ENTRANCES

ENergy TRANsitions from Coal and carbon: Effects on Societies

D4.6 South Wales Region Case Study Report

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Abbreviations

CCT	Coal and Carbon Territory
CET	Clean-Energy Transition
ENTRANCES	ENergy TRANsitions from Coal and carbon: Effects on Societies
EU	European Union
EC	European Commission
GDP	Gross Domestic Product
GVA	Gross Value Added
LMA	Labour Market Area
MAF	Multidimensional Analytical Framework
NACE	European Classification of Economic Activities
PAR	Political Administrative Region
SSH	Social Sciences and Humanities
WP	Work Package

Executive Summary

ENTRANCES is a three-year project funded by the European Union's Horizon 2020 research and innovation programme. The project explores cross-cutting issues related to the "Social Sciences and Humanities (SSH) aspects of the Clean- Energy Transition" (call: LC-SC3-CC-1-2018-2019-2020). The 13 case studies of coal or carbon intensive regions utilised a common approach which is summarised in Table A. The research addressed questions related to the challenges of decarbonisation, associated coping strategies, and processes of territorialisation.

Table A – Summary of the methodology

Component	Method	Approach
Socio-Cultural	Focus groups	Two focus group meetings with the same participants. Focused on residents of Port Talbot. Format and content of Focus Group designed by lead partner. Target number of participants 6. Achieved participants 2.
Socio-Psychological	Survey	Online survey of residents of Port Talbot and neighbouring areas. Questionnaire prepared by lead partners and provided to all case studies. Target responses 50. Achieved responses 53.
Socio-Political	Text research	Documentary analysis of policy strategies and policy documents, media reports and grey literatures. Target number of documents 50. Achieved sample 52.
Socio-Economic	Quantitative data collection	Requested data was provided to IWH, who took responsibility for the analysis of this data.
Socio-Ecological & Technical	Semi-structured interviews	Interviews with policy representatives and other knowledgeable actors from private sector, civil society and third sector. Questionnaire prepared by Lead Partner. Target number of interviews 6-10. Achieved sample 8.

The South Wales Case study evaluated the town of Port Talbot and contiguous area where the steel-plant is significant to the UK industry, employing 4,000 direct employees of an estimated 24,000 steel industry jobs in the UK. In the region there are a further 3 – 4,000 agency and contract workers and up to an estimated 4,000 additional indirect jobs. However, this carbon-dependent territory contributes an estimated 47% of 2018 industral emissions in Wales and 15% of overall emissions in Wales emanate from the Tata steel plant in Port Talbot.

Port Talbot and the surrounding areas have been subject to significant and ongoing economic restructuring since the 1980s, with a high level of job losses from the steelworks and the closure of coal mines. These factors have adversely shaped the socio-economic situation in the town with limited opportunities for career advancement and reduced employment opportunities. Further, in 2010, the steel industry contributed around 3% of Welsh GVA, the largest contribution of any single private sector employer (Pinto and Jones, 2012)[1], showing the integrality of the steel industry in Wales. This background highlights how Port Talbot's future is entwined with the decarbonisation of

[1] Pinto, V. And Jones, C. (2012) The economic impact of Tata Steel in Wales. Welsh Economic Review, 23.

the steel industry. This therefore makes the findings of this research important to a number of audiences – local and national government actors, businesses, and citizens.

Key findings

The socio-cultural analysis identified 18 key strain situations in the region. The greatest proportion of strain situations were identified from within the past two years such as the development of Y Bryn Windfarm and challenges with regional political identity. Other strains have been present in one form or another for several decades such as the economic dependence on the Tata Steelworks, loss of community infrastructure, and outmigration. Significantly, populism and gender disparities were not identified as strains within the region. However, the research highlights gender-disparities in wages that suggest structural inequalities in the region. Most strains belonged to the financescape, with many strains forming part of multiple strain scapes.

The socio-psychological component that assessed regional outlook established a very strong sense of place attachment whilst at the same time noting that Port Talbot is not a unique place. Respondents valued strong social ties, close-knit family, and had a sense of satisfiaction with their current home. Respondents report a strong sense of personal resilience and ability to adapt, with an optimistic outlook on life. Almost three-quarters reported that they are not easily discouraged by failure. This perhaps reflects the outlook of a community that has been sugject to economic restructuring for many decades.

Decarbonisation is viewed positively in South Wales. The socio-political analysis found, however, that there is a dominance of technology-centric net-zero narratives in the discussion of Port Talbot and steel decarbonisation. This is noteworthy in the context of sustainability transition as it outlines the positive momentum for change, but at the same time a focus on technology has the potential to limit the extent of transformative change that will be embraced. The limited economic complexity with a reliance on steel as an employer poses a risk to “just transition” that addresses structural inequalities. Evidence shows that there is a strong focus on the local community by Welsh and Port Talbot governance actors, making this research important to future policy considerations.

The socio-ecological and technical components identified a range of actors that are undertaking purposive actions around decarbonisation – different layers of the Welsh Government, the public sector, and universities amongst other civil society organisations. There are several collaborative projects that seek to drive forward Net Zero initiatives. However, concerns were raised that not all sectors of society that will ultimately contribute to the transition are engaging, and this was attributed to lack of knowledge and capacity. These factors are exacerbated by the ongoing challenges faced by the region. Importantly, experimentation is taking place but it is noteworthy that ENTRANCES research in South Wales identified a need for a clear roadmap that is supported by extensive system thinking to co-ordinate decarbonisation to assure a positive outcome.

CHAPTER 1

INTRODUCTION

1 Introduction

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

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

One of the key aspects of the project was thus the development of 13 regional case studies dedicated to just as many European coal and carbon-intensive regions in transition.[2] All the case studies were based on the application of the same Multidimensional Analytical Framework (MAF) within the project to grasp the multi-faceted aspects of the de/re-territorialisation processes ongoing in the regions. This report is the one dedicated to the case study of South Wales that was developed by Cardiff University.

South Wales, more specifically Port Talbot and contiguous areas, is relevant for the ENTRANCES study owing to the significant importance of steel-making to its economy. Port Talbot forms part of the municipality of Neath Port Talbot County Borough Council, one of the 22 Local Authorities in Wales. Owing to data requirements the full CCT is the Neath Port Talbot local authority area. For statistical reasons, the Labour Market Area, defined by the ENTRANCES study team is considered to comprise the wider territory of Swansea, Neath Port Talbot and Bridgend. The Political Administrative Region (PAR) is defined as Wales, owing to the importance of devolution, although many powers are not devolved and so the UK would form the political unit in these cases.

Port Talbot has been identified as the focus of the Coal and Carbon Territory (CCT) owing to the significant importance of steel-making to its economy. The dependence of the Port Talbot economy on the steel plant is well-documented, as is the significance of the Port Talbot plant to steelmaking in Wales and the UK. Port Talbot has a long legacy of metal working. The origins lie in the opening of operations by the English Copper Company in the Cwmavan valley in the 1770s. In the 1880s these works were closed, and the focus of steel making migrated down the valley to the coast at Port Talbot, where a docks facility had been established in the 1830s. Between 1901 and 1926 two steel plants opened in Port Talbot, with a third (known as the Abbey Steelworks) opening in 1951. Closure

[2] https://entrancesproject.eu/project-deliverables/

of the two original plants in the 1950s and 1960s meant that the Abbey Steelworks (now known as Tata Steel Wales) dominated the town. In its heyday the Abbey Steelworks was the biggest steel plant in Europe and the largest employment site in Wales, with 20,000 employees. References to 'steel plant', 'steel making' or 'Tata Steel' in this report all refer to the Port Talbot plant of Tata Steel Wales.

Currently, the steel plant directly employs some 4,000 workers (out of 24,000 steel industry jobs across 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 CO_2 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.

The report is structured into seven chapters: Chapter 2 presents the **conceptual, methodological framework** adopted for the development of the case study, including information on how [Name of the region] has been operationalised in different interrelated units of analysis. Chapter 3 is focused on **the analysis of the South Wales Coal and Carbon Territory**, i.e. the territory heavily dependent on fossil-fuel-based industries or the extraction of fossil fuels themselves, with the lenses of the socio-cultural and socio-psychological dimensions. Chapter 4 provides an overview of the **socio-economic situation** of the region. Chapter 5 covers the **analysis of the Clean Energy Transition** underway at the regional level through the lenses of the socio-political and socio-technical dimensions. Chapter 6 presents the main **territorial challenges, associated coping strategies and gender-related aspects** and discusses them in the light of all the dimensions included in the study (i.e. socio-economic, socio-cultural, socio-psychological, socio-political and socio-technical dimensions). Finally, some conclusions formulated by the case study team complete the South Wales case study report (Chapter 7). A fuller assessment of the empirical findings that underpin Chapters 3 and 5 can be found in an accompanying Annex: Thematic Analyses for South Wales.

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CHAPTER 2

CONCEPTUAL AND METHODOLOGICAL FRAMEWORK

2 Conceptual and methodological framework

2.1 Case study objective(s) and organisation

2.1.1 The case study objective(s)

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

1) What are the principal socio-economic, socio-technical, socio-ecological, socio-cultural, socio-political, socio-psychological, and gender-related challenges facing coal and carbon-intensive regions in transition? What coping strategies have emerged in recent years?

2) What variables have been most influential in the appearance of the *deterritorialisation* process and how do they interact? What kinds of strategies are the key determinant of success in terms of *re-territorialisation*?

3) What policies or combination of policies would be most appropriate to recover the ties of the territory and community in coal and carbon-intensive regions while fostering their transition toward clean energy?

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

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

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

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

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

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

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

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

- *RF2: Structural Change in the Labour Market Area (LMA)*. The case study has investigated the change in the socio-economic structure over the last three decades. This is an essential dimension for understanding the underlying dynamics that affected and that still affect the CCT at the structural level. To investigate structural change, *Labour Market Area (LMA)* was established as a secondary unit of analysis. The Labour Market Area was defined as the area including the Coal and Carbon Territory in which a bulk of the labour force lives and works.

- *RF3: The clean-energy transition in the Political Administrative Region (PAR).* If RF2 investigates medium and long period dynamics that are affecting the CCT, the focus on the clean-energy transition ensures that the research considers the incipient change triggered by the purposive transformation of the energy system that is promoted to deal with climate change. Such objectives have been recently accelerated through the European Green Deal. In each regional case study, the clean energy transition has been observed at the level of the Political Administrative Region (PAR), i.e. the administrative region encompassing the Coal and Carbon Territories more closely associated with governing the energy transition through a directly elected legislature.

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

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

Box 1: The three units of analysis

Following the structure of the case study, three units of analysis have been delineated in the South Wales case.

Figure 1 – Case delineation

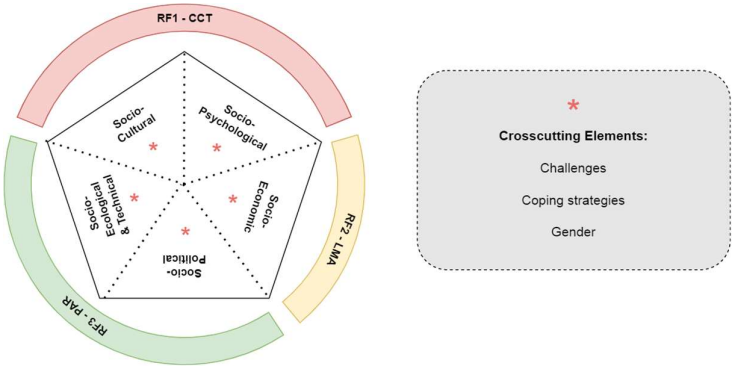
Coal and Carbon Territory | Labor Market Area | Political Administrative Region

Created with Datawrapper

2.2 Overview of the Multidimensional Analytic Framework

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

Figure 2 – Overview of the multidimensional analytic framework: research foci, components and crosscutting elements



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

2.2.1 Socio-cultural component

Domain of enquiry

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

Concepts

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

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

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

Change, resistance to change and ambivalences. The dynamics of change, resistance to change and ambivalence in the CCT are described following four different dimensions of change: the territorial trajectory, by analysing continuities or ruptures; the territorial boundaries, by analysing the

distinctiveness or alignments of the territory; the territorial governance by analysing endogenous or exogenous governance; by territorial symbols, analysing both territorial stigma and territorial myths.

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

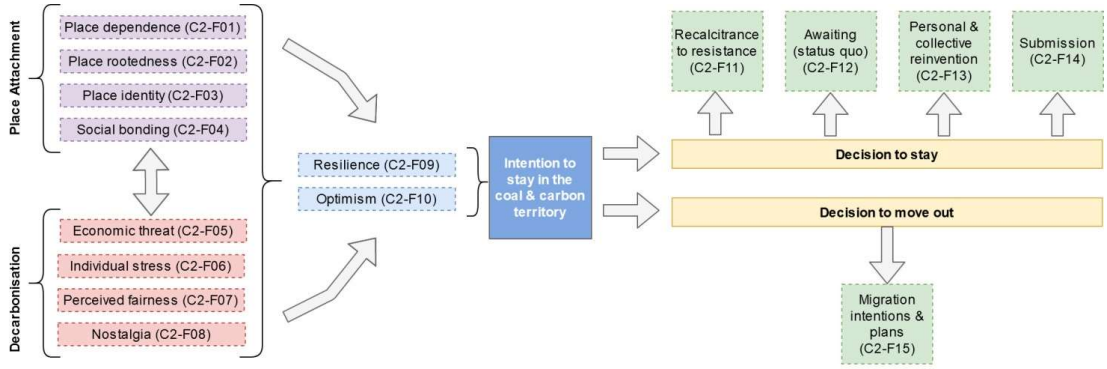
2.2.2 Socio-psychological component

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

Concepts
The concept of place attachment has been used by scholars to understand the bonds humans share with the physical environment. Leveraging on an integrated model of place attachment (Raymond et al., 2010), the component articulates place attachment in four dimensions: a) place dependence, reflecting the functional dimension; b) place rootedness, reflecting the cognitive dimension; c) place identity, reflecting the symbolic dimension and d) social bondage, reflecting the emotional dimension. *Resilience*. The term resilience, in psychology, refers to positive adaptation in the face of stress or trauma (Luthar, Cicchetti, and Becker, 2000). In the socio-psychological component, the study of resilience is used for achieving a more comprehensive understanding of the response adopted by individuals to the challenges faced by the citizens more directly exposed to decarbonisation in the coal and carbon-intensive regions in transition.*EVLN approach*. The possible copying strategies of citizens are identified in this component based on the “Exit, Voice, Loyalty, Neglect” (EVLN) theory, initially proposed by Hirschman (1970) to study responses to decline in firms, organisations, and states (EVL theory). The theory affirms that when dissatisfaction is experienced in a relation – in our case in territorial belonging - there are a few possible and interrelated coping strategies from the individuals.

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

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



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

Methodology

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

2.2.3 Socio-economic component

Domain of enquiry

The socio-economic component focuses on structural change in the economy, i.e., the reallocation of economic activity across different economic sectors (Herrendorf, et al., 2014) and regions. Structural change can lead to a change in a region's economic, financial and demographic composition. The component is thus focused on a descriptive analysis of technological progress, demography, economic inequality, employment and economic activity based on various data sources over the last three decades. The socio-economic component focuses on the Labour Market Area but also relies on the other units of analysis as a reference and as a comparison.

Concepts

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

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

2.2.4 Socio-political component

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

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

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

- *technological adjustment*, the impact constituency – the people who lose when a new technology is introduced or when a technological shift is ongoing – engage in strategies that try to compensate for the loss of social prestige or social power

- *technological reconstitution*, the impact constituency tries to reverse the meaning of the technology imposed through regularisation. Differently from technological adjustment strategies, the strategies related to technological reconstitution attack the foundation of technical regularisation, and activate a self-conscious "revolutionary" ideology aimed at producing a symbolic inversion and antisignification of the technological regularisation process.

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

2.2.5 Socio-ecological and technical component

Domain of enquiry
The socio-ecological component provides an overview of the capacity available in the case study region to shape its decarbonisation pathway. The focus on transformative capacity allows us to

discern how far a region is actually able to deviate from its current (carbon-intensive) path toward sustainable outcomes.

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

Concepts

Transformative capacity is strongly influenced by the governance of the regional decarbonisation or clean energy transition in question. Three **governance and agency** components are critical to the ability of a regional development apparatus to foster the transformability of a system: the inclusiveness and multiformness of governance arrangements (C1); polycentric and socially embedded transformative leadership (C2); and the empowerment and autonomy of relevant communities of practice (C3). These elements are preconditions for the transformability of a system: there needs to be connectivity and responsiveness built into governance, effective leadership able to bring people together around a vision, and actors empowered to experiment and innovate. These three attributes must be developed by stakeholders in **capacity development processes** to enhance their transformative potential, including enhancing understanding of the systems of which they are a part (C4), engaging in participatory visioning and alternative design scenarios (C5), experimenting with novel solutions to social needs (C6) and ensuring that these innovations can be embedded (C7). Ideally, this can be seen as a learning loop, where system(s) understanding helps inform visions and pathways, which in turn orient experimentation, with successful innovations being embedded and better system understanding resulting from this process. These processes should be fed back into governance through social learning (C8) as well as the effective involvement of actors at different scales (C9) and levels of agency (C10).[3]

Methodology

These components were assessed by way of mixed quantitative-qualitative interviews with various stakeholders engaged in the CET. The aim was to obtain and contrast differential stakeholder assessments of transformative capacities. A diverse set of stakeholders were interviewed, representing public, private, third and civil society actors. Respondents were asked to assess statements corresponding to each measure of transformative capacity according to whether and how much they agreed with or disagreed with the statements.[4] They were then asked to elaborate their answers in open follow-up questions, which were subsequently transcribed, coded and analysed.

[3] For full elaboration of transformative capacity and its components, please refer to Wolfram (2016, 2018, 2019).

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

2.2.6 Synopsis of the five components

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

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

Component	Research focus	Unit of analysis	Domain of enquiry	Unit of observation	Methodology
Socio-Cultural	Territorial change	Coal & Carbon territory	Stress strains in the territorial organisation	Strain Situations	Focus group mapping
Socio-Psychological	Territorial change	Coal & Carbon territory	Place attachment, Decarbonisation, Resilience and Coping	Citizens	Online Survey
Socio-Economic	Structural change	Labour-Market Area	Change in the socio-economic structure	The area as a whole	Quantitative data collection
Socio-Political	The clean-energy transition	Political Administrative Region	Narrative battles to determine the meaning and "appropriation" of the energy transition	Statements & Counterstatements	Text research
Socio-Ecological & Technical	The clean-energy transition	Political Administrative Region	capacity available in the region to shape its decarbonisation pathway	Multilevel System interaction	Semi-structured interviews

2.2.7 Cross-cutting elements

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

Challenge: In the case study we focus on the challenges faced by the CCT, i.e. from the perspective of the CCT. A challenge can be defined as composed of two elements: (i) a current situation (as the territory makes sense of it); (ii) the specific desired outcome(s) of a process intended to change that existing situation. Please note that a challenge is a social construct as the sense of the current situation only exists in a given social context (i) and that the outcome is desirable by the territory itself (ii). Depending on the state of awareness of the territory, the degree of clarity and definition of the challenges may vary a lot. In this respect, depending on the cases, the territorial challenge(s) may be rather vague or well structured (e.g. in the latter case also including indicators to assess the success in achieving the challenge).

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

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

2.3 Activities

2.3.1 Desk research

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

2.3.2 Focus groups (socio-cultural component)

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

The focus group approach transitioned to a Virtual Focus Group format owing to the circumstances of the Covid-19 pandemic in late 2021. Guidance on Focus Group participants proposed recruiting up to 6 participants who would each be involved in two Focus Group sessions. Participants were expected to speak on behalf of the community and bring knowledge and memory to the table. For balance across the case study, it was decided to recruit from the community and not to involve those who had a professional, political, academic or activist perspective that might act to frame their inputs. In practice, the case study team found it difficult to engage community members virtually. For some, the subject of the case study was not regarded as compelling or sufficiently ‘personal’ by many of those contacted, others were reportedly reluctant to use a virtual platform for the meeting owing to lack of familiarity with this approach beyond social activities. At the beginning of April 2022 the case study team decided to progress the focus group on the basis of the participants who had agreed to participate and the promise by participants to invite others. The Focus Group meetings were held on consecutive days (May 3rd and May 4th) 2022 by zoom. Each call was recorded with the agreement of the two participants, participants used pseudonyms in the recording for anonymity..

2.3.3 Survey data collection process (socio-psychological component)

The survey methodology was based on an on-line survey, using a standardised questionnaire, of members of the Neath Port Talbot County Borough Council (NPT Council) Citizens’ Panel. This approach was selected in order to engage with a representative selection of views of residents of the study area. It offers advantages over randomised telephone or online survey approaches in that panel members are preselected, broadly representative of the wider population and generally committed to contributing to conversation on issues that are of relevance to the locality.

NPT Council reviewed the survey instrument and agreed its relevance to the Citizens’ Panel. The survey was then circulated by NPT Council in accordance with its own procedures, with members of the Citizens’ Panel invited to respond if they so wished. The questionnaire and the survey approach was subject to ethical review by the Ethical Review Committee of the School of Geography and

Planning at Cardiff University, and approval was secured for the proposed approach prior to commencing the survey.

The target size for the online survey was 50 responses, as set out in the project proposal. The survey was distributed to 157 members of the Citizens Panel established by Neath Port Talbot County Borough Council. This sample was determined based on the number of Citizen Panel members registered as living in the post code districts of Port Talbot and neighbouring districts in Neath and the Avan Valley. A total of 53 valid responses were received (a response rate of 34%).

2.3.4 Socio-economic data (socio-economic component)

IWH provided the research team with a list of data requirements common to all case studies, this was gathered from a number of databases: . Where requested data was available this was encoded and returned to IWH in the requested format. IWH supplied the case study research team with the results of their analysis in June 2022. This has been incorporated in Section 3 of this report. The data was sourced from several sources: Stats Wales, UK Government documentation, NOMIS, ONS, www.regionstatistik.de and www.energy-charts.info.

2.3.5 Text analysis (socio-political component)

Fifty-two documents were analysed in total, primarily drawn from government policy or strategy documents, with a focus on Welsh Government but also including local and UK governance scales. Documents were also sourced from media outlets, environmental and business groups and other actors (including academia and thinktanks).

The analysis identified the use of key words and terms, the development of different framing narratives and considered the existence of three potential constituencies (“imposing”, “coping” and “resisting” stakeholders). All data was encoded and analysed using the Nvivo suite of qualitative research tools. Some 501 statements were coded.

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

Mixed quantitative-qualitative interviews with various stakeholders engaged in the CET have been conducted. The aim was to obtain and contrast differential stakeholder assessments of transformative capacities. In total, eight stakeholders were interviewed via the Zoom video platform, representing public, private, trade unions, higher education, science, non-governmental organisations, research institutions and civil society actors. Respondents were asked to assess statements corresponding to each measure of transformative capacity.[5] With participants’ informed consent, interviews were recorded to facilitate the production of anonymised interview transcripts. Each interviewee provided up to one hour each (some were unable to commit to a full hour). One opted not to be interviewed but completed the questionnaire used for the interviews. Not all interviewees answered all of the questions (either due to time constraints or due to their declining to do so). Interviews were transcribed and then analysed according to the question format of the questionnaire.

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

2.3.7 Data reporting, interpretation and the case study report

The broad set of research activities carried out for the development of the case study implied an extensive data processing and reporting activity. For each of the above-mentioned components, a short report describing the data collection procedure as well as a dataset were produced. This will allow making the data collected available to the public in the future in accordance with the FAIR principles. All the data collected have been interpreted by the case study team with two complementary approaches: through a component-focused interpretation (see Chapters 2-4); in the light of a holistic understanding of the case (see Chapter 5). The results of such an interpretation are reported in the next chapter of the case study reports.

CHAPTER 3

ANALYSIS OF THE COAL AND CARBON TERRITORY

3 Analysis of the Coal and Carbon Territory

3.1 Overview of the coal and carbon territory

3.1.1 Historical Development

Port Talbot has a long legacy of metal working. The origins lie in the opening of operations by the English Copper Company in the Cwmavan valley in the 1770s. In the 1880s these works were closed and the focus of steel making shifted to Port Talbot, where a docks facility had been established in the 1830s. Between 1901 and 1926 two steel plants opened in Port Talbot, with a third (known as the Abbey Steelworks) opening in 1951. Closure of the two original plants in the 1950s and 1960s leaves the Abbey Steelworks (now owned by the Tata group of companies and Known as the Tata steelworks) dominating the town. By the 1970s it was the biggest steel plant in Europe and the largest employment site in Wales, with some 20,000 employees on site.

The steelworks has shaped the locality. Between 1947-1955 the Sandfields housing estate, comprising some 3,000 homes, was constructed. This provided housing for the rising numbers employed in the steelworks. This significantly increased the population of Port Talbot. Similarly, the construction of a new deep water dock facility between 1966-1970 meant that Port Talbot was the first dry bulk cargo terminal in the UK able to accept ships with a deadweight greater than 100,000 tonnes. Prior to the opening of the facility the maximum size able to be accommodated in the old docks was 10,000 tonnes.

Another notable development was the opening of the M4 arterial motorway in 1966 (connecting Swansea to Cardiff, Bristol and London via a new crossing of the River Severn). This fundamentally altered the connectivity of Port Talbot. Prior to the M4 Port Talbot looked east towards Cardiff. With the opening of the M4 and the bridging of the River Neath the city of Swansea became more accessible resulting in the re-orientation of Port Talbot eastwards towards Swansea. However, whilst opening of the M4 increased accessibility for those in Port Talbot it also meant that activities could also now 'bypass' the town as east-west connections improved. However, the M4 altered the landscape of Port Talbot has it passed through and 'over' the town.

From the 1980s, Port Talbot and surrounding areas have experienced significant levels of economic restructuring and losses in employment opportunities. The loss of jobs in the steelworks from the 1980s, coupled with the miners' strike of the 1980s and the subsequent closure of coal mines inland of Port Talbot adversely affected the socio-economic development of the town, particularly with regard to available job opportunities.

The Steel industry in Wales has a long history of significant contribution to the economy, alongside the social and cultural heritage. Research calculated the contribution of Tata Steel Wales on Welsh GVA at £1.28bn in 2010, which was estimated at 3% of Welsh GVA and

the largest single contribution of a single private sector employer (Pinto and Jones, 2012)[6]. In 2010, the total economic impact of Tata was estimated at £3.2bn in Wales and as such, Tata was recognised as an anchor company for its contribution and potential to develop the economy (Welsh Government, 2013)[7].

However, the steel industry is among the biggest producers of carbon dioxide, producing around 8% of global carbon dioxide emissions (Hoffmann et al., 2020[8]). In 2018 Neath Port Talbot had the highest rate of CO_2 emissions in Wales (6,506 kilotons of CO_2 or c.45.5 kilotons per capita) and was the source of around one quarter of all Welsh emissions[9]. Much of this emanates from the steel works. Combined with carbon reduction policy goals, the decarbonisation of steel production is important to ensuring the future of the industry. As a result, municipalities such as Neath Port Talbot County Borough Council have an industrial past and future that is entwined with carbon intensity and efforts towards decarbonisation.

The importance of the steelworks to Port Talbot is as much symbolic as economic. The steelworks is considered by many to be the cornerstone of Port Talbot, media reports a local councillor stating that "Port Talbot is the steelworks and the steelworks is Port Talbot" (Duffy, 2016). There are families that have for generations worked at the Port Talbot steel plant, and there are many media accounts of the social and economic significance of the steel works to the Neath Port Talbot community (Cresci, 2016).

3.1.2 Ecological and environmental situation

The majority of Welsh industrial and business carbon emissions can be directly attributed to companies located along the M4 corridor in South Wales (Hayward, 2022). It is estimated that around 15% of Welsh carbon emissions can be traced to one source - the Port Talbot steelworks (Burkitt, 2021). The situation along South Wales's M4 corridor (and Port Talbot in particular) stands in sharp contrast with other parts of Wales such as Pembrokeshire and Gwynedd, which have some of the cleanest air in the UK (Newell, 2021). This latter point underlines the spatially uneven distribution of Wales's environmental injustices.

The Port Talbot steel works uses a substantial amount of energy, estimated at a cost of more than £60m a year (Dicken, 2016), and electricity costs are some of the highest in Europe (Carbon Brief, 2015). To combat this, Tata sought permission to build a new plant to generate some of its own energy. The Tata Steel Internal Power Generation Enhancement project is the installation of two boilers with a generating capacity of 225Mwe. The two boilers replace four existing boiler and are fuelled by gasses generated in the steel making process (Natural Resources Wales, 2016).

Options for decarbonisation of the steel plant range from adopting hydrogen as an energy source, through carbon capture and storage to replacing primary steelmaking with steel recycling (which obviates the need for coking coal). However, the technology remains novel and the capital investment costs are significant and considered beyond the scope of one company or the Welsh

6 Pinto, V. And Jones, C. (2012) The economic impact of Tata Steel in Wales. Welsh Economic Review, 23.
7 Welsh Government (2013) The Steel Industry in Wales. Written evidence to the House of Commons Welsh Affairs Committee, January 22 2013.
8 https://www.mckinsey.com/industries/metals-and-mining/our-insights/decarbonization-challenge-for-steel
9 https://www.walesonline.co.uk/news/wales-news/steel-carbon-emissions-port-talbot-19927484

Government alone. Closure of the plant may simply transfer emissions overseas unless demand for steel in the UK falls to match.

As the climate crisis indicates, the negative environmental impacts of Wales's carbon-emitting activities are not confined to its territorial borders. Nevertheless, these activities have significant localised impacts. For example, in Port Talbot, poor air quality is a key concern. This is linked to high levels of chronic health conditions in the region and, partly in consequence, Neath Port Talbot County Borough Council was one of the worst affected areas in Wales by the Covid-19 global pandemic in terms of numbers of deaths. The reduction of pollution is therefore very important in the region.

In 2000 an Air Quality Management Area (AQMA) was designated in Port Talbot. A number of measures have been undertaken, including the introduction of a permanent lower speed limit on the M4 as it passes through Port Talbot (50mph instead of 70mph as elsewhere) and the 'cleaning up' of Tata steel processes (partly driven by EU legislation). These measures have led to measurable improvements observed in the decade leading to May 2020, but further improvement is sought.

In the year 2017 – 2018, Neath Port Talbot witnessed an overall drop in CO_2 emissions of some 14% attributed largely to the steel works (Department for Business, Energy & Industrial Strategy, 2020). However in 2018, the latest figures available, Neath Port Talbot County Borough Council still has the highest Kilo tonnes of industry and commercial of any local government authority in Wales – 5983.8 kilo tonnes or 47% of this type of CO_2 emission in Wales (InfoBaseCymru, No Date). In comparison Bridgend has just 306.6 kilo tonnes of industry and commercial CO_2 emissions. This perhaps highlights how different the industrial profiles are of the two local government authorities that make up UKL17, and how Neath Port Talbot is the industrial epicentre for carbon emissions in Wales.

Encouragingly, Neath Port Talbot has been shown to be one of the local authority areas with the highest renewable energy capacity and generation in Wales, with 1,944 renewable heat and electricity projects in the region in 2019 producing 352 MW (Welsh Government, 2019a). There are two large-scale onshore wind projects, Lynfi Afan and Mynydd Brombil. Margam Green Energy Plant is also a £160m biomass plant that utilises waste wood to produce energy. These projects are all connected to the centralised energy grid. A further windfarm development is proposed at Y Bryn. Despite the large consumption of electricity by Tata steel, the renewable energy production in Neath Port Talbot means that around 65% of the energy consumed in the region is delivered by local renewable generation (Welsh Government, 2019a).

It is worth noting that within Neath Port Talbot there is also a working coal mine. The Aberpergwm drift mine. This reopened in 2018 and is one of the few remaining producers of high-grade anthracite. It supplies Tata Steel and other industrial users and employs around 160 persons. The coal produced by Aberpergwm is not only used as a fuel source but can also be used for other purposes, such as water filtration technologies.

3.2 Socio-cultural component

3.2.1 Summary of results

A total of 18 strain situations were mapped in the focus group (with one strain situation highlighted twice due to its importance). A list of the strain situations and related features is provided in the

Table 2. One of the strain situations identified in the 'strain-tree' (Populism) was deemed not to be present as a strain situation in the area.

Table 2 – Strain situations

♒	Name	Type	Area	Factors		Geo	Time
				1st	2nd		
1	Economic dependence on the Tata Steelworks	Exo conflict	Finance-	F11	F13	Port Talbot	1980s
2	Closure of local banks	Exo conflict	Finance-	F13	-	Port Talbot	2022
3	Proposed development of the Y Bryn windfarm	Exo conflict/dependence	Finance-	F11	-	Port Talbot	2020
4	Development of the Aberafan shopping centre		Finance-	-	-	-	1970
5	Rise of the 'welfare' economy		Finance-	-	-	-	1990
6	Rise of virtual interactions replacing in-person communication	Endo conflict/Impasse	Techno	F16	-	Port Talbot	2020
7	Proposed development of the Y Bryn windfarm	Exo conflict/dependence	Techno-	F11	-	Port Talbot	2020
8	Loss of community infrastructure and outmigration	Dependence	Ethno	F01	F09	Port Talbot	1970
9	Tourism	Impasse	Ethno-	F04	-	Port Talbot	2000
10	Ethnic diversity		Ethno	-	-	-	-
11	Internal community cohesion		Ethno	-	-	-	1960
12	State vs market	Impasse/Exo conflict	Ideo-	Fa1	-	Port Talbot	1980
13	Political identity	Exo conflict	Ideo-	Fa2	-	Port Talbot	1996
14	Populism		Ideo-	-	-	-	-.
15	Environmentalism		Ideo-	-	-	-	2020
16	Biodiversity agenda	Exo conflict	Nature-	F15		Port Talbot	2020
17	Covid-19 pandemic	Exo conflict/Endo conflict	Nature-	F19	-	Port Talbot	2020
18	Climate induced behavioural change		Nature-	-	-	-	

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

Source: ENTRANCES Focus Group Discussion

The table summarises the strain situations that were mapped, classifying each strain situation in relation to (a) type of the strain situation; (b) areas of change and related stress factors; (c) position in space; (d) position in time. A short description of each strain situation is provided in Annex 1. Eleven of the strain situations were discussed in detail. These can be identified as those which have a strain type associated with them. The next section (3.2.2) details the terminology used. All strain situations apply to Port Talbot and contiguous areas.

All strains identified remain current, with older strains forming a contextual background to the situation currently prevailing in Port Talbot. Many of the strains identified form part of a complex and interlocking network of causes and effects, with affective consequences. The greatest proportion of strain situations were identified from within the past two years, suggesting that immediacy heightens perceptions of strain, rather than a rise in strain situations in recent years. Other strains have been present in one form or another for several decades. Most strains identified have been located in the period of the 'steel transition' which is dated from around 1980 through to the current day. It is this transition that decarbonisation is layered on to in Port Talbot.

The strain situations identified are broadly distributed across each of the stress 'scapes'. The largest number highlighted are to be found in the financescape. The smallest numbers are in the technoscape. Although no multiple strain situations were discussed during the Focus Group, many are, in practice, multiple in nature. For example, the closure of local banks can be discussed as part of the financescape, technoscape and, arguably, ideoscape. At the same time, it can also have an impact on the ethnoscape.

The emphasis on financescape may, arguably, also be an indicator of our own deep-rooted and prevailing ideoscapes that foregrounds the economics of society rather than, for example, its environmental or social underpinnings. A second strain situation was repeated as an example by the Focus Group (Y Bryn windfarm) as they wished to highlight different elements of the situation (Financescape and Technoscape). Arguably it might also have been considered under Naturescape but was not identified here.

Table 3 – Number of strain situations mapped in each area of change

Financescape	Technoscape	Ethnoscape	Ideoscape	Naturescape	Multiple
5	2	4	3	3	0

Source: ENTRANCES Focus Group Discussion.

Of the 11 strain situations discussed by the Focus Group, half were identified by the participants primarily as exogenous conflicts (Table 3). Five of the eleven strain situations described were explicitly labelled as including two different types (03; 06; 07; 12 and 17). However, in another three cases Focus Group participants proposed that there were elements of at least one other strain type involved (highlighted in the description of each in Section 5) which have not been included Table 3. On balance this suggests that eight of the eleven strain situations described in detail can be categorised according to more than one type of strain, again highlighting the complex interplay of features involved.

Table 4 – Strain situations across different types mapped in Port Talbot

Type	Endogenous conflict	Exogenous conflict	Impasse/contradiction	Dependence/Uncertain.
N.	2	8	3	3
%	12.5	50.0	18.8	18.8

Source: ENTRANCES Focus Group Discussion.

3.2.2 Interpretation

Stress vectors

Ten vectors were identified as underlying the strain situations identified. These are set out in Table 5. Two vectors (Va1 and Va2) were identified in addition to the 19 pre-selected by the ENTRANCES project. One further vector (not identified in the socio-cultural stress tree) might also be added to the analysis – that is the out-migration of skilled workers (broadly defined). These workers are not currently covered under the categories of youth out-migration, aged-people out-migration, in-migration and return migration. This vector is not considered further here. No single vector emerges as predominant, although the dependence on exogenous private investments/disinvestments appears to be visible.

Table 5 – Breakdown of the strain situation and types for each stress factor

Factor	N.	Endo conflict	Exo Conflict	Impasse	Dependence
V01: Youth Outmigration	1				x
V04: Tourism	1			x	
V09: Top-down development projects	1				x
V11: Exogenous private investments	3		xxx		xx
V13: Disinvestments	2		xx		
V15: Global environmentalism	1		x		
V16: Digital divide	1	x		x	
V19: Pandemic	1	x	x		
Va1: Allocative decision-making	1		x	x	
Va2: Political centralisation	1			x	

Note Va1 and Va2 refer to the two additional factors .

Exogenous private investments (V11) and Disinvestments (V13): Participatory mapping of stress vectors suggests that exogenous private investments is one of the major causes of strain situations. Three strain situations were highlighted. One of the most significant is the exposure of the local economy to decisions taken regarding the Tata Wales Steel works (01). Since the 1970s,

the plant has been through a variety of owners which has progressively removed control of the steel plant further from the locality. In 2017 a proposed merger between Tata Steel UK and ThyssenKrupp was blocked by the European Commission on grounds of competition. In 2016, as part of a major restructuring of its UK operations Tata announced it intended to sell the steelworks in Port Talbot. There is reported to be no conflict or tension with Tata Wales Steel at the local level, as all parties wish to see the plant thrive, but there is a sense of economic uncertainty.

Participants also identified the Y Bryn Windfarm proposals (03) as another example of the stress created through private investments. It is being developed by Coriolis and ESB, neither of whom is headquartered in Wales. Some 26 turbines were initially proposed, with the largest turbine blades of any on-shore windfarm in the UK. Local opposition to the development is strong, with opponents citing the visual impact, loss of green space and limited local economic benefits. Focus Group participants suggested that local opposition has been strengthened by a lack of consultation (either real or perceived) with local residents. Following opposition, major amendments to the proposals have been made. Participants at the VFG noted that the opposition to the impact of the turbines on the natural environment comes despite, or maybe due to, the existing industrial landscape of Port Talbot (and the fact that the proposed development site was historically industrialised but has since returned to a more natural state). This makes existing green spaces highly valued and demonstrates the relational values implicit within any landscape. The lack of local protagonists is exacerbated by the view that the windfarms bring little local economic benefit to the area (few jobs) with the windfarms focusing on the energy produced, this energy-centric discourse has less traction locally. The third example is also contemporary and focuses on external disinvestment decisions, notably the closure of a local bank branch (02). In February 2022, Barclays Bank (one of the major retail banks in the UK) closed the branch located in Port Talbot. The nearest alternative branches of Barclays Bank are to be found either five miles away or eight miles away. Participants in the Virtual Focus Group noted how this disproportionately affected those without access to cars and local businesses. The reason for closure was diminishing use of the branch, with Barclays citing increasing use of online and telephone banking – demonstrating a link to the effects of the changing technospace. Participants highlighted how digital exclusion also influences the distributional impact of such closures. The closure of the local branch is part of a wider national pattern of branch closures across the UK.

Top-down development projects (V09): Participants highlighted a composite strain (08) situation focusing on the loss of community infrastructure (08). Contributory factors are local outmigration of Port Talbot residents to neighbouring localities (with commuting to Port Talbot), the out-migration of former residents in search of work to more distant locations (London, Bristol, Cardiff) owing to reduced opportunities to access high skilled or higher paid employment opportunities in the local labour market (partially related to the reduction of employment opportunities in the steel works but also in other manufacturing/energy related companies) and the closing of community infrastructures (such as local shops). The result of these trends is that Port Talbot has to find a new rationale and a new vitality. Participants underlined the historical legacy of the steelworks, noting how the current form of Port Talbot was a function of in-migration associated with the expansion of the steelworks in the 1950s, emphasising the cyclical nature of the economic and social fortunes of the town. Many of the investment activities that have sought to diversify the local economy and offer new employment opportunities have been driven by external actors (in cooperation with local authorities and universities) such as Welsh Government using funds made available by the European Commission.

This approach has been criticised by the current UK government as limiting local decision-making powers and new approaches are proposed to strengthen the local influence. Participants also noted the development of the Aberfan shopping centre (04) in the 1970s (refurbished in the 1990s). This replaced a part of the old town centre that was demolished for the building of the M4. Whilst the shopping centre contains a number of leading retailers, these are less often local businesses. Local businesses struggle to meet the higher rents and rates charged by the shopping centre operators. These are also example of a sense of a loss of a local locus of control.

Youth (and skilled worker) out-migration (V08): A consequence of the loss of community infrastructure (08) and reduced employment opportunities is the out-migration of young adults and skilled workers. This further affects the vitality of the town. It is not only the low density of employment that is limiting, the occupational mix that is available in the area (Section 3) indicates the lack of opportunities in many occupational categories.

Tourism (V04): Tourism was discussed as a strain situation (09). This is less in terms of its potential as an alternative economic sector but more the debate on the mix of the tourism offer (categorised as an impasse but also linked to territorial strategies). It is currently focused on outdoor and some heritage focused activities. Virtual Focus Group participants stressed the rise in the profile of street art within Port Talbot, illustrate by the ARTwalk street art festival, and the potential that this offered both as an alternative source of economic activity and an example of celebrating Port Talbot's heritage in a new and differentiated manner. This can serve to offer new economic futures and help to reshape external perceptions of 'Port Talbot'. The tourism offer is not solely about the immediate economic return.

Global environmentalism (V15): There has been a rising local engagement around the theme of biodiversity in the area. In part this is due to campaigns highlighting the detrimental impact that climate change, hillside wildfires and the development of windfarms may have. It also reflects a rising awareness of the extent of biodiversity that is present within the locality. In the past, it was suggested by the Virtual Focus Group, residents have overlooked the richness of the biodiversity around them, owing to the appearance of the area as a degraded environment. There is a new appreciation of the value that is present. However, the rising awareness of local actors is creating tensions with external bodies that typically make decisions around environmental actions in the area. The Virtual Focus Group identified a lack of dialogue between these external actors and the local community.

Digital divide (V16): The participatory process identified the rise of virtual interactions (06) as contributing to a stress situation for Port Talbot. The rise of online shopping is affecting the mix of retail activity in the centre of Port Talbot (favouring service-based activities that require physical interaction). Whilst on-line technologies provide opportunities to local businesses, this is less manifest in 'high street' retail outlets. The trend reduces the choices open to residents with less access to digital resources and opportunities for physical interaction. The rise of social media as a means of communication and engagement (including community Facebook pages), is also reducing occasions of physical interaction and can spark tensions as well as promoting cohesion within communities. There is a strong ambivalence here, with a nuanced landscape of strain situations that is neither universally experienced nor unidirectional. The significance of decisions by external actors was noted in the Virtual Focus Group owing to the role that social media companies play in shaping both the available technologies, and their use through their business models, alongside the role of external regulators.

Pandemic (V19): Participants at the Virtual Focus Group identified the stresses and strains incurred during the Covid-19 pandemic (17). Doubtless this was a current concern and so fresh in their minds. It had wide ranging effects. It had a major effect on local commerce and resulted in reductions in community interactions, with a lasting legacy for many, alongside tensions within the community regarding social 'policing' of covid-related restrictions and mask wearing. Some positive outcomes were noted whereby changes in delivery – such as the increase of livestreaming – had enabled the previously excluded to participate in events. However, remote participation does not build the same level of community engagement as physical interactions. There is a close link here to the digital divide stress vector (V16).

Allocative decision-making: An important stress vector identified in the study is the over-riding nature of allocative decision-making. The participatory process highlighted the role that a move towards a more neo-liberal, free-market ethos (12) has left Port Talbot exposed to external economic forces. Since the 1980s the UK government has taken a strong free market orientation towards steel production, whilst the US-EU dispute around state aid for Boeing and Airbus led to retaliatory import tariffs on steel imports by the US. The competitiveness of Port Talbot has been affected by low steel prices on the global market and rising energy prices. The free-market orientation of the UK government contrasts with the strong legacy of labour activism in Port Talbot.

Political identity: The Virtual Focus Group pointed to the loss of political identity as an important 'strain' situation (13) for Port Talbot. This is akin to losing the political voice of the town. Changes to the administrative and political boundaries have gradually created larger administrative units in Wales. The loss of political identity may also reflect a decade or more of 'austerity politics' with local authority budgets drastically cut and welfare payments also reduced as a consequence of political decisions being taken by the UK government. At another level, the UK government in Westminster has, for the past 40 years, largely had a different political composition to the staunchly labour politics of Port Talbot. However, similar political make-up does not equate to 'voice'. For some residents, the Virtual Focus Group suggested, the political interests of the 'party' have been seen to overshadow the interests of the locality (to address local needs), raising internal tensions. This is not only in respect of the divide between the political right and left but also within Labour politics in Wales and the UK. This was perhaps most clearly demonstrated in the EU (Brexit) referendum, where 56.9% of those who voted in Neath Port Talbot voted to leave the EU (in contrast to the position of the Welsh Labour Party, but reflective of Wales as a whole).

Stress-strain analysis

Analysis of the stress and strain situations suggests that residents of Port Talbot experience a strong sense of dependence and uncertainty, primarily owing to the strength to which they feel exposed to the vagaries of decisions made externally, by others. In times of uncertainty, which transitions tend to present, this manifests in feelings of insecurity and is visible in the out-migration of population.

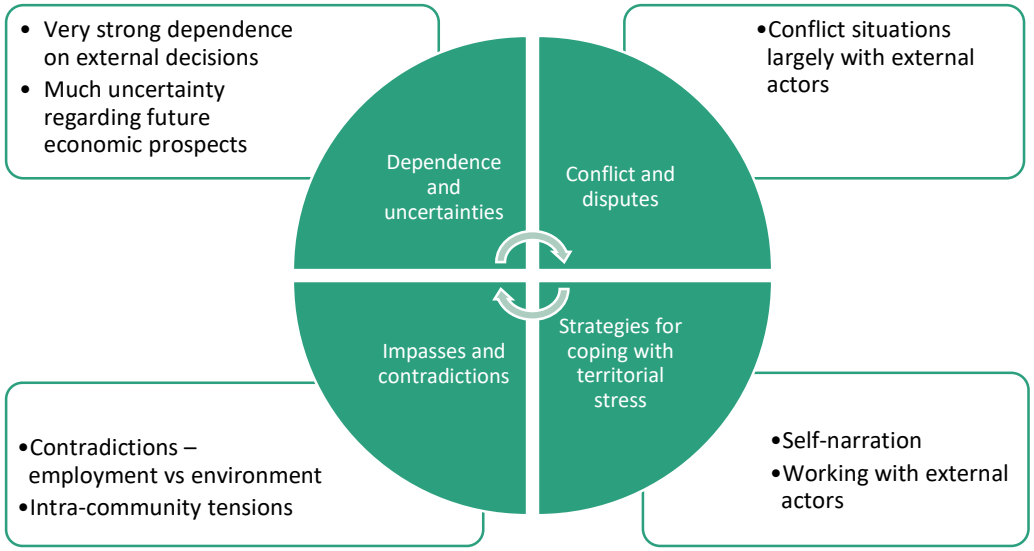
The stresses and strains reflect conflict and disputes with external actors, which are latent and often unspoken. This latency can be reflective of a sense of powerlessness to influence decisions taken by state and global actors, feelings that are heightened by the reported sense of a loss of political influence ('voice') as a result of changes in political geographies. Endogenous conflicts were not identified through the participatory process. Instead, participants spoke of impasses and contradictions emanating from different perspectives and values. The influence of these impasses/contradictions on territorial development processes was not evident and so may simply

reflect the existence of different viewpoints. The most evident contradictions appear to illustrate a dissonance in environmental beliefs and actions. There is strong support for biodiversity but opposition to a windfarm. However, again there is a coherence of values here if one positions the narrative to reflect local scarcity of natural and open spaces, where the potential environmental costs to the locality may be felt to outweigh the wider gains (which might not accrue locally). Equally, one important aspect of the conflict in this instance is argued to be the lack of initial consultation between the external investor and the local community.

Coping strategies

The strategies for coping with territorial stress appear to centre on a rise in self-narrated identities, which accords with the concept of seeking to return the locus of control to a more local standing. However, participants stressed the importance of working with external actors to achieve these ends, as these bring resources, reach and, potentially, innovative approaches. A process of co-creation and, possibly co-governance, appears to be evolving.

Figure 4 – Strategies for coping with territorial stress



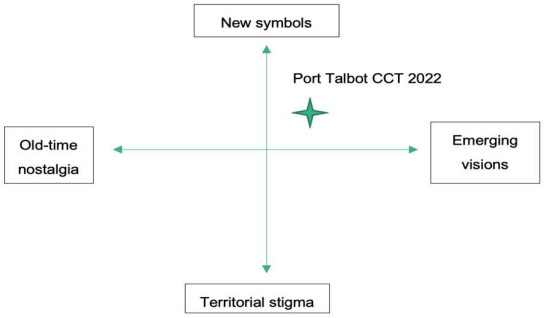
Place Identity

The participatory process identified the following features of identity dynamics.

- Strong **continuity** valuing heritage and legacy but forging a new identity. Challenging external perceptions of stigma. Summed up by the phrase: 'Breaking with the past, whilst building on the past'.
- Strength of community and importance of a **self-narrated** identity. The involvement of external actors enables the articulation of local voices and helps others 'see through the stigma'.
- Uncertainty, yes, but **too strong to speak of a crisis of the territory**. Decarbonisation simply another manifestation of long-standing global trends.
- Centralisation of governance cedes political and administrative control, but **a new locus of self-governance** is emerging within the locality

In relation to the territorial stigma and nostalgia, participants suggested that Port Talbot might, in 2022, be located in the upper right quadrant, whereby there is the emergence of new symbols and emerging visions, but these are not yet fully formed.

Figure 5 – Territorial stigma and nostalgia



Virtual Focus Group participants highlighted that although external perceptions of Port Talbot may be characterised by territorial stigma, this was not the case internally. External perceptions tend to light on themes of air pollution, noise pollution, social deprivation and visual cues suggesting industrial pollution. However, the members of the Virtual Focus Group contended that whilst there is substance in the factual data for many of the negative imageries, when you live in the area a different picture emerges, one that embraces the new symbols and emerging visions that point to a vibrancy of Port Talbot, building on the vibrant heritage that characterises the heritage of the town – such as the street art highlighted previously. They argued that Port Talbot is a good place to live – and is seen in this light by local residents. Virtual Focus Group participants were keen to stress that old-time nostalgia – in so-far as this might constitute a longing for the past or a sense of a past golden age – is not prevalent in Port Talbot. However, there is a sense of pride in the legacy of their inherited heritage, particularly social. This pride emerges in a valuing of important historical figures, many of whom may be less known outside of Port Talbot – such as Emily Talbot – through to globally renowned figures, such as the late Richard Burton and, currently, Michael Sheen, both actors. The example of Michael Sheen's 'Passion' was provided as an example of how the town is able to take an old (discontinued) tradition and reinvent it and reimagine it as a contemporary event. The Passion exemplifies the spirit in Port Talbot that emphasises a strong continuity of path development, through the development of new paths (rather than simply extending the old or invoking sharp disjunctures or discontinuities).

Generating de-territorialisation and re-territorialisation narratives Although features of de-territorialisation can be observed in Port Talbot, with challenges to continuity and self-governance, overall a narrative of re-territorialisation is strongly present. There is continuity with the past, coupled with a distinctive identity for the territory. Residents are increasingly self-narrating this identity whilst working with 'external' actors. This is encouraging new perceptions and imageries of Port Talbot, helping to challenge the stigma that often prevails amongst external viewpoints whilst also changing internal views of Port Talbot. Strength of community activism supports a narrative of self-governance, and a potential mode for self-governance, but is challenged by the de-localisation of government functions.

Table 6 – Territorial dynamics in Port Talbot

	De-territorialisation	Re-territorialisation
Continuity	The continuity of the territory is challenged by the uncertainties associated with the future of the steel works, which remains a dominant economic actor.	The VFG highlighted numerous continuities with the past which are contributing to a re-territorialisation trend. These include Michael Sheen's Passion and the strengthening of natural and cultural heritage assets, such as the regeneration of the Aberavon beachfront.
Distinctiveness	In many respects, the traits that are being challenged are the negative perceptions held by those external to the area.	VFG participants highlight the strength of community identity and the significance of a self-narrated identity.
Self-narration	It may be too strong to speak of a crisis of the territory. The uncertainty facing the steel works has been present for many years, the energy transition and pressure for decarbonisation is simply another manifestation of long-standing global trends.	The VFG highlighted numerous positive narratives of the territory, focusing on cultural and natural assets. Whilst these are 'self-narrated' in so far as they are held by the community, they are also being given voice by external actors (including national arts bodies). What is significant is that these bodies enable the self-narrated voices of local actors to be heard, rather than imposing a narrative upon them. The involvement of external actors not only enables the articulation of local voices it also helps others from outside of Port Talbot see the area for themselves and 'see through the stigma'. The power of this self-narration is it also changes how those in Port Talbot 'see ourselves'.
Self-governance	The territory is losing control of its own governance as the locus of power has been raised to a larger administrative unit (Neath Port Talbot County Borough), whilst there has been a centralisation of powers both by Welsh Government as part of the devolution of powers from Westminster and by the UK government.	A new locus of self-governance is emerging within the locality as the community rediscovers, reinvents and reasserts its identity. Local activism is on the rise with a strong community spirit.

Port Talbot appears to be experiencing an on-going process of (re)-emergence, fuelled by a mix of external and internal factors and enabled by new ways of doing things and working together. In this emerging imaginary of the territory, the steel works should be seen as a backdrop to Port Talbot, rather than foregrounded - as it typically is in policy debates and external imageries. Whilst features

of both de-territorialisation and re-territorialisation can both be identified in an ongoing struggle for territorial identity, the components of re-territorialisation appear to be in the ascendency at present in all areas bar self-governance. Here, the trend towards larger political and administrative units in the name of efficiency presents a challenge of alignment – to enable local community self-organisation rather than compete with this. The inherent dynamic tensions that exist in the ongoing processes of de/re-territorialisation are manifestly evident in the case of Port Talbot. The balance may be emerging in favour of a re-territorialisation dynamic at present, but this is fragile ground.

Table 7 – Conceptualising the territorial dynamic

	De-territorialisation	Re-territorialisation
Continuity	++	+++
Distinctiveness	+	++
Self-narration	+	+++
Self-governance	+++	+

3.2.3 Gender Dimension

Participants in the focus group activity undertaken as part of the socio-cultural analysis were asked for their views on the gender dimension to the stress and strain situations identified. In their opinion there were no strong gender dimensions visible, rather they chose to highlight how age characteristics were more likely to lead to differential experiences and impacts of the situations identified. This suggests that disparities are perhaps engendered in the region more historically due to the type of industry, with characteristics of the employment in steel (high salary, shift work) influencing family structure and decisions. Concern for inter-generational disparities centre on the steel-works which is shown to be male dominated. This perhaps suggests an opportunity for path-breaking from what could be considered a 'male' narrative framing through future activities undertaken for decarbonisation and sustainability transition.

3.3 Socio-psychological component

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

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

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

3.3.1 Summary of results

Profile of respondents

Of the 53 survey responses received, 27 respondents (51%) identified as 'female', 25 (47%) as 'male' and one as 'other' (2%). This closely reflects the estimated gender composition of Port Talbot in 2020 (51% female and 49% male) published by the Office of National Statistics (ONS). Only those aged 18 and over were eligible to participate in the survey. Half of respondents were aged 46-65 years with almost a quarter aged 31-45 years. Just under 10% were aged between 18 years and 31 years of age. Those aged over 65 years made up around 17% of all responses. ONS data records that in 2020 20.5% of Port Talbot's population was estimated to be over 65 years of age, suggesting that the sample is broadly reflective of the elderly population. Further comparisons are difficult to make as ONS reports age data in decadal intervals (30-39, 40-49 etc), however ONS data suggests that 39% of the population is aged 40-60, which may suggest a slight over-inclusion of those of older working age (46-65 years) and the under-inclusion of those in younger adult age groups.

A quarter of all respondents reported that their maximum qualification was secondary education, 44% reported a university qualification and 31% reported a professional level qualification. The most common occupation of respondents was that of public (civil) servant, followed by service occupations. Almost a fifth of respondents were retired. Around 8% of respondents reported that they worked in industry. The remaining occupations (unemployed, inactive and agriculture) were reported by one respondent each. This suggests that respondents tended to be more highly educated and engaged in public service than the population of Port Talbot as a whole.

Most respondents (62%) reported that they are married and 40% reported having dependents (aged under 16 or over 65 years) in their household. This may affect the ability of individuals to relocate, but should not be assumed to do so. More than four-fifths of respondents (83%) reported that they were born in the region, with around one tenth (9%) reporting that they were born in another region in the country. The proportion of respondents reporting that they were born outside of the country is similarly low (8%). The average length that respondents have lived in the region is around 40 years (mean 40.85 years, median 40.0 years) and ranges from a low of 6 years to a high of 79 years.

Place Attachment

Across respondents there is a very strong sense of attachment to Port Talbot and the surrounding area. 79% agree that they identify strongly with Port Talbot, 84% that they are strongly attached to Port Talbot and 90% agree that Port Talbot means a lot to them. Overall, 84% feel that Port Talbot is part of them. Respondents reported strong social ties, including the importance of a close-knit family, who they could see on a regular basis, and a sense of satisfaction with their current home in Port Talbot. Close friendships are also important to respondents but fewer agreed with this statement compared to family ties. Respondents also reported an affinity with the setting of Port Talbot, agreeing that living close to the coast is important to them.

Despite the reported strength of affinity, respondents do not feel that Port Talbot is particularly unique. Almost half (48%) disagreed with the statement that Port Talbot is the best place for the activities they like to do (No Opinion, 20%). Fewer than half agreed with the statement that no other place can compare with Port Talbot and 51% disagreed with the statement that they would not

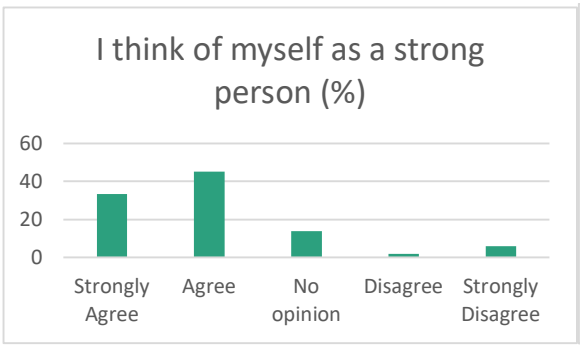
substitute any other area for the activities they do Port Talbot. There were mixed views surrounding the statement that 'moving from place to place is exciting and fun' with some 44% agreeing and 42% disagreeing, suggesting that respondents are open to new experiences but are also quite rooted.

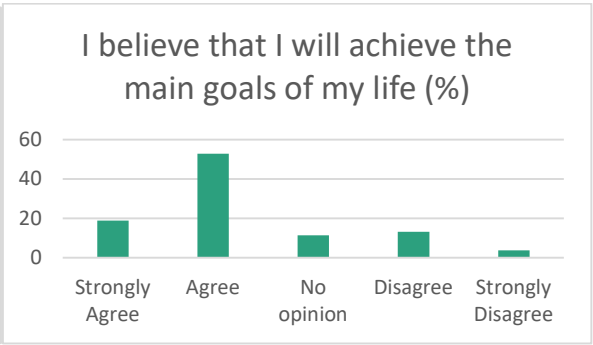
Reflecting the positive view of Port Talbot as a place to live less than a fifth of the respondent agreed that they could not be happy living in Port Talbot for the rest of their life, with three fifths disagreeing. A similar proportion agreed that there is not much a future for them in Port Talbot and again most respondents disagreed or strongly disagreed, highlighting that most respondents see a future for themselves in this location.

Personal resilience

Responses to the survey illustrate a strong sense of personal resilience and ability to adapt amongst respondents. Respondents tend to have an optimistic outlook on life and believe that they are able to deal with failure and unpleasant circumstances. Most respondents believe that they can deal with 'whatever comes'. Less than a tenth (7.6%) felt that they could not do so and disagreed with this statement that they can deal with whatever comes, whilst three-quarters (75.4%) agreed with this statement. Most respondents also agreed with the statement that they tend to bounce back following illness or hardship (79% agree), with many (65%) reporting that they try to see the humorous side of problems.

Respondents generally described themselves as a strong person, with almost three-quarters suggesting that they are not easily discouraged by failure. Similarly, most respondents (73%) believe that they can handle unpleasant feelings, with less than a quarter (22%) disagreeing with the statement that they could do so. The sense of positivity is reinforced by the respondents' broad agreement (71% in agreement or strong agreement) with the statement that they see the positive aspect of things. Similarly, most respondents (65%) also agreed with the statement that 'no matter how bad things turn out, I find positive aspects'.



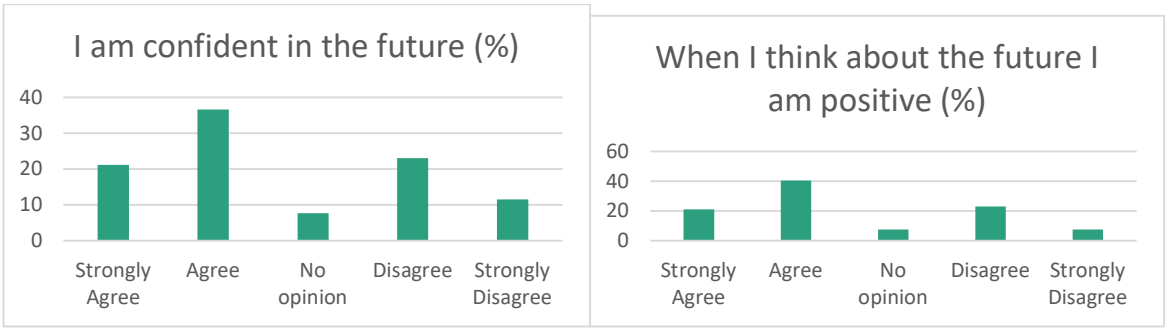


Source: online survey.

This positive attitude spills over to a strong sense of self-belief. A substantial majority of respondents (86%) believe that they can achieve their goals, despite encountering obstacles, with most believing that they will achieve the main goals of their life. This suggests a sense of being in control of one's destiny, which may reflect a positive and optimistic outlook and/or a realism in personal objectives.

However, when asked about the future a more uncertain tone emerges, with a strong proportion (30%) disagreeing with the assertion that 'when I think about the future I am positive'. Overall,

however, most respondents (61%) were positive about the future and expressed confidence in the future (57%). Again, however, an important minority expressed less confidence (35%).



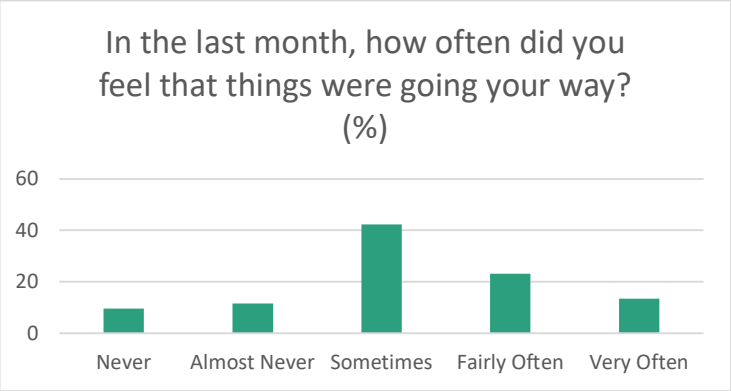
Source: online survey

Although, most respondents (69%) reported that they were confident in overcoming problems, the positive tone is slightly muted when considering how problems are perceived. Not all challenges are perceived as an opportunity by respondents. Whilst slightly more than half (53%) agreed with the statement that they see every challenge as an opportunity, 29% stated that they disagreed or strongly disagreed with this statement.

Sense of control

Overall, respondents demonstrated a strong feeling of control of their own circumstances. Respondents report that they generally feel in control of the important things in their lives. Half of respondents reported that they never or almost never felt unable to control these things in the past month with only a fifth reporting that they felt this way fairly often or very often. Most respondents report that they have almost never (26.5%) or only sometimes (41.5%) been upset in the previous month by something that happened unexpectedly. Echoing this, most respondents report that they only rarely felt nervous or stressed in the past month (40% sometimes, 15% almost never, 14% never). However, an important minority (31%) reported that they have felt nervous or stresses fairly often or very often in the past month. This perhaps reflects the confidence most respondents report in their ability to handle their personal problems (60%). However, again, an important minority (18%) state that they never or almost never felt this confidence in the past month.

In general, respondents tended to feel that things were, at least sometimes, going their way in the past month (Table below). However, almost a quarter (23%) of respondents report finding (fairly often or very often) that they could not cope with all the things that they had to do in the month prior to completing the survey. In addition more than a third (37%) reported finding this at least sometimes during the month. Similarly, whilst many respondents reported being able to control the irritations in their life in the preceding month (very often, 17%; fairly often, 23%); around two-fifths reported that they could only do this sometimes (39%) and a fifth reported that they could never (4%) or almost never (17%) do this.

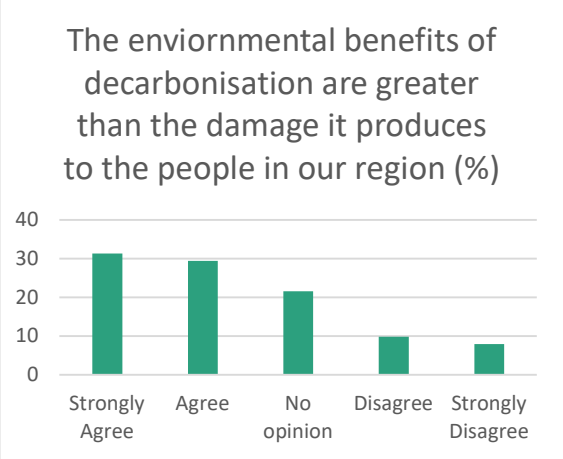


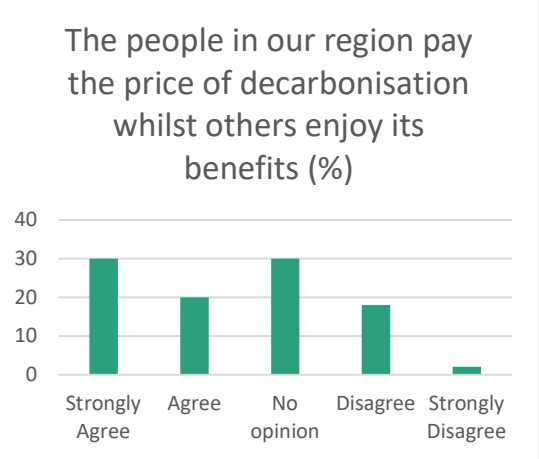
Source: online survey

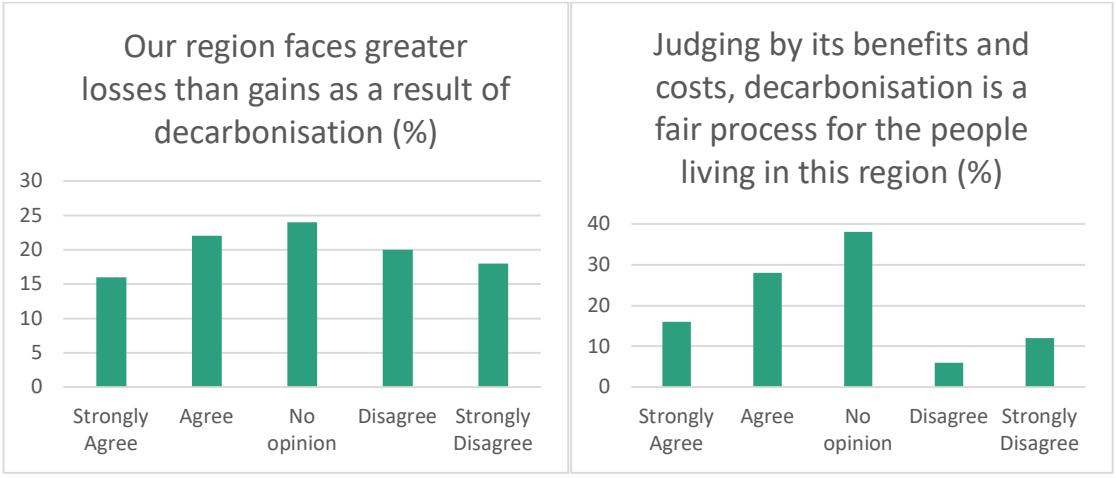
Equally, whilst almost two-fifths (38%) of respondents reported that they felt on top of things in the previous month, a fifth (21%) almost never felt this way and 8% reported that they had never felt on top of things in the month before. Linked to this, more than a fifth (22%) of respondents report that in the previous month they felt that things were piling up so high they could not overcome them. A third of respondents (33%) reported feeling this way sometimes.

Perceptions of decarbonisation, economic futures and potential coping strategies

There is a strong consensus amongst respondents that the environmental benefits of decarbonisation outweigh the potential damage this may have for people living within the region. Less than a fifth of respondents disagreed with this statement (10% disagreed, 8% strongly disagreed). Views as to whether the region faces greater losses than gains as a result of decarbonisation though are mixed. The proportion of respondents agreeing and disagreeing with this statement is the same, at 38%. However, there is a stronger agreement that those in the region are paying the price of decarbonisation and that others will reap the benefits of this. Half of respondents agreed with this statement (with 30% strongly agreeing), whilst just a fifth disagreed (and only 2% disagreed strongly).



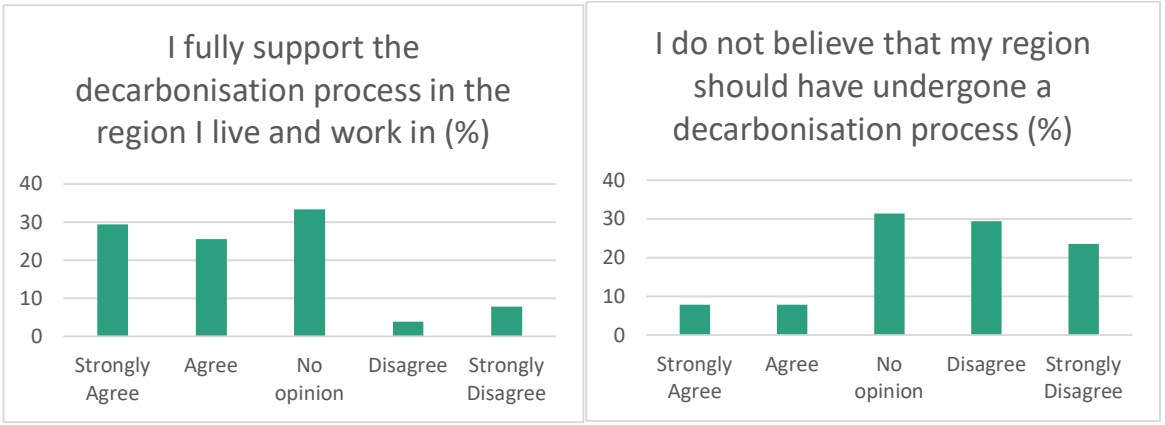




Source: online survey

Despite the pervasive feeling that people in the region pay the price of decarbonisation whilst others enjoy its benefits, respondents generally reported that they felt that decarbonisation was a fair process for people living in the region, when judged by its benefits and costs. Forty four per cent of respondents agreed (or strongly agreed) with this statement and fewer than a fifth (18%) disagreed (or strongly disagreed). A relatively high proportion of respondents (38%) offered no opinion on this.

Respondents expressed a strong degree of agreement with and support for the decarbonisation process in the area. Just over half agreed with the statement that they fully support the process, with a third expressing no opinion on this statement. Similar proportions expressed their agreement with the process. In each case, only around a tenth of respondents stated that they disagreed or strongly disagreed with the process. By corollary, few respondents stated that they did not believe that their region should undergo a decarbonisation process (16% agreeing or strongly agreeing with this statement). The proportion of respondents expressing no opinion as to whether they agree with the decarbonisation process remains notable (31%), and this proportion strengths to more than two-fifths (43%) when asked whether they like the decarbonisation plan for the region where they live or work. Of those respondents expressing an opinion most state that they like the decarbonisation plan, less than a fifth suggest that they don't like it.

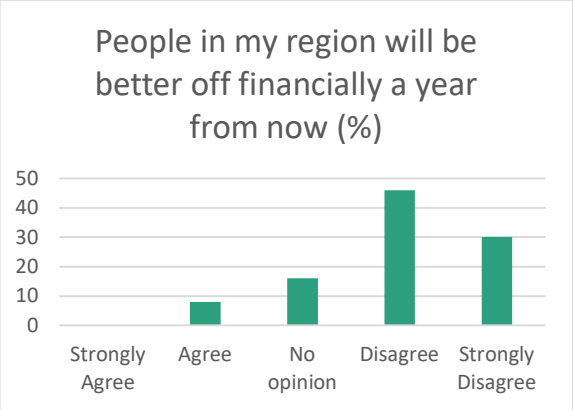


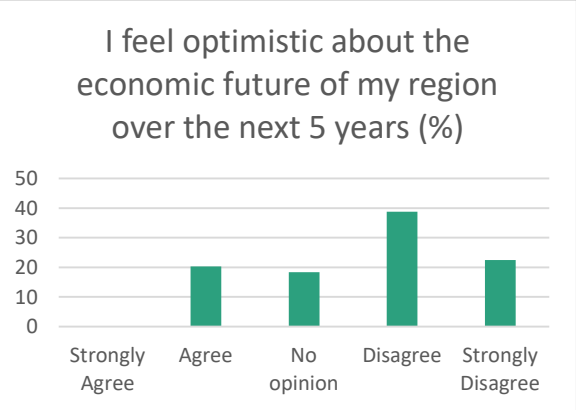
Source: online survey.

In terms of the decarbonisation process itself, respondents generally expressed no opinion, suggesting that this is not something that is strongly in their mind. More than half (52%) had no opinion as to whether there is anything they could do to stop the decarbonisation process (with a third agreeing that there is little they can do) and most respondents (67%) reported that they had no opinion on the strength of the organisations they perceived to be behind the decarbonisation process.

The sense that many respondents are not highly engaged in debates surrounding decarbonisation agendas is strengthened when analysing responses to questions relating to protest and resistance. Whilst slightly more than one-quarter (28%) state that they support those protesting against the decarbonisation plan for their region, this is offset by more than one-third (36%) disagreeing with this statement. Again, there is a strong proportion of respondents expressing no opinion (36%). When asked whether they would participate in a meeting/protest against the decarbonisation process in their region, 41% of respondents expressed no opinion. Less than a quarter (22%) agreed that they would do so, with around 37% disagreeing.

Respondents are very thoughtful regarding their future economic situation. Just a quarter (26%) report that they never/almost never think about this. There is a modest sense of uncertainty amongst respondents about their current economic situation, most (45%) report that they sometimes have a sense of economic uncertainty. Respondents have a highly pessimistic outlook on the coming economic situation (Tables below). Respondents do not believe that there will be less unemployment in their region in the coming 12 months, nor that the degree of poverty will decrease.





Source: online survey.

At a personal level, opinions are divided. many respondents (38%) report sometimes feeling a sense of future risk or threatened (37%) as to their future economic situation. However, the proportion of respondents who agree or disagree with these statements are split. A slightly higher proportion (35%) report never or almost never feeling threatened against 29% who report feeling threatened fairly or very often. This does not stop respondents worrying about their economic future. Almost two-fifths report worrying fairly often or very often, with a further third (32%) reporting that they worried about this sometimes.

In the face of economic challenges individuals may choose to relocate or to learn new skills to change occupation. Survey responses suggest no strong anticipatory behaviours in this direction.

Respondents had mixed views as to whether they would accept a job offer that would require a change of residence to another region. 40% agreed that they would do so but 43% disagreed. In practice, respondents feel that it is unlikely that they will move away from the area in the immediate future. Almost four fifths (79%) of respondents disagreed or strongly disagreed with the statement that they would leave the region in the next 2 years. Just 8% agreed or strongly agreed with this statement. Perhaps reflective of the stability of residential preferences, just 15.5% of respondents agreed that they actively search for new places to live, and fewer than a tenth reporting that they are 'always searching for new places to live of work in'. Overall, the survey results suggest a level of contentment with living in Port Talbot, with no strong preferences or pressures to leave the area.

In general, respondents are not undertaking training or developing new skills or qualifications, either to change their profession or to otherwise adapt to the decarbonisation process. Two-thirds disagreed with the proposition that they have been learning new skills to adapt to the prevailing decarbonisation process. Similarly, just 14% reported that they have been learning new skills in order to change their profession and 10% agreed that they are taking school/college classes in order to learn a new profession.

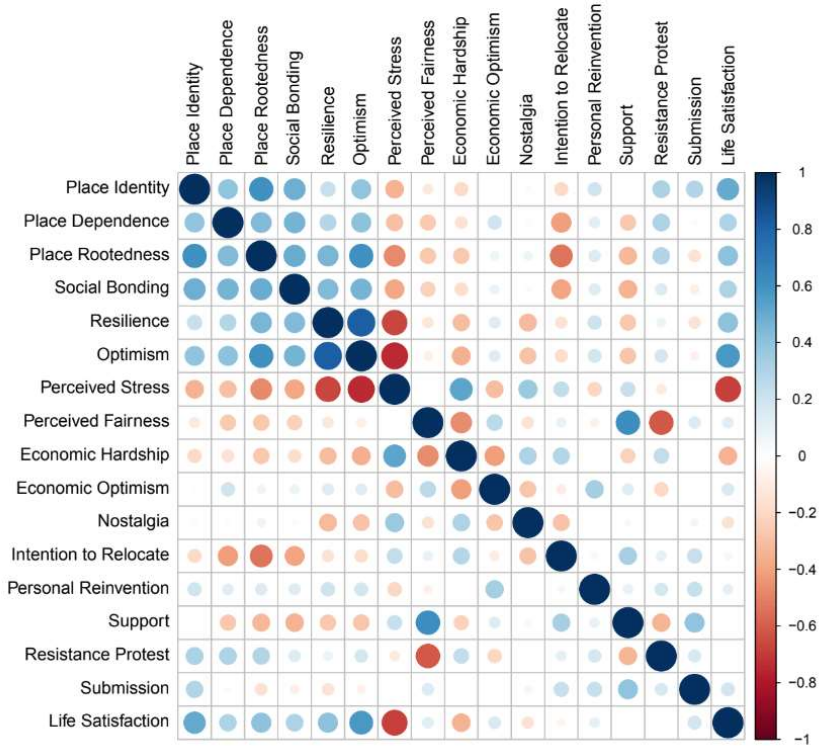
Life satisfaction

Most respondents (61%) felt their life conditions to be excellent and agreed that they are satisfied with their life (66%). 78% agree they have got the important things that they want in life, but 42% would change some things if they could live their life over again. However, many respondents also report a sense of nostalgia for the past. More than half reported feeling nostalgic at least sometimes (55%) and for many this was fairly often (35%) or even very often (4%). This was matched by a reported feeling of sentimentality and wistful affection for the past. For several respondents (38%) this reportedly manifested in them often longing to return to a former time in their past.

3.3.2 Interpretation

Overall, survey respondents had a similar age and gender profile to the wider Neath Port Talbor population. However, the proportion of respondents working in public service and educated to degree level appears to be disproportionately high. This is perhaps a reflection of the sample population as the approach is based on a self-selecting sample of residents. It may be assumed that those who apply to be members of the Citizens' Panel are more likely to be interested in issues relating to the development of their area than the population more generally and, potentially, are committed to contributing to the positive development of their area. Equally, they may be anticipated to have a higher level of awareness or understanding of issues pertaining to the development of the local area. As members of a Citizens' Panel they may also be expected to identify closely with the area and have a strong sense of place attachment. Set against this, the fact that the sample tends to be an engaged population and that respondents report higher levels of education, may act to strengthen the finding that levels of awareness of decarbonisation and engagement with this debate are both reportedly low.

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



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

Source: ENTRANCES survey data.

Responses to the online survey illustrate a strong sense of place attachment amongst respondents, bonded through strong social and, more particularly, family ties. These bonds have formed over many years, with respondents' resident in the area for substantive periods. Most respondents see their future in, or around, Port Talbot. Living in Port Talbot provides a strong sense of life satisfaction, with respondents positively valuing the natural environment (coast), home and social circles. Few are actively considering moving away, and this seems to be driven by positive decision-making rather than inertia. That said, the strong degree of sentimentality and nostalgia for the past recorded by respondents suggests that many believe that the best days of the area lie in the past.

Respondents regard themselves as personally resilient and adaptive. Most have a positive outlook on life and feel that they are in control of their own destiny. Most see themselves as a 'strong person'. Stress levels amongst respondents are not overly high, but are significant for an important minority (approximately one-fifth). There is a sense of looming uncertainty amongst respondents, with a significant proportion expressing concern regarding the economic and financial environment. Many acknowledge that they worry about this quite frequently. Most respondents believe that residents of the region will be financially worse off next year, with rising unemployment, and few are optimistic about the region's economic prospects over the coming five years.

Whether this uncertainty is related to the decarbonisation agenda is not clear, with the Covid-19 pandemic playing an important backdrop. The most common response of respondents to questions relating to decarbonisation was to express 'no opinion', suggesting a lack of informed awareness on this topic. Of those who expressed an opinion, most respondents believe the region may pay the cost of decarbonisation whilst others reap the benefits. However, set against this, most respondents who express an opinion also believe that this is a fair price to pay as the environmental benefits of decarbonisation are worth the cost to the locality.

Table 8 – Mean score and standard deviations for all factors

Factors/ Latent constructs	Sub constructs	Mean score	Standard deviation	Cronbach's Alpha
Place Attachment	Place Identity	4.22	0.75	0.92
	Place Dependence	2.96	1.1	0.88
	Place Rootedness	3.59	0.78	0.70
	Social Bonding	3.17	1.03	0.70
Moderators	Resilience	3.81	0.82	0.83
	Optimism	3.55	1.03	0.75
Decarbonisation Impacts	Perceived Stress	2.77	0.81	0.91
	Perceived Fairness	3.09	0.85	0.77
	Economic Hardship	3.04	1.03	0.86
	Economic Optimism	2.31	0.87	0.87
	Nostalgia	3.33	0.7	0.89
Coping Strategies	Intention to relocate	2.12	0.93	0.87
	Personal reinvention	2.17	0.93	0.76
	Support	3.51	1.26	0.88
	Resistance and Protest	2.62	0.92	0.82
	Submission	3.05	0.69	0.30
Life Satisfaction		3.4	0.89	0.86

Sources: ENTRANCES survey data.

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

Overall, respondents demonstrate few active coping strategies associated with the decarbonisation agenda, perhaps signifying a perspective that this is not something that they have control over, or suggesting that the coping or adaptation strategies being adopted were not reflected in the survey questions. Potential out-migration from the area does not appear to be an active consideration amongst respondents. Although around 2/5ths suggest that they would accept a job elsewhere, few are actively seeking to move or expect to do so in the next two years. Similarly, retraining or reskilling is an activity that only a minority of respondents are currently actively engaged with. On balance,

respondents appear to exhibit a high degree of acceptance of the decarbonisation agenda and approach, the aptitude for engaging in protest or supporting protests seems low. However, the strong proportion of respondents expressing 'no opinion' also gives a sense that most individuals are not highly engaged in debates or conversations on this topic. There is sense that the debate around decarbonisation remains a more abstract high-level discussion with respondents yet to experience how this might personally affect themselves.

Table 9 – Z score and STAN for all factors

Factors/Latent constructs	Sub constructs	Z-score	STEN
Place Attachment	Place Identity	0.05	5.60
	Place Dependence	-0.39	4.72
	Place Rootedness	-0.18	5.14
	Social Bonding	-0.16	5.18
Moderators	Resilience	-0.11	5.28
	Optimism	-0.26	4.98
Decarbonisation Impacts	Perceived Stress	0.17	5.84
	Perceived Fairness	0.28	6.06
	Economic Hardship	-0.01	5.48
	Economic Optimism	-0.47	4.56
	Nostalgia	0.61	6.72
Coping Strategies	Intention to Relocate	-0. 12	5.26
	Personal Reinvention	-0.15	5.20
	Support	0.33	**6.16**
	Resistance and Protest	-0.14	5.22
	Submission	-0.43	4.64
Life Satisfaction		-0.02	5.46

Sources: ENTRANCES survey data.

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

Gender Dimension

Gender analysis of the socio-psychological data from the on-line survey is challenged by the small sample size. However, some distinctive traits can be discerned where the views of female and male respondents differ. Overall, female respondents appear to report a stronger attachment to place than men, with a particular emphasis on the importance of family and social ties. This links to the likelihood of historical societal mechanisms, where gainful employment in the steel works informed household

structure. Adding strength to this, 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. Males were also more likely to report that they are actively searching for new places to live and work. This may reflect the more pessimistic outlook reported by men as to the economic future of Port Talbot, with males relatively more likely to respond that people in Port Talbot will be worse off in the coming year, that unemployment will rise, and that economic conditions will worsen in the coming 5 years. It could also be inferred from the data, that males are more likely to be the primary breadwinners and therefore more impacted by declining employment. At the same time, in this context it can be surmised that females are more likely to be responsible for the home and children, making family and social ties that more important.

On balance, female respondents were more likely to admit to feeling angered or overwhelmed by circumstances, and to often consider their economic situation. They were also more likely to feel threatened by their future economic situation. Despite this, female respondents were more likely than males to provide a positive response when asked whether they felt they were a strong person, confident in their abilities to overcome problems and with a positive outlook on life. Female respondents were also more likely to feel they could achieve their life goals than males. It appears that female respondents exhibit a stronger degree of personal resilience than their male counterparts, although males were more likely to report feeling in control of circumstances.

When questioned about their views on decarbonisation, male respondents were more likely to agree that the environmental benefits of decarbonisation outweigh the damage than female respondents and that the decarbonisation process is fair. However, these results are subject to a strong caveat as the majority of female respondents did not express an opinion on these questions.

Table 10 – Gender differences in mean score for all constructs

Factors/ Latent constructs	Sub constructs	Mean score		T-test (df 504)	P-values
		Men	Women		
Place Attachment	Place Identity	4.21	4.43	-2.836	0.00
	Place Dependence	3.52	3.78	-2.751	0.00
	Place Rootedness	3.62	3.58	0.850	0.39
	Social Bonding	3.42	3.61	-2.027	0.04
Moderators	Resilience	3.98	4.00	-0.421	0.67
	Optimism	3.83	3.92	-1.380	0.17
Decarbonisation Impacts	Perceived Stress	2.51	2.56	-0.698	0.48
	Perceived Fairness	2.26	2.29	-0.420	0.67
	Economic Hardship	2.77	2.92	-1.352	0.17
	Economic Optimism	2.68	2.69	-0.236	0.81
	Nostalgia	2.89	2.90	-0.089	0.93
Coping Strategies	Intention to Relocate	2.05	1.96	0.930	0.35
	Personal Reinvention	1.99	1.97	0.259	0.79
	Support	2.19	2.01	1.686	0.08
	Resistance and Protest	3.71	3.73	-0.252	0.79
	Submission	3.77	3.84	-0.916	0.35
Life Satisfaction	Life Satisfaction	3.51	3.64	-1.964	0.05

Sources: ENTRANCES survey data.

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

3.4 Conclusion

A wide range of strain situations were identified through the Virtual Focus Group, with respondents highlighting a concern for future generation's ability to live and work in the region. Virtual Focus Group participants also outlined the strain of continuous economic restructuring – a factor that is likely to remain in Port Talbot for some time with the decarbonisation process. The narrative thus far points to how the steel industry has influenced place, and the limited economic complexity means that the future of Port Talbot will continue to be shaped by the steel industry. Survey respondents outline how strong their attachment is to this place, but also the concerns that they have for their future in the region – attributable to decarbonisation and other mechanisms such as austerity. Respondents are aware of potential injustices as a cause of decarbonisation, with the region likely to bear the cost of decarbonisation processes. However, overall, decarbonisation is viewed positively.

CHAPTER 4

SOCIO-ECONOMIC SITUATION

4 The socio-economic situation

4.1 Introduction to the socio-economic situation

This chapter provides an overview of the socio-economic situation of the region. We refer to the three different delineations of the region, namely the Coal Carbon Territory (CCT)[10], Labour Market Area (LMA)[11] and Political Administrative Region (PAR)[12] as described in Section 2.4 (Figure 1). The delineations correspond to the nomenclature units of territorial statistics (NUTS). As described in 2.4, it should be borne in mind that the CCT adopted for statistical purposes (NUTS 3 code UKL17, comprising the local authority areas of Neath Port Talbot and Bridgend) is a larger territorial unit than is commonly understood when referring to Port Talbot. Owing to the specificity of Port Talbot, a territorial perspective of the socio-economic situation in Port Talbot is presented in Section 4.5. Section 4.5 is not comparable to other Case Study reports.

Important factors for economic development are population dynamics, labour force, capital stock and technological progress. The assessment of the socio-economic context for the case study area is based upon analysis undertaken by Halle Institute for Economic Research (IWH).[13]

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

4.2 Determinants of economic development

An important indicator of economic development is real gross domestic product (GDP) per capita. [14] Real GDP per capita (Y/N) can be decomposed into three components, i.e. labour productivity (*Y/L*), employment rate (*L/E*) and share of population in working age (*E/N*):

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

where *Y* is real GDP, *N* population, *L* employed persons and *E* working-age population.[15]

10 Neath Port Talbot and Bridgend
11 Neath Port Talbot; Bridgend and Swansea
12 Wales
13 The economic approach is an orthodox neo-classical production function model applied to all case studies in common (other, heterodox, approaches are available which could give different findings).
14 Gross domestic product is not created to measure welfare. It measures the transaction value of goods and services over a specific period (see Eurostat 2014, p. 146). Other measures such as mortality, leisure and inequality show a high cross-country correlation with GDP (see Jones and Klenow 2016). Therefore, GDP is a good proxy for welfare despite its apparent shortcomings. Nevertheless, one should use various indicators to finally assess the welfare of a region (see Fleurbaey 2009).
15 The population in working age refers to the persons aged 15-64 years. This differs slightly from the standard definition used in the UK (16-64).

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

The economic overview is detailed in Figure 7 and the analysis demonstrates the long-standing understanding that labour productivity (a),GDP (f) and GDP per capita (e), lags behind that of the UK, but follows the broad UK trend. This is accepted as being due to the stronger performance of London and South-East England. The trend in population growth (b) in the LMA and CCT are, not unsurprisingly similar, and are slightly in excess of that recorded for Wales, but below that of the UK as whole. Overall, all areas exceed the trend in population growth reported for the EU. The working age population increased between 2014-2017 in the CCT and LMA, but fell again by 2018. It is lower than the UK average, but above that of the EU. In terms of the share of employed persons, the CCT remains marginally above the PAR average but below that of the UK.

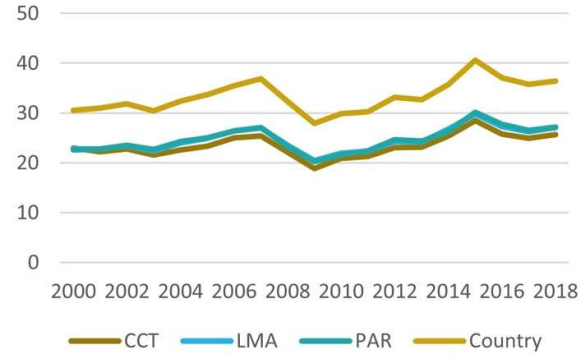
4.3 Sectoral structure

The declining proportion of manufacturing in the sectoral composition of the economy is particularly marked in the CCT and LMA (Figure 8). In contrast, Other Services are increasingly predominant. This stands in contrast to the UK and EU where Other Services are less prevalent and have remained a relatively constant proportion of economic activity since 2000. In comparison, the UK demonstrated a stronger increase in Finance and Professional Services.

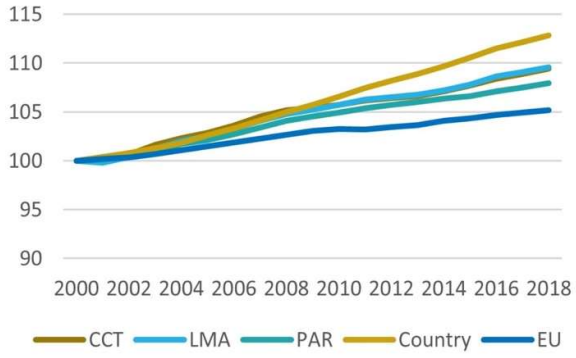
Figure 9 disaggregates the components of growth, differentiating between labour productivity growth and labour growth. From the data, it appears that the CCT, LMA, PAR and UK all experienced a significantly greater growth in GVA than the EU average between 2000-2018. It is notable that the CCT experienced less growth than the LMA, PAR or UK. The primary reason for the differential performance appears, from the data provided here, to be due to weaker performance in the sector K-N. A lower representation of these growth sectors – and higher exposure to lower-growth sectors – will differentially impact on the growth experience of the CCT.

Figure 7 – Economic Overview

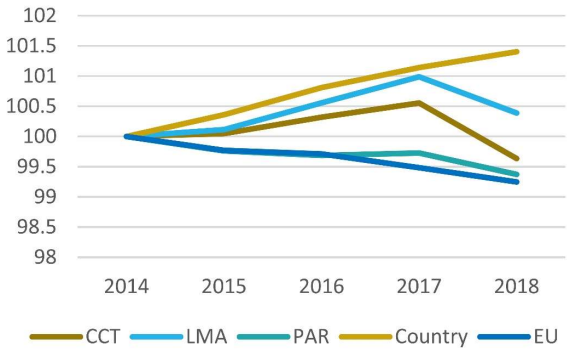
a) Labor productivity (*Y*/L) (EU28=100)



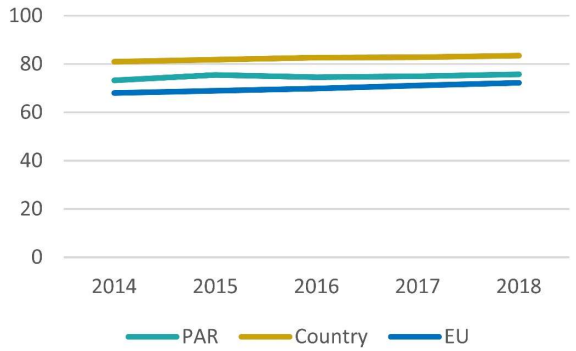
b) Population (*N*) (2000=100)



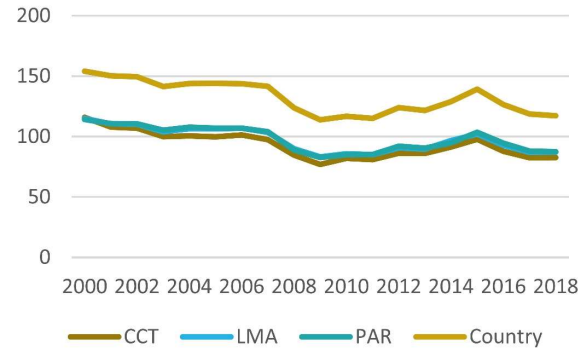
c) Working-age population (*E*) (2014=100)



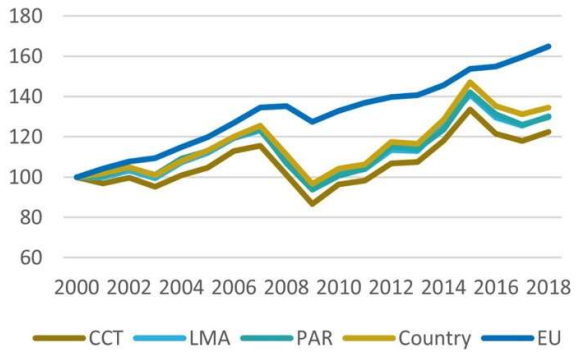
d) Share of employed persons (*L*/*E*)



e) GDP per capita (*Y*/*N*) (EU28=100)



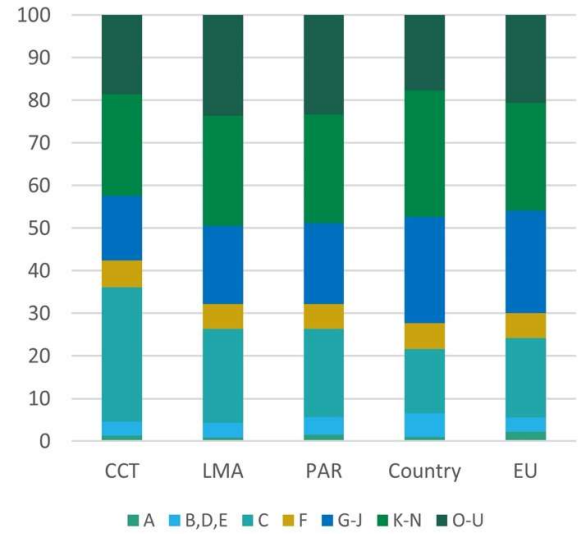
f) GDP (*Y*) (2000=100)



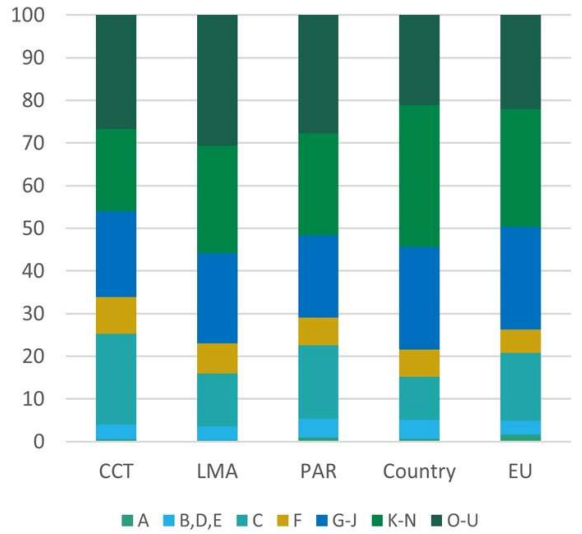
Sources: Eurostat and Regional Statistics.

Figure 8 – Sectoral Structure

a) Gross value added in 2000 (in percent)



b) Gross value added in 2018 (in percent)



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

4.4 Socio-economic settings of Port Talbot

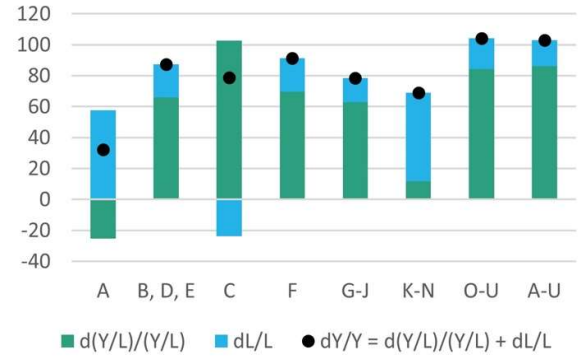
The following section includes demographic data for Port Talbot and economic data for Neath Port Talbot. We include this data here as it provides a better description of the economic context of Port Talbot than aggregate data at the NUTS 3 level covering Neath Port Talbot and Bridgend reported above. There is limited economic data appertaining to Port Talbot with most data available at the level of the Neath Port Talbot local authority area.

In 2020, Port Talbot had an estimated population of 38,134[16]. There has been a low annual growth in population (0.25% per annum between 2011 and 2020). 51.1% of the population are female and 48.9% male. Almost three-fifths of the population (59.8%) are aged between 18 and 65. There is an even division between the proportion of elderly residents (65 years +) and those aged under 18 (20.5% and 19.7% respectively). 96.8% of residents were born in the UK. Those born outside of the UK and the EU total 1.9% of the population. The population is predominantly white (97.1%). Most residents regard themselves as Christian (62.8%) or of no religion (35.6%).

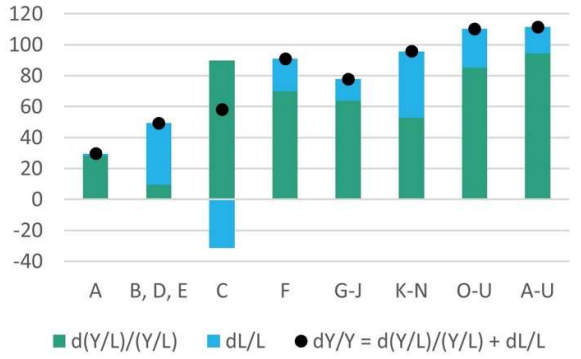
16 https://www.citypopulation.de/en/uk/wales/neath_port_talbot/W38000144__port_talbot/

Figure 9 – Growth decomposition (2018 – 2000)

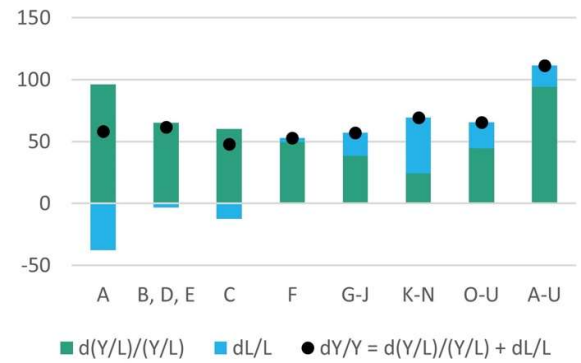
c) PAR (in percent)



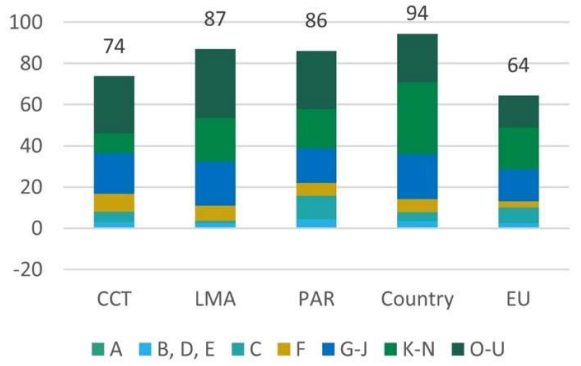
d) Country (in percent)



e) EU (in percent)



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



Sources: Eurostat and Regional Statistics.
Note: Sectoral growth (dY/Y) is decomposed into labour producivity growth (d(Y/L)/(Y/L)) and labour growth (dL/L). The growth contribution by each sector (i) is the initial share of the sector (Y_i/Y) in the year 2000 times the sectoral growth rate between 2000 and 2018 (dY_i/Y_i). Abbreviations for the sectors are provided in Annex.

Across Neath Port Talbot, 75.6% of the population were economically active in 2021, slightly below the rates for Wales (76.4%) and the UK (78.4%). Males were slightly more likely to be economically active than females. The combined unemployment rate in 2021 stood at 3.8%, slightly below the rates for Wales (4.2%) and the UK (4.4%). The economic inactivity rate for Neath Port Talbot (24.4%) is slightly greater than that of Wales (23.6%) and the UK (21.4%). Of those recorded as economically inactive, the highest proportion were recorded as long-term sick. The proportion of the economically inactive recorded as long-term sick in Neath Port Talbot (41.8%) is significantly greater than that of Wales (30.2%) or the UK (24.6%). There is no further disaggregation of this data to assess whether this may be due to environmental conditions, occupational history, socio-economic deprivation or other reasons. Of the economically inactive, a slightly higher proportion do not want a job (85.9%)

than is the case across Wales (82.4%) and the UK (81.4%). A fifth of households in Neath Port Talbot (20.6%) are workless, compared to 16.5% in Wales and 13.6% in the UK[17].

Overall (2021, gross weekly wage), male in-work residents of Neath Port Talbot earned slightly more per week (£612.7) than the Welsh average (£599.7), but less than the UK average (£655.5). Female in-work residents earned less (£518.3) than the Welsh average (£528.3) and the UK average (£558.1). Job density (ratio of total jobs to working population aged 16-64) was less in Neath Port Talbot (0.63) than the Welsh (0.76) or UK average (0.84)[18].

The relative significance of employment in the manufacturing sector is visible in sectoral employment data appended in Appendix 2. Occupational data (contained in Appendix 2) demonstrates that compared to Wales and the UK, residents of Neath Port Talbot are less likely to occupy managerial positions and more likely to be employed in skilled technical or administrative occupations.

4.5 Gender dimension

The Neath Port Talbot labour market is an unequal one[19], 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.

Table 11 – Average gross weekly wage (2021)

	Neath Port Talbot	Wales	UK
Female	£518.3	£528.3	£558.1
Male	£612.7	£599.7	£655.5

One factor contributing to this imbalance may be the dominance of steel employment in Port Talbot and the inequalities in employment opportunities and remuneration within the steel industry. Figures for the Port Talbot plant itself are not available but across Tata Steel UK, approximately 11% of employees are female (89% male). In 2019/20, Tata Steel UK reports that women were, relatively, over-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

17 https://www.nomisweb.co.uk/reports/lmp/la/1946157394/report.aspx?town=neath
18 https://www.nomisweb.co.uk/reports/lmp/la/1946157394/report.aspx?town=neath
19 sources: https://gender-pay-gap.service.gov.uk/Employer/7J2bQcxf/2019; https://www.tatasteeleurope.com/sites/default/files/Gender%20Pay%20Report%20March%202021.pdf

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.

4.6 Conclusion

The energy transition and decarbonisation process is yet to have a profound impact on socio-economic conditions in Port Talbot. However, there are important elements to the current context that set a marker for the future. For those in work, wages tend to be above the Welsh average and, whilst lower than the UK average this is likely to be due to the structural inequalities between London/South East England and the rest of the UK. It is, though, harder to find a job in the area as the job density is relatively low. Given the relatively low levels of unemployment registered in the economy, this suggests the out-migration of working age residents to find employment opportunities. The occupational structure of the economy is also imbalanced, with relatively fewer managerial occupations represented and a disproportionate reliance on skilled technical and administrative occupations. This imbalance both affects the opportunities available (with potential effects on out-migration) and the opportunities for transfer to new occupations if economic restructuring should affect the existing employment mix.

Whilst unemployment rates are lower than Wales and UK averages, levels of worklessness (particularly those not looking for work) and economic inactivity are relatively high. The proportion registered as experiencing long-term sickness are notably high, which may be a consequence of past industrial structure, poor environmental quality or the implications of socio-economic deprivation (or a combination of these).

The analysis demonstrates the long-standing understanding that labour productivity (GDP and GDP per capita) in the CCT, LMA and PAR, lag behind the UK, but follow the broad UK trend. This is accepted as being due to the stronger performance of London and South-East England. The trend in population growth in the LMA and CCT are, not unsurprisingly, similar and are slightly in excess of that recorded for Wales, but below that of the UK as whole. Overall, the data suggests the continuation of deeper structural economic trends that have been present in Wales, South Wales and the CCT/LMA over recent decades centred on ongoing restructuring of older industrial regions. The population growth recorded suggests that the area remains attractive to residents and potential residents, particularly in comparison to other – perhaps more remote and rural – parts of Wales.

Thus far, a complex, and highly relational, socio-economic picture is emerging, the area exhibits some facets of socio-economic deprivation but retains above average wages. Employment opportunities are limited but population levels continue to grow – likely spill-over from growing populations in Swansea and Bridgend. The greatest challenge is perhaps the risk that decarbonisation presents to the incumbent industrial structure, which has experienced substantial restructuring in past decades, and the sense of dependency on a few key employers. However, the experience gained through decades of economic restructuring may also confer a sense of resilience and ability to cope in the face of uncertainty and transformation.

CHAPTER 5

ANALYSIS OF THE ENERGY TRANