 gives an overview of the gender differentiated assessment of transformative capacity in Upper Nitra. Here, the overall picture shows that men rated the transformative capacity slightly more positively than women did. Main differences exist as men perceive higher effectiveness of intermediaries (C1.3), a good level of actor`s understanding of the system and interdependencies of the different aspects of the transition (C4.1 and C4.2) and the prevalence of greater experimentation for novel solutions (C6). Women perceived better reflexive regulations and higher social learning for the transition (C7.3 and C8), but both factors are rated lowest among women and men. The group of

interviewees was gender balanced, information on sectors was not provided for the analysis.

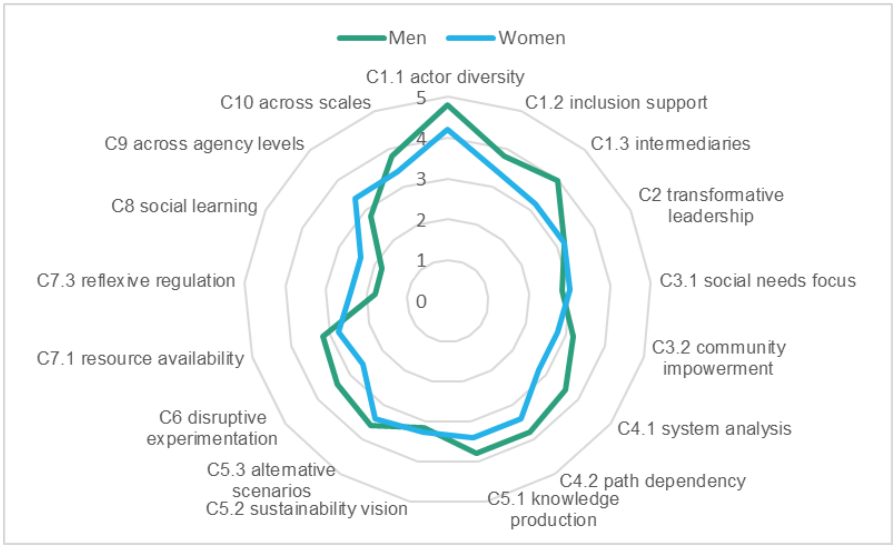

Figure 11: Upper Nitra_ Transformative capacity assessment by gender

Brindisi

Figure 12 gives an overview of the gender differentiated assessment of the transformative capacity in Brindisi, where both female interviewees represent sector B. Overall, women rated transformative capacity more positively than men did in the region of Brindisi. In general, the interviewed women have a greater perception of the transition in the region as a process with broad stakeholder involvement (C1.1), effective intermediation (C1.3), transformative leadership (C2) and focus on the community (C3.1 and C3.2). They also perceive that the actors have a good level of understanding of the system and interdependencies of the different aspects of the transition (C4.1 and C4.2). Additionally, knowledge production (C5.1) was rated significantly higher by women than by men. In this regard, it is important to mention that despite the existence of broad diversity of knowledge produced from different sectors, some interviewees pointed out that the transition policies in the regions are lacking mechanisms to incorporate the social aspects in the local communities involved and the relative impacts on social capital (workers, young people seeking employment, gender issues). Both male and female interviewees find that, in terms of regulation (7.3), the region has implemented changes that support the transition, including energy and environmental acts for the promotion of renewables. Both groups also gave similar scores to the availability of mechanisms for monitoring and learning. Despite the positive female assessment of the actor diversity, the component report of the region mentioned a possible lower involvement of women

and young people as a possible shortcoming in the diversity of the actors governing the transition.

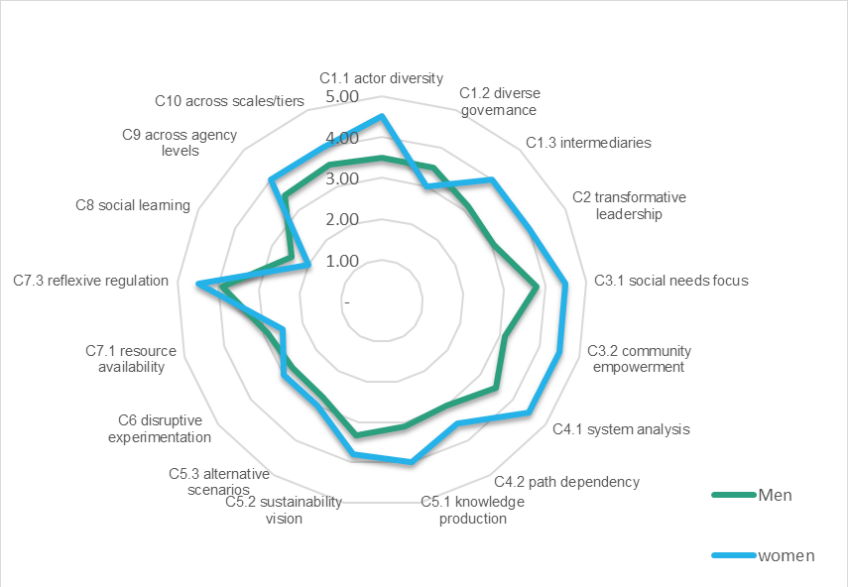

Figure 12: Brindisi Transformative capacity assessment by gender

Krakow Metropolitan Area

Overall, Figure 13shows a more positive rating of the transformative capacity by women than by men in Krakow. Even though the general assessment of the actor diversity is low, the interviewed women rated this factor (C1.1) higher than men. Women recognize greater addressing of social needs (C3.1) and that actors have a high understanding of interdependencies of the different aspects of the transition (C4.2). The resource availability (C7.1) was rated higher by men. A lower evaluation from women was explained by insufficient laws for transition, lack of resources for NGOs and information noise produced by the fossil fuel lobby and technology producers. When addressing the actor diversity and involvement in the transition, an interviewee pointed out that energy poor households are excluded from participation. Energy poverty also emerged as a relevant social need (C3.1.) that is not adequately addressed in the energy transition. In this regard, it is important to consider that women are at greater risk of energy poverty than men due to income disparities. Therefore, a gender and intersectional perspective is fundamental in addressing energy poverty. Female interviewees were from sector D, male interviewees from sector A, B and C.

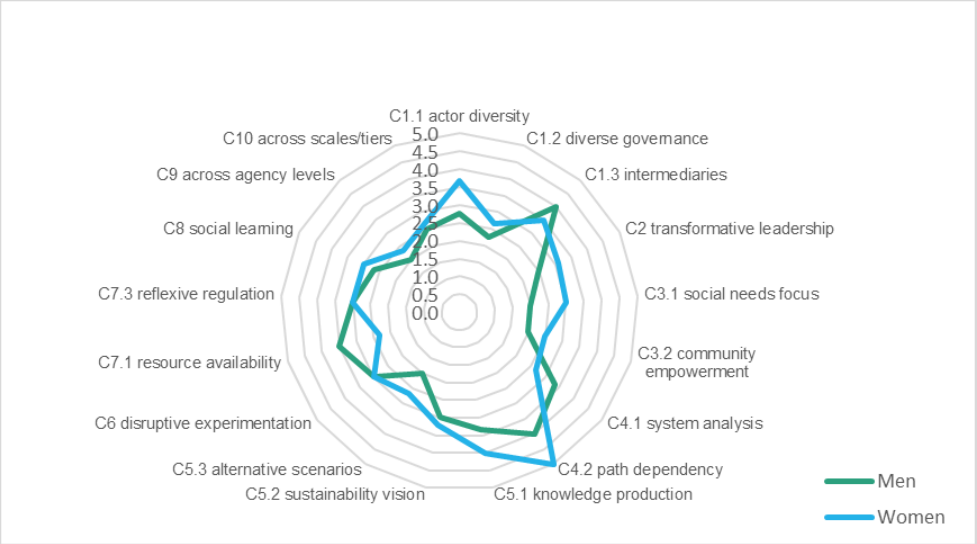

Figure 13: Krakow Transformative capacity assessment by gender

A Coruña

Figure 14 gives an overview of the gender differentiated transformative capacity assessment in A Coruña. Three female interviewees represented the sector A, whereas one interviewee represented B and D each. The overall picture shows a higher assessment of transformative capacity by women. Women and men gave similar ratings to the actor's diversity (C1.1.), the diversity of experimentation for disruptive solutions (C6) and the work across broad agency levels (C9). Women considered that especially the owner of the power plant and trade unions are important intermediaries (C1.3), while some male interviewees questioned the role of intermediaries for a fast transition. Women, especially from sector A, perceived that the stakeholders in the region recognize systemic interdependencies and potential obstacles to change (C4.2). Female interviewees also rated the development of knowledge (C5.1) through the different stakeholders and alternative pathways to reach sustainability goals (C5.3) significantly higher than men.

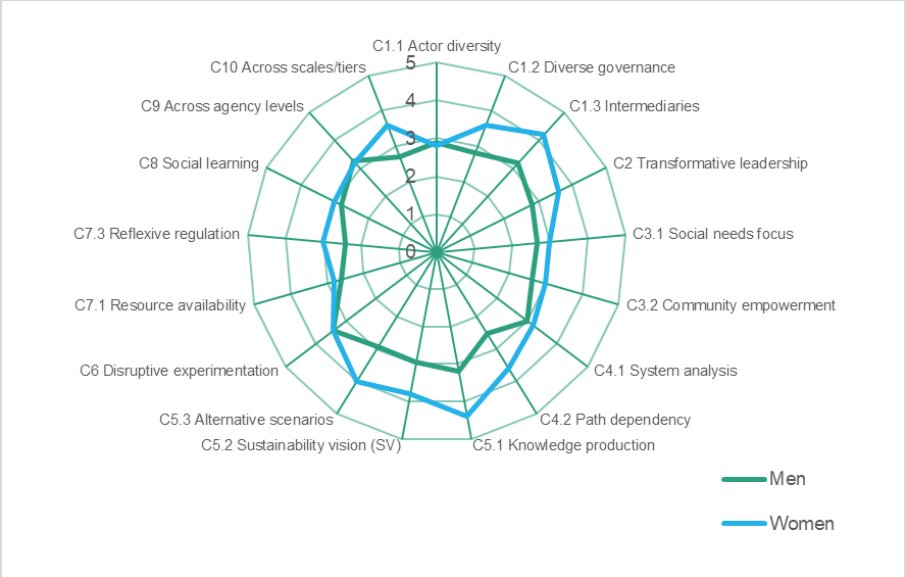

Figure 14: A Coruña Transformative capacity assessment by gender

5.3.3 Differential assessment of transformative capacity across regions

In general, women gave a total higher assessment of the transformative capacity in 6 regions and men in 3 regions. Moreover, in two case studies (Lusatia and Upper Nitra) transformative capacity was assessed nearly equally by women and men. One region (Rhineland) could only be compared to fragmented available data from female interviewees. In particular, women rated actor diversity (for 3 regions), the effectiveness of intermediaries (for 3 regions), the social focus in the transition process (for 5 regions) and knowledge production (for 3 regions) significantly higher (with a difference in the mean rating greater than 1).

The positive assessment of actor diversity by women contrasts with the mentioned lesser involvement of women and people at risk of energy poverty in the transition governance. Intermediation was significantly rated higher from female interviewees, except in the region of Central Germany, where male interviewees had significant higher values for this factor. A higher inclusiveness and multiformness of governance arrangements was perceived by the interviewed women. The social focus was rated five times significantly higher by female interviewees, which could be an indicator that, in several regions, the focus of men was rather on the insufficient measures taken for loss of employment due to the coal phase-out. Moreover, higher knowledge production from different actors was perceived by women, where the lower rating of men could partially be explained by focusing not only on the production but also on the insufficient application of knowledge in the regions.

5.4 Socio-political component

Based on a comprehensive text analysis of the statements and counterstatements of local actors, the socio-political component analyses the narrative battles on decarbonisation and energy transition in the coal and carbon-intensive regions. The aim of the component is to identify how different social processes are contributing to shape the energy transition and modify the local field of power. The component identifies which are the actors that are forming the constituencies imposing the transition (technological regularisation), coping with the transition (technological adjustment), or opposing the transition (technological reconstitution) and how these different constituencies are reflected in the local field of power. Through analysing the narratives of such actors, the component investigates how the constituencies understand the benefits and losses from the decarbonisation process and how they operationalise them. Finally, the component shows the inclusion and exclusion dynamics resulting from technological change in the region.

From a gender perspective, the analysis of the socio-political component deals with two main issues, namely the (under)representation of women in the local field of power and the inclusion/exclusion of gender-related issues in the decarbonisation narratives and polices.

5.4.1 The (under)representation of women in the local field of power

To analyze this issue, organizations working on gender-related issues were identified and included in the stakeholder grid in order to integrate their discourses and narratives regarding the transition. Moreover, the research teams collected information about women's representation in decision-making positions at the regional and local level.

The stakeholder analysis conducted in all the case studies have shown that, in some cases key stakeholders in the private, public or civil society sectors are represented by women. This is the case in A Coruña, where women have a strong presence in environmental protection groups and grassroots movements and hold important positions in the local government. Similarly, in Jiu Valley and Upper Nitra, some local NGOs are represented by women, and in Stavanger two stakeholders from the municipality are women. Nonetheless, only in few cases organisations representing women interests are actively involved in the regional clean energy transition policies. The presence of such organisations in the other regions cannot be excluded, but as they did

not appear in documentary research and in the analysis of the press, it means that their visibility (and negotiation power) might be low.

In the Lusatian case study two organizations representing women's interests in the regional CET were identified as key stakeholders. In particular, the platform 'F wie Kraft' was stablished in 2016 with the specific aim of supporting, addressing and networking women in Lusatia in relation to the CET. Together with the Alliance of Municipal Equal Opportunities Officers in Lusatia (the second key stakeholders representing women), 'F wie Kraft' has produced a position paper that underlines how the discussion on structural change in the region has focused on the (male dominated) industry issues and paid little attention to other sectors and fields of activity, especially those traditionally perceived as female sectors such as the care sector and the cultural and educational sector (F wie Kraft, 2020). The paper moreover emphasizes the importance of women's visibility (in all their roles and positions) and the recognition of their contributions to the structural change in the region(F wie Kraft, 2020).

When looking at representation in positions of power in the political sphere, it is possible to conclude that women are generally under-represented in the local field of power. For instance, none of the German PAR analyzed in the project has achieved gender-parity in the legislative and executive positions. In North Rhine-Westphalia, 6 out of 14 ministerial positions are currently occupied by women and every third member of the state parliament is female (33.8 %). A similar proportion is found in the states that are part of the Rhineland case study: in Saxony Anhalt, five out of ten ministerial positions are currently occupied by women and in Saxony, only three out of fourteen are occupied by women. In the state parliaments, women hold 26.7% of the seats in Saxony-Anhalt (23 out of 86) and 28% in Saxony (33 out of 118). For the Lusatian case, in Brandenburg, while six out of eleven ministerial positions are held by women, the proportion of female ministers and senators together is 40%. The proportion of women in the state parliament is 31.8% and the proportion of women in local elected positions is 28.4%. In Saxony only three out of thirteen ministerial positions are occupied by women. The proportion of female ministers and senators together is 27.3%, and the proportion of state secretaries, state councilors and ministerial directors is 8.3%. The proportion of women in the state parliament is 27.7% and the proportion of women in local elected positions is 20%.

According to the power indicators of the Gender Equality Index developed by the European Institute for Gender Equality (EIGE), despite significant progress in the last decades, a wide gender gap in the field of power remains in most EU countries. Table

21 summarizes women's representation indicators at the national level for the countries of interest in the project.

Table 21: Share of women in political positions (national)

Country	Share of ministers	Share of members of parliament	Share of members of regional assemblies
Poland	20%	27%	27%
Germany	41%	32%	31%
Italy	43%	36%	23%
Romania	5%	20%	20%
Slovakia	23%	23%	14%
Spain	47%	42%	47%
Austria	47%	41%	35%
Norway	52.6%	45%	44.7%
UK	21.7%	34%	42.4%

Source: Own elaboration based on (EIGE, Gender Equality Index, 2022)

Additional information about the representation of women in the local fields of power can be found in Annex 1 of this report (Gender Context Analysis).

The presence of women in key positions for the implementation of decarbonisation policies was pointed out in the A Coruña case study report. Particularly, the report highlights that the ministry responsible for the elaboration and implementation of decarbonisation policies (Ministry for the Ecological Transition and the Demographic challenge -MITECO) is chaired by a woman.

Data on women's representation in corporate boards of the key business stakeholders was not collected in the ENTRANCES case study regions. However, the Stavanger case study report points out that in Norwegian companies63% of the CEOs and business leader are men. The country, nonetheless, has set gender quotas in place for corporate boards, thus achieving a reduction in the gap between the relative representation of men and women. The higher education sector and some political parties have also gender quotas in place.

5.4.2 Inclusion/exclusion of gender-related issues in the decarbonisation narratives and policies

The coding grid of the socio-political component included codes regarding employment opportunities for women and men in the frame of the transition as well as the potential impact of the transition on gender roles in the region (e.g., through gender shifts in the

labour force). These codes aimed to identify if the clean energy transition narratives in the regions are considering impacts on gender equality.

In general, the gender dimension is little or not at all mentioned in the media sources and statements selected for text analysis in all regions. Moreover, even though the unequal distribution of impacts of the decarbonization on different societal groups is extensively mentioned in the analysed texts, little attention is given to the potential gendered nature of these impacts. For instance, in the text analysis of the Sulcis case study more than 400 statements about the transition and justice were coded, and none of them was related to gender issue.

Gender or intersecting characteristics such as age, educational level or socio-economic position are not commonly mentioned in the public discourse when referring to concerns about increasing energy poverty due to decarbonisation policies in the Silesian region.

5.5 Socio-economic component

The socio-economic component moves from the observation that, in the general context of the energy transition, coal and carbon-intensive regions are facing more substantial structural change than other regions, which rely less on coal or carbon-intensive industries. Therefore, this component focuses on structural change in the economy, i.e., the reallocation of economic activity across different economic sectors(Herrendorf, Rogerson, & Valentinyi, 2014)and regions. Structural change can lead to a change in a region's economic, financial and demographic composition. Thus, the component is 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.

A coal phase-out and transformation of carbon-intensive industries has significant impacts on a society and its wellbeing. To investigate these impacts, a gender and intersectional perspective ensures the inclusion of all groups of society, avoiding the replication or exacerbation of existing injustices and vulnerabilities that may be transferred into new energy regimes (Johnson, et al., 2020). While negative effects might be particularly felt by current or former employees of the coal and carbon-intensive industries that are mainly male-dominated, resource shocks, specific to men, may also create negative spill overs to female workers in the rest of the economy (Aragón, Rud, & Toews, 2018).

Understanding those gender-specific effects in the labour market is essential, considering that women's relative labour opportunities are linked to a host of other outcomes, such as their political influence and their decisions on motherhood(Del Bono, Weber, & Winter-Ebmer, 2012),as well as their intra-household bargaining power since intra-household violence rates against women tend to increase with increasing gender wage gaps(Aizer, 2010).

For the socio-economic component, a quantitative data collection for ten identified factors was performed. To ensure a gender perspective, five out of ten factors were identified as gender- sensitive. To mirror gender sensitivity in the data, the collection of gender-disaggregated data is necessary. However, the integration of gender into the socio-economic component has proven to be challenging, since very limited gender-disaggregated data is available and new gender variables could not be integrated in the socio-economic model.

This section of the report aims to compare gender differentiated impacts of the socio-economic component. As mentioned before, due to the scarcity or lack of gender-differentiated data, an extensive analysis is not possible. Therefore, only the information mentioned in the case study reports is analysed.

5.5.1 Population indicators

Sex disaggregated population data is available for the CCT, Labour Market Area (LMA) and Political Administrative Region (PAR) in all the studied regions. Overall, except for Stavanger the project regions have a slightly higher share of women in the population. In Stavanger, the share of women has decreased from 50.4% of the population in 2000 to currently 49.5%. This is in line with the Norwegian national trend, where the number of men is higher than the number of women since 2010. This change in the sex ratio of the population has been mainly explained by increased male immigration. Table 22 presents the 2020 sex share in the Labour Market Areas of the project regions.

Table 22 Population share by sex (2020)

	Region	Female share 2020	Male share 2020
Coal regions	Silesia	51.70%	48.30%
	Lusatia	50.80%	49.20%
	Rhineland	51.07%	48.93%
	Central Germany	50.83%	49.17%

	Jiu Valley	51.18%	48.82%
	Sulcis	50.39%	49.61%
	Upper Nitra	50.87%	49.13%
Carbon-intensive regions	Brindisi	51.68%	48.32%
	Krakow*	52.14%	47.86%
	A Coruña	52.06%	47.94%
	Upper Styria	50.61%	49.39%
	Stavanger	49.45%	50.55%
	South Wales*	50.32%	49.68%

*Last available data from 2019

The population in Lusatia, Rhineland, Central Germany, Jiu Valley, Upper Styria, Sulcis, Upper Nitra and South Wales shows similar shares of female and male population with little change over the past years. More significant differences in the ratio of women to men are found in the Polish regions (Silesia and Krakow), A Coruña and in Brindisi, where the proportion of women is higher by at least 3 percentage points. In the case of Silesia and Krakow, the female population share is around 52% in the LMA as well as at the country level. In A Coruña, the gender composition changed in As Pontes from 1.02 men per woman in 1998 to 0.92 men per woman in 2019. This change has been explained as the result of a massive emigration of young men, who lost their well-paid jobs.

Changing demographic trends have been also observed in the German regions of Rhineland and Central Germany. While the population has increased by 5% since the year 2000 in Rhineland, the share of women in the population decreased slightly by 0.4 percentage points, similar to the national share. On the other hand, in Central Germany, the population has declined by more than 10 per cent since the year 2000 and at the same time, the share of women in the population also declined by 0.75 percentage points. On the national level, the share declined only by 0.5 percentage points.

5.5.2 Differentiated impacts

Direct and indirect employment

Analysing gender as part of the factors of *direct and indirect employment and production* was challenging. The lack of gender disaggregated data, especially around the proportion between men and women employed in the sector/mines did not facilitate the analysis. However, there is a common understanding among the regions of Lusatia, Rhineland, Central Germany, Sulcis and A Coruña that, in terms of employment, men are primarily and directly affected by the decarbonisation process since between 70-80%

of the employees are male, resulting in a lower direct exposure of female workers to the energy transition.

Detailed information for the gender segregation of labour in the region has been provided for the South Wales case study. According to the case study report, the dominance of steel employment in Port Talbot led to inequalities in employment opportunities and remuneration within the steel industry. The report states that figures for the Port Talbot plant itself are not available but across Tata Steel UK, approximately 11% of employees are female and 89% male. In 2019/20, Tata Steel UK reports that women were, relatively, good represented in the top pay quartile and the lowest pay quartile (12.5% and 15.1% respectively). During 2020/21, the pattern was maintained but the proportion in the upper pay quartile fell to 10.3% (11.5% 2021/22) and in the lowest pay quartile to 14.5% (18.5% 2021/22). This was reportedly due to the differential distribution of furlough arrangements during the Covid-19 pandemic, an initiative shown to have a gendered outcome. Although site specific data is not available for the Port Talbot plant, it is likely that managerial, professional, and technical staff form a lower proportion of the overall workforce (as the headquarters staff are based in London) and the industrial employment available at Port Talbot is mostly taken-up by males. Another possible outcome of this imbalance is that male employees may be more adversely affected by any reduction in employment at the Port Talbot plant. This presents a significant socio-economic risk in the region, as the evidence suggests gender-based structural inequalities that may be exacerbate with the loss of well-paid employment.

Jiu Valley observed similar changes regarding the employment opportunities of men and women. The traditional gender roles within the miners' families during the last decades of the communist regime were almost completely polarized, with men employed in the mining industry and earning high wages that covered all household expenses and women dedicated mainly to unpaid care and household work. The progressive decline of the mining exploitation and sector in the Jiu Valley brought high rates of unemployment for men and the pressure on women to become financial providers. In this new gender scenario, both men and women are exposed to the socio-economic risks associated to the under-developed status of the region.

While most case studies agreed that female workers' direct exposure to the energy transition is lower, they also agreed that women might be indirectly affected by it through social networks, such as marriages and life partnerships, as specifically mentioned by Lusatia, Rhineland, Central Germany and Sulcis. Those regions furthermore mentioned

that female workers are mainly working in public services, especially in the education sector, where lower tax income might reduce labour demand and indirectly impact this sector as well. In Stavanger, women also mainly work in education, human health and social work activities which showed, among others, the largest labour growth. However, A Coruña stated that the growth of the service sector, traditionally dominated by women in Spain, is, on the one hand, increasing the proportion of women in the labour force, but, on the other hand, now facing competition from laid-off men who used to work in the industrial sector and are now forced to work in the service sector.

Economic inequality and access to resources

Gender differences can also be seen in terms of *economic inequality*. In Rhineland, in 2019 in the PAR 48% of women worked part times as compared to 12% of men, closely relating to the nationwide distribution of part-time employment among sexes in Germany. Economic inequalities were also mentioned in Upper Sytria, where the gender pay gap is an important challenge because men have a relatively good salary from industry jobs and women earn significantly less. Similarly, in South Wales, the Neath Port Talbot labour market is an unequal one, with the hourly average wage for women being less than that of men. This inequality is more marked by the fact that the average female wage is lower in Port Talbot than in Wales or the UK as whole, whilst the average male wage is higher than the Welsh average.

The previously mentioned economic inequalities put a certain pressure on *migration*. In Upper Styria, for example, as a result of the gender pay gap, women may search for better paid jobs elsewhere in Styria and Austria and whole families with kids and husbands tend to accompany them. On contrary, in A Coruña, the loss of well-paid male jobs led to a massive emigration of especially young men, which had an effect on the gender composition of the population of As Pontes (from 1.02 men per woman in 1998 to 0.92 men per woman in 2019). As mentioned before, in Rhineland as well as in Central Germany, since the year 2000 the share of women in the population decreased by 0.4 and 0.75 percentage points, respectively, which indicates a higher emigration of female persons in the 2000s. For the upcoming structural change caused by the energy transition, similar patterns might be present again.

Policies addressing economic inequality

Unequal access to opportunities is what maintains inequalities between genders, as has been observed in Upper Nitra. There, some initiatives are in place to counter these inequalities and to regain citizens and attract newcomers. Special modules focus on female entrepreneurs: creating a platform to share their business experiences and ideas,

creating regional female communities who share an attachment to the region of origin as well as the desire to contribute innovation to the regional economy, thus becoming inspiring examples for other women. Similarly, in Brindisi, the Apulia region had promoted policies for gender equality to prevent all forms of discrimination, taking on the principle of equality and equal opportunities in all government activities, programming, and implementation. In 2007, the Apulia region approved the law “Norms for gender policies and reconciliation of life – work in Puglia” to provide a firm regulatory basis for services and initiatives that can guarantee effective conditions of equal opportunities and redesign the profile of cities around the right to liability and improvement of living conditions for all. The Spanish government has also made gender equality one of the main priorities of the current government. For example, future energy projects are obliged to offer job opportunities to both sexes. Therefore, in the future it is to be expected that there will be more female workers in the energy sector.

CHAPTER 6

GENDER ANALYSIS OF CHALLENGES AND COPING STRATEGIES

6. Gender analysis of challenges and coping strategies

The distinct challenges that regions in transition are facing and the emerging coping strategies to overcome those challenges are at the core of the ENTRANCES research. To investigate them, the project hinges on the idea that, as a complex and multidimensional process, the transition to clean energy affects the daily life of local communities and thus, has the potential to activate or strengthen **deterritorialisation** processes (progressive weakening of ties between a community and its territory) or conversely to trigger **re-territorialisation**. Challenges are therefore context specific: they occur at the territorial level and their interpretation, the expected outcomes and the resulting coping strategies might vary depending on the state of awareness within the territory.

However, despite the variety of specific situations that the regions in transition are facing, there are certain commonalities in the challenges and dynamics that affect them. For this reason, this section focuses on a set of 12 challenges common to several (if not all) regions in transition. In almost all the cases, these challenges and coping strategies are formulated in the regions without taking into account how they differentially impact on men and women.

This chapter is dedicated to analyse challenges faced and coping strategies developed in coal and carbon intensive regions with a gender lens to identify potential differential impacts and gaps. In fact, from a gender perspective, challenges might affect differently women and men and determine different opportunities or risks for them. Similarly, the adopted strategies to overcome the challenges might widely vary in terms of gender responsiveness.

The chapter is structured in 12 sections, one for each challenge. Each section will first present the recurrent challenge as singled out in the case studies and then analyse it with a gender perspective.

6.1 Outmigration and population decline

Summary of the challenge

A substantial reduction of the regions' population due to outward mobility flows presents a common problem to the overwhelming part of the investigated CCT regions. Population shrinking was explicitly mentioned as one of the main challenges in the region for the cases of Silesia, Lusatia, Rhineland, Central Germany, Jiu Valley, and A Coruña.

Nevertheless, concerns regarding the effects of increasing out-migration can be also traced in other case studies.

Outmigration occurs predominantly among the young and economically active population as well as among families formerly linked to the coal or carbon-intensive sector. Educational expansion and declining job opportunities in the region are two main reasons for it. The largest migration flows occurred in the 1990s, as a result of major economic and political reforms with effects that are still being felt today. Outmigration and the resulting population decline may result in a scarcity of skilled workforce in the regions and deepen economic and social marginalisation.

Gender analysis

Migration is highly gendered and must be analysed as such. It is important to flag the different gender dynamics involved in migration processes because women's and men's outmigration patterns are different, intersect with other personal factors, and happen for different reasons. However, not all investigated case study areas found traces of gender differentiation either in the formulation of the challenge or in the strategies devised to overcome it.

Gender differentiated migration patterns and impacts have been identified in the three German regions investigated in the project. In Lusatia, Rhineland and Central Germany, a higher proportion of women, especially young women, have left the regions in recent decades, which has led on the one hand to the masculinisation of local communities, and on the other hand to a shortage of labour in traditionally female-dominated sectors (education, care and services). Likewise, in the Upper Styrian region, women have been leaving their municipalities due to the lack of full-time childcare options and suitable job offers. This applies especially to well-educated women in the region. When female family members reorient themselves and leave the region, the core family moves with them. Thus, the communities lose also male citizens, children and young people, and additionally tax revenues in the end.In general, women leave regions where childcare offers are less likely to be compatible with full-time work and where the difference between male and female part-time rates is high.

Female outmigration has manifold consequences in the long run. A kind of downward spiral is created when women migrate at high rates (Weber & Fischer, 2012). It affects social interaction and has effects on social cohesion in rural communities. Various get-togethers or festivities take place less frequently, because women are still much more

likely to organize leisure time together. In addition, an exodus of women affects the financial situation of the communities both in the short term and in the long term. Moreover, highly skilled women are less likely than men to return to their home region and it takes a disproportionate amount of effort to get them to come back(Heinz, Baumegger, & Hofinger, 2022).

6.2 Ageing population

Summary of the challenge

Ageing population refers to an increasing median age of a population due to youth outmigration, decreasing fertility and/or increased longevity. Ageing of society and shrinking of the younger population is a challenge faced by most investigated CCT regions. This challenge was explicitly identified in Silesia, Lusatia, Rhineland, Central Germany, Jiu Valley, and A Coruña and was mainly associated with high rates of outmigration of young people.

Despite being a global trend resulting from significant advances in health systems and economic development, an ageing population has more impacts on some regions than on others. Particularly, regions with marked shrinking ratios of workers to pensioners face great pressures on their labour markets and health, pension and care systems. A population with a higher proportion of older people might also have an impact on the ability to adopt to new and innovative technologies.

Gender analysis

Regarding this challenge, it is important to collect demographic data on the composition (gender and intersecting factors such as the socio-economic position) of the elderly population at the regional level. An ageing population presents a highly gendered challenge as, in general, the life expectancy of women is higher than for men and thus the majority of older people are women(Tinker, 2002). Nonetheless, greater longevity does not imply a better quality of life: older women are more likely to suffer from disability, to live alone and to have worse health (ibid). Moreover, as women take on a greater share of unpaid work, they are more likely to take breaks from employment or work part-time, which implies reduced income at retirement. In the context of the energy crisis and rising energy prices, it is important to bear in mind that older people, and among them especially women, are more exposed to energy poverty and its associated health consequences.

Proposed and discussed coping strategies to respond to the ageing phenomena encompass two main categories: first, those that aim to promote immigration to transition regions and second, those that seek to improve the quality of life of older people through investments in health systems and social infrastructure. Whether to attract new population groups or to correct disparities in access to social services for elderly population, strategies should be gender responsive. If ageing population policies and strategies do not address gender disparities, women will continue to be at risk of being disproportionately affected by poverty, social isolation and unmet care needs in their own advanced age.

6.3 Digital peripheralisation

Summary of the challenge

Adoption of digital and technological solutions are generally seen as crucial to the development of new economic sectors in the investigated regions. Yet, poor communication infrastructure and services pose significant challenges to some regions (e.g. Brindisi, A Coruña). In addition, there are concerns about a gap between the profiles required for automation and innovation and those available in the regions, which might discourage new firms from setting up in the regions. Therefore, digital and communication inclusion requires strategies in both areas: infrastructure development and digital skills development.

Access to digital services was identified as a common stressor in the focus groups. Participants' concerns revolved around the weak internet infrastructure of their regions, the increased digitalization of work and services despite inequalities of access and training, and therefore the risks of exclusion from the new economy for certain population groups, especially elderly people and communities in remote areas. Even though gender was not explicitly mentioned as one of the determinants of digital marginalization, it is important to consider the intersections between age and gender as evidence shows that elderly women are less likely than men to access digital services.

Gender analysis

The case study in A Coruña points out that communication, digitisation and sustainability represent new fields of action for men and women. They represent the opportunity to initiate and start work trajectories in the territory, providing new job opportunities that will have an impact on the development and employment and social stability of the area and the region. Furthermore, digitisation and internal and external visibility of communication

and participatory processes in the negotiation, transition and implementation phases: Achieving internal and external visibility of communication processes between authorities, workers, employers and social and business representatives and participatory processes in the negotiation, transition and implementation phases of new projects through digitisation.

While digitalisation can offer great opportunities for economic and societal development, access to information and communication technologies is not equal among genders. This is captured by the "digital gender gap" (Alliance for Affordable Internet, 2021), which shows that women and girls' access to and use of digital tools is more limited compared to men and boys. A representative study by D21 investigated the degree of digitisation in Germany based on access, usage behaviour, competence and openness and found that the degree of digitisation of German women was 51% whereas for men it reached 61%(Initiative D21, 2020). A report by OECD disclosed that barriers in access, affordability, girls' relatively lower educational enrolment in STEM subjects as well as gender biases and socio-cultural norms hinder women and girls to fully benefit from the opportunities offered by the digital transformation(OECD, 2018). According to AAI, in 2020, globally $126 billion USD in GDP were lost due to women's exclusion from the digital world(Alliance for Affordable Internet, 2021).

The case study in A Coruña points out that communication, digitisation and sustainability represent new fields of action for men and women, providing new job opportunities that will have an impact on the development and employment and social stability of the area and the region. Yet, incorporation women into the new labour market still poses a challenge, even though representatives of various institutions in the industry, within the region of A Coruña, are women with training in technology. A Coruña further points out that the new generations have been acquiring digital training and information through various organizations, such as the Center for Women in As Pontes and the School of Women's Empowerment. Among their many objectives are those of facilitating digital tools for their participation in negotiation processes and visibility in social and political decision-making processes that affect the decarbonization of the region. The women's perspective incorporates another vision of the communication, management and coordination processes between the various authorities involved in the energy transition process. More specifically, unemployed women from As Pontes will be able to improve their digital skills thanks to the program 'Muller Digital', an initiative that aims to improve digital skills and that will allow them to take advantage of the possibilities associated with

new technologies. These workshops seek to reduce the gender gap and train women in rural areas for entrepreneurship and access to information.

The need to incorporate women in new labour markets in order to meet the demand for qualified workers in the regions is highlighted by many energy institutes, industrial and business associations. Therefore, digital inclusion as well as gender-just policies and equal opportunities are essential to develop and strengthen new economic sectors. At present, new energy and technology companies in A Coruna, together with the existing ones, incorporate diversity management and inclusion as a key element to connect talent and grow as companies, ratifying their commitment to equal treatment and employment opportunities, by approving Equality Policies that intend to offer new job opportunities to women and can help to eliminate wage gaps.

6.4 Economic and infrastructural peripheralisation

Summary of the challenge

Economic and infrastructural peripheralisation is an increasing concern in some of the investigated regions, including Lusatia, Sulcis, Silesia, Rhineland and Brindisi. In some cases, mass outmigration and economic processes associated to deindustrialisation have been accompanied by a decline in transport and public service infrastructure. Peripheralisation is, so to speak, the flipside of growth, innovation and centralization processes. The so-called peripheral areas are typically struggling with economic decline, population loss and diverse social problems (Leibert & Golinski, 2016). Peripheralisation is also intertwined with labelled stigmatisation processes that are consolidated in viewing these areas as lagging behind and backward orientated(Mihaly, 2022; Leibert & Golinski, 2016). Furthermore, Peripheralisation and an increased outward mobility of the younger – and in some case study areas female population- can be seen as mutually reinforcing phenomena.

In Lusatia, the experience of massive unemployment and outmigration alongside weak public finances and administrative restructuring left the region exhibiting strong peripheralisation trends in relation to more economically strong regions, including Berlin and Dresden. On the other hand, concerns about the peripheralisation of the Rhineland region are strongly associated with the shortage of skilled workers and the cultural and economic processes involving the devaluation of mining as the main economic sector.

Poor infrastructure and low private sector competitiveness are also seen as determinants of peripheralisation in some regions. For example, the lack of adequate transport

infrastructure in Sulcis has led to the region being seen 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 infrastructure, including roads, trains and public transport. The Jiu Valley region, on the other hand, is facing a significant economic decline since the beginning of the decarbonization process in the region in the 1990s, which has in effect led to an increase in precarious and low-paid work in the region.

Gender analysis

Both the causes and the impacts of peripheralisation are gender sensitive. As aforementioned, peripheralisation is closely intertwined with outmigration and loss of economically active population. Age- and gender-selective migration patterns may not only change the demographic structure of the affected regions but also deepen sectoral labour shortages and cause cultural stigmatisation. Regarding impacts of declining infrastructure, infrastructural cutbacks have intersectional impacts on women in their roles as workers and caregivers, as well as on low-income groups and marginalised communities without effective support networks in terms of mobility, access to amenities and care, and participation in social life. Men represent most car owners and users, while women represent most of public transportation travellers, and commuting patterns are different because of the assigned care roles: Therefore, women might be disproportionately hit by limited public transport supply. Data from the regions show that, for instance in Upper Styria, the (insufficient) structure of urban planning forces people to take their own car and some municipalities subsidised the construction of parking lots. In Upper Nitra, stakeholders decided to finance a high-speed motorway instead of public transport.

Mobility-related strategies should thus pay particular attention to women’s and excluded groups’ mobility needs. In this sense, a strict top-down approach is seen critical as top-down decision-making processes commonly follow a gender-neutral approach that fails to address gender equality and does not refer to gendered differentiated impacts of policies.

6.5 Relauching/saving the energy sector

Summary of the challenge

Another significant challenge in the regions investigated is related to the clean energy transition itself. In this context, three types of challenges that involve rethinking the energy sector can be identified:

- The implementation of renewable energy systems that allow for the renewal and reconversion of important local industries such as the aluminium or steel industries
- The development of new activities related to energy production to maintain a competitive position as an energy region, sustained mainly on research and development
- Pressure to either reactivate temporally the fossil energy sector or to accelerate the transition in order to reduce dependence on Russian gas.

Any one of the 3 scenarios implies considerable technical and infrastructural changes, and, in some cases, there is uncertainty about the region's ability to make substantial progress in short to medium term.

Diversification of energy sources has become a top priority for many governments in the European Union. Germany's federal government is, amongst other European countries, establishing trading relationships with different suppliers of natural gas, as well as building LNG terminals to receive imports by sea and establishing a "hydrogen alliance" with Canada to import hydrogen fuel. Energy efficiency (energy-saving technological progress) needs to be accelerated while on the other hand the economic activity needs to reduce its energy intensity.

Gender analysis

Transforming the energy sector has a direct relationship to gender. The energy sector has been traditionally male-dominated, yet the energy transition is an opportunity to address low women's participation in the sector. Indeed, with a 32% female share, the renewables sector already employs significantly more women than the conventional energy sector(IRENA, 2019). However, the sector is still far from gender equality as gender pay gaps prevail and women continue to perceive entry barriers mainly related to the perception of gender roles and social norms that erode girls' and women's confidence, interest and willingness to engage in STEM subjects(UNESCO, 2017). Therefore, it is crucial to provide students with early experiences that demonstrate to both girls and boys that they can succeed in these fields(Cheryan, Ziegler, Montoya, & Jiang, 2017).

Training programmes should address gender equality.In A Coruña, for instance, the training programmes for future jobs in the renewable energy sector favours former industry workers (mainly men) on grounds of fairness as they have lost their jobs.

However, this policy might end up reproducing employment segregation patterns of the past. The energy transition must carefully consider the fundamental differences in education levels and employment opportunities between women and men, and the socially determined "gender" of the (renewable) energy and industry sectors, that might hinder women from studying these topics and applying for those jobs even though they represent the economic future of their region.

Overall, even though the speeding up of regional economy transformations could hold new job opportunities and participation of women, policy makers in the fields of education, business and gender equality need to implement clear action strategies and measures to advance gender equality in this area.

6.6 Economic diversification

Summary of the challenge

Shifting the economy away from just one income source (the coal and carbon-intensive industry) towards several income sources by entering, expanding and strengthening different economic sectors and markets is considered a key challenge in most investigated regions. The decarbonisation process has either stopped, dramatically reduced, or put at risk the (economic) activities within the coal and carbon-intensive industry. This led to a loss of direct and indirect jobs with a chain effect on workers of all activities linked to the coal or carbon-intensive industry and has a strong impact also on receptive structures and all activities that used to work with this sector. Sectors such as tourism, the chemical industry or R&D intensive industries are emerging as alternative sectors in the regions.

Most of the investigated case study regions and their regional economies went through fundamental changes in the past years. Upper Nitra, for example, is heading towards decarbonization and decentralization, and the new economy provides already enough employment opportunities and helps to balance losses from the gradual ceasing of the mining operations. Regarding gender, the case study states that the transformation to a new sustainable and decentralized economy based on SMEs might provide more job opportunities for women and for a more gender-balanced labour market.

Gender analysis

Given the gendered structure of the economy and workplaces, the choice to prioritize certain sectors over others will affect women and men differently. Some regions such as Lusatia, Sulcis, Brindisi, A Coruña, and Rhineland are trying to foster the tourism

industry. Tourism is usually seen as a window of opportunity for women, but its development is slow and was abruptly stopped with the Covid-19 pandemic, delaying women's employment opportunities even further. Furthermore, as stated in the Lusatia case study, "a preference for big industry as a pillar of structural change and "well-paid industrial jobs" (a key factor for the unions) reinforces the status of male-dominated professions over other potential economic sectors."

While the opportunities for women to participate in the labour market might increase with economic diversification, the burden of private and care responsibilities, the unpaid work, still rests largely on their backs. Women's increase in working hours does not automatically lead to a more balanced sharing of domestic and caregiving work between women and men. Therefore, when talking about structural change as an opportunity to redress gender segregation in sectoral employment, it is key to consider barriers to enter different sectors, not only related to education but also to the distribution of care work. In general, to ensure equal access to created job opportunities, girls and women need more support to enter traditionally male-dominated fields through education, more equal recruitment process and enabling workplace policies.

6.7 Climate change adaptation

Summary of the challenge

Fields relevant to climate change adaptation such as water management, land use planning and balance of green-and-blue spaces in urban settings are of increasing concern in the investigated regions. Specifically, the German case studies pointed out the multidimensional impacts of environmental degradation and the pressure it exerts on the territory. The Lusatian CCT has been beset by drought since 2018 and projections indicate that climate change will lead to decreased water supply in the summer months across Central and Eastern Germany, which in turn, jeopardizes the availability of drinking water supplies and sustainable and regenerative land use (forestry, fisheries and farming) under water stress. Similarly, in Rhineland the region is facing increasing tensions in water management due to an increasing scarcity of water supply due to lignite mining and climate change.

Gender analysis

Although an assessment of the effects of climate change in the regions is beyond the scope of the project, it is essential to bear in mind that climate change impacts are inflected by gender. An analysis of the climate-gender nexus sheds light on differentiated

emission patterns, vulnerabilities to the impacts of climate change, perceptions and attitudes towards climate change, and capabilities to adapt (depending on access to and control over assets)(Pearse, 2017).

As already stated, gender is also relevant to climate governance and policies. The abovementioned differential factors should be an integral part of climate change policy debates. Women's participation and meaningful involvement in climate change decision-making is key for socially just climate policies. Yet, while women are highly present in civil society and are leading agents of change in the youth climate movement, they remain underrepresented in international climate negotiation, policymaking, and corporate decision-making around the transition to carbon neutrality(Heffernan, Heidegger, Köhler, Stock, & Wiese, 2022).

6.8 Ecological damage remediation and land rehabilitation

Summary of the challenge

The coal mining and carbon industrial history has shaped the landscape and environment of the territories investigated and, in a post-mining scenario, the policies and strategies for remediation and land rehabilitation are an important concern for environmental activists, policymakers and the local population. In some areas, such as Sulcis, the CCT is disseminated with "environmental scars" because of coal extraction. Many polluted and contaminated sites need environmental remediation interventions. Some parts of the coast are also contaminated and hazardous to health. Similar concerns are found in the cases of Brindisi, Rhineland and A Coruña.

Gender analysis

Women play an important role in environmental conservation by e.g. engaging in more environmentally friendly behaviours than men do. (Tindall, et al., 2003). A Coruña case study noticed that women in different positions in local administration and environmental groups are playing an important role in raising awareness about the environmental damage caused by the industry and how to restore the natural landscape of the region.

While many interventions are planned or in place to reclaim and restore the landscape of former industrial or mining sites in the regions, ensuring women's participation in land-use planning is crucial for sustainable development. An empirical study about changing land use practices showed that gender plays a big role in decision making about alternative land use options and that females are more active and dynamic than men in responding to external opportunities shaping landscapes

6.9 Participatory governance

Summary of the challenge

Weaknesses in coordination and cooperation across governance levels and gaps in transition policies and schemes were reported in several case studies. Two situations were mainly highlighted: first, the lack of a clear and collectively constructed vision for the transition and regional trajectories and, second, prevailing tensions among stakeholders, accompanied by limited involvement of affected groups.

Gender analysis

Compared across all case study regions, the governance of the transition appears gender neutral at first sight, especially regarding discursive approaches. For instance, in the South Wales case study, gender has not been featured strongly in the analysis of the discourse of the energy transition, decarbonisation or the move towards net-zero carbon. There is a strong emphasis on promoting a 'just' transition across Wales, but details as to who may be included, or even excluded, in this framing are not strongly specified.

In general, the design of participatory mechanisms has not considered and addressed gender inequalities and power asymmetry and the resulting plans and strategies are formulated with a gender-neutral approach. As presented in the analysis of the socio-ecological and technical component, women are underrepresented in key decision-making positions in most of the regions. This is well exemplified in the case of Upper Styria and Stavanger with a lack of women in the interviews, which reflects the dominance of male stakeholders in the transition governance.

Broad participation is essential for a successful transition strategy. If decision-making mechanisms do not ensure that a broad range of stakeholders actively participates in the governance process, there is a risk of reinforcing existing inequalities. If decision-making mechanisms do not ensure that a broad range of stakeholders actively participate in the governance process, there is a risk not only of reinforcing existing inequalities but also of failing to harness alternative visions and knowledge beneficial to the achievement of the transition(Kronsell, 2013).

6.10 Increasing riskof poverty and social exclusion

Summary of the challenge

The costs and benefits of the structural transformations that the regions in transition are undergoing are not evenly distributed across the population but certain groups and communities are disproportionately affected. Some regions are still dealing with the adverse socio-economic effects of the previous decline of the coal sector (such as the closure of mines in the Jiu Valley in 1997 or the "Wende" in Lusatia in the 1990s). Loss of employment and income, increase in the cost of living, and low purchasing power appear as main concerns.

In the Spanish case study region of As Pontes, the town council has highlighted the need for greater attention to the particular social needs arising from the closure of the thermal power station, which was the main source of employment and income for the municipality. These needs are not being adequately addressed and have affected employment, the unsustainability of the area, housing prices, council services and the progressive abandonment of the area with a consequent decline in the population. The local administration is assisting vulnerable groups, but its sources are limited. The national security system is assisting people who have lost their jobs due to the closure of the power plant.

Gender analysis

From a distributional justice approach, the risks for three main groups should be considered: (1) those directly affected by the closure of the industry, i.e. employees in the coal sector; (2) those indirectly affected by changes in the local economy such as employees in the retail sector and in in companies along the coal value chains demand may be drastically reduced; and (3) those disproportionately affected by shifts in energy costs or provision such as low-income households(Piggot, Boyland, Down, & Raluca Torre, 2019).

These groups are not homogeneous, and an intersectional approach is crucial for the recognition of specific vulnerabilities and risks. Evidence shows, for example, that in past transition processes in the German context the effects of unemployment were particularly adverse for unskilled workers from the producing industries, migrants, and young people under the age of 25, but they were not explicitly recognised as affected stakeholders in the transition process(Arora & Schroder, 2022). Despite not being explicitly addressed in transition strategies, it is crucial to consider the gender dimension of poverty risk and social exclusion. Evidence shows that women feel these financial shocks more intensely than men, as they earn less and endure more financial barriers. Pay gaps and disparities in the distribution of care work emerge again as a key determinant of increased risk for

women. The case of South Wales provides a good illustration of differential risks as the reported concerns about the rise of food bank utilisation and homelessness has a severe gender dimension knowing that the majority of homeless people in temporary accommodation in the UK are women. This can be explained in part because of exacerbated vulnerability to economic shocks, domestic abuse, or being a single mother. Nevertheless, in Wales, there are only very few support centres for homeless women (none in Port Talbot) and almost none has female-only facilities.

Against the backdrop of steep rises in energy prices, it is paramount to consider the risk and impacts of energy poverty from an intersectional approach (considering socio-demographic factors such as gender, age, income). Women and women-led households are disproportionately affected by energy poverty. Therefore, energy frameworks and policies need to ensure a more gender-equal and fair access to energy services at both technical and financial levels.

6.11 Health concerns

Summary of the challenges

There are well-stablished concerns about the effects of mining on human and environmental health in the regions, especially related the long-term effects of exposure to hazardous materials and air pollutions for both miners and surrounding communities.

The regions studied have increasing pressures on their public health systems because of reductions in health infrastructure investment (and related to peripheralisation) and increasing needs of healthcare for an ageing population. The Upper Styria region illustrates this point clearly. In the region, the failing of structures for the healthcare system has manifold effects on the older population as well as on mostly female caregivers and became highly problematic during the Covid-19 pandemic. The Upper Styrian region has been affected by hospital closures for years. Health care and provision of medical assistance and elderly care in Austria is in the hands of the federal states and the regional population is mainly dependent on external decisions. Because of the failed provision of elderly care, persons in need of care were resettled to other nursing homes in the federal state Styria, which are relatively far away from the CCT due to the mismatch of caregivers and people to be cared for. Thus, elderly people suffered from being torn out of their familiar surroundings. This situation is becoming increasingly visible and is perceived as a longstanding consequence of savings that were imposed on the regional health care system.

Gender analysis

Downsizing of the health systems might impact women and men differently as they have differential exposures and vulnerabilities to disease and different mortality and morbidity outcomes. Thus, it is important to look at which services are being closed and how it impacts the response to specific gender needs. Moreover, the global lack of health care may end up overburdening women.

Energy poverty, as already explained above, might play another significant role in health issues in some of the investigated regions. Illness and chronic diseases can affect the amount of energy required by a person (e.g., to refrigerate insulin or to use an oxygen machine) and, as a result, be a predictor as well as an outcome of energy poverty(Jessel, et al., 2019). As already explained, women are more likely to be affected by energy poverty, which in turn interferes with their health and well-being.

6.12 Right-wing populism

Summary of the challenge

Rising right-wing populism is posing challenges in some of the investigated regions. For instance, feelings of political disaffection have made the region of Lusatia into a fertile ground for right-wing populism that manifests itself mainly in anti-immigration protests, the growing affiliation to the right-wing AFD party, and protests against health policies. In the region, right-wing support coupled with the homogenisation of the population resulting from high outmigration of women is likely to reinforce intolerance, anti-democratic attitudes, and xenophobia (F wie Kraft, 2020).

Moreover, the uncertainty generated by the decarbonisation process is exploited by populist movements as a trigger for nostalgia and remembrance of the prosperous past associated with mining. This situation, in effect, is also based on the idea of re-establishing traditional (gendered) roles and power dynamics.

Gender analysis

The relationship between right-wing populism and gender issues is increasingly becoming a field of research in political science and is showing that the narrative of the right-wing movements is fundamentally laden with references to gender (and its intersection with race and class). In general terms, the concept of gender and feminist policies are used in the public debate as a threat to family and traditional values. As a results, it is not surprising that rising right-wing populism is associated with restrictions

on women's and girls' rights (particularly reproductive rights) and stigmatisation of gender non-conforming people and members of the LGBTQIA+ community.

CHAPTER 7

INTEGRATED FINAL RESULTS AND CONCLUSIONS

7. Final results and conclusions

7.1 Introduction

The methods used for this report – i.e., literature review, context analysis, gender mainstreaming and challenges analysis – provide evidence about the relevance of gender in the transition towards a low-carbon economy. Sustainability transitions are **gendered.** Gender norms and relations are closely related, on the one hand, to the distribution of the impacts and benefits of the transition and, on the other hand, to the agency and meaningful participation of all social actors in governance of the transition.

The collective analysis of the data allowed the task team to identify a set of emerging themes and single out four key messages. Those messages reflect different levels of exclusion of gender in the territorialisation processes of coal and carbon intensive regions. First, the interpretative level gives an account of the meaning of gender in the territorial transition. Second, the political level discusses the issue of gender in territorial and transition decision-making. Third, the operational level answers the question of what is happening to women in the regions. Finally, the symbolic level accounts for the relationship between gender equality and territorial redefinition.

7.2 Interpretative level: gender-neutrality in societal interpretations

The ENTRANCES research showed that the transition processes are, in general, still perceived as highly technical and economic processes with little relation to gender and most narratives continue to focus heavily on technological aspects, which implies a risk of neglecting aspects of social justice, inclusion, and gender equality. Even when asked specifically about gender inequalities and challenges in the frame of the transition, many social actors find them difficult to identify. This is illustrated for example, by the absence of the gender dimension in the narratives of the clean energy transition (analysed in the socio-political component) and the governance of the transition (analysed in the socio-ecological and technical component) as well as by the low inclination of the actors to relate gender impacts to the different strain situations in the territory (analysed in the socio-cultural component).

Similarly, transition policies and strategies are normally formulated with a gender-neutral approach, which means that they are based on the assumption that a given situation impacts equally women and men and therefore a good policy also benefit them equally (Khamati-Njenga & Clancy, 2002). However, there is growing evidence that these logics make invisible the differentiated needs of men and women, do not address the underlying

mechanisms of discrimination that reinforce gender inequality and fail to recognise the different potential that men and women bring for a successful transition.

The absence of gender issues as a key aspect for achieving a just transition is also evident in policies, action plans and other regulatory frameworks from the local level to the EU level. For example, despite the fact that the Gender Equality Strategy 2020-2025 of the European Commission sets out the specific objective of enhancing gender mainstreaming by "**systematically including a gender perspective in all stages of policy design in all EU policy areas, internal and external**"(emphasis in original)(European Commission, 2020, p. 2), gender is far from being systematically integrated into sectoral climate and energy policies (see, e.g., Hefferman, 2022). National plans, such as the National Energy and Climate Plans (NECP), in most cases simply ignore any gender or intersectional aspect when addressing the key dimensions for achieving energy and climate targets or do not introduce specific gender measures.

Overall, the results of this report suggest primarily the need for gender-specific research in the study but also in planning of sustainability transitions in order to overcome gender neutrality trap. Collection of gender-disaggregated data is a crucial step, but data alone is not sufficient to ensure gender- responsiveness of research and policies. Gained knowledge needs to be translated into truly inclusive responses and transformative policies. Two main issues need to be consider in this regard:

- Gender disaggregated data, quantitative and qualitative, with an intersectional perspective (e.g. race, gender identity and sexual orientation, ability, class, age) should be systematically collected at the local, national and EU levels, analysed and included in researches, policies and strategies;
- Mainstreaming gender across energy policies, directives and strategies at the EU, national and local levels. This can be done by integrating:
    - gender equality into the objectives of strategies,
    - gender action plans and inclusive indicators allowing gender impact assessment, gender budgeting and gender responsive monitoring and evaluation.

7.3 Political level: underrepresentation of women in territorial and transition decision-making

From the gender mainstreaming in the five ENTRANCES components, we can conclude that the lack of attention to gender in the transition is also visible in the underrepresentation of women in the interviews and focus groups conducted in the frame of the project. This reflects a representation of reality as women endure unequal participation in decision-making positions and in the labour market.

The analysis of the Energy Transition at the Political Administrative Region level shows that, in general, women remain underrepresented in decision-making in both public and private institutions. Underrepresentation has two distinct but interconnected facets: on the one hand, the nominal parity in decision-making positions across the political sphere (descriptive representation) remains difficult to achieve in several investigated regions. On the other hand, substantial representation of women's interest and expertise on the energy-gender nexus is limited. When talking about representation, it is key to consider that while descriptive representation is fundamental to the legitimacy of institutions, equality in numbers itself does not guarantee the gender-sensitivity of policies and measures. As stated by Kronsell, in climate and energy governance, "for equal representation to add substantial input, it requires the input from those actors who are knowledgeable about gender aspects on climate issues"(Gender and transition in climate governance, 2013, p. 12). Therefore, to develop gender-sensitive transition policies, it is key to ensure equal participation of women, at the decision-making level, in political institutions and in the male-dominated energy sector, by enforcing quotas for better representation of genders (Women in Board Directive, 2012, EU Commission) and involving gender expertise (women's organisation, institutions etc.).

7.4 Operational level: the de-facto exclusion of women

The evidence presented in this report provides information on how situations affecting the territories had differently affected men and women. Women in regions with dependence on a male-dominated economic sector such as mining or carbon-intensive industries face structural barriers that, in turn, motivate them to leave their regions in search of educational and employment opportunities. However, more gender-specific research is needed to understand gendered migration patterns and how those relate to the opportunities the region offers. In order to avoid the *de facto* exclusion of women from their regions, it is necessary to radically rethink that happens at the community level from a gender perspective and examine the interconnection of gender with the diverse social phenomena affecting at territory, as demonstrated in the analysis of challenges and coping strategies.

7.5 Symbolic level: the relevance of gender in reterritorialisation processes

The regions investigated face territorial stigmas either from within or from the outside. Stigma may be associated with a negative image of the region's economic situation, or with environmental problems associated with the coal sector (pollution) or, in some cases, with political aspects. Moreover, in some regions, there is a persistent feeling of nostalgia for the socio-economic conditions achieved in the boom periods of coal or industrial production. In this context, symbolic aspects such as a “strong mining identity” -identified e.g. in the Silesia and Jiu Valley case studies- have traditionally had an intrinsic relationship with gender as the characteristics of the employment in the coal or carbon-intensive sector influenced gender structures, norms and roles in both the private and public sphere.

Breaking the stigma and initiating reterritorialization processes will require the re-signification of the territory and the creation of new territorial symbols or at least a fresh re-interpretation of the old ones. This implies actions in the socio-economic, political-institutional and symbolic-cultural spheres of the territory and also acknowledging the role that gender plays in the success of such actions is fundamental.

7.6 Conclusions

The four levels of exclusion analysed above show how the exclusion of women in coal and carbon intensive regions in transition is a complex and multidimensional phenomenon. Taken altogether, gender neutrality in societal interpretation, the exclusion of women from decision-making, the drain of women from the territory and biased territorial symbols, define an adverse context for women to engage in the processes of territorial change. A product of the exclusion dynamics is thus the lack of social space for women for fully participating in shaping the territorial transitional trajectories, which turns out to be a waste of human capacities and energies for re-thinking the territory. In this respect, the exclusion of women can be considered among the main key factors of deterritorialisation of coal and carbon intensive regions. Without the full inclusion of both men and women at all the level analysed above, it will be difficult for coal and carbon intensive regions to pursue an effective re-territorialisation process.

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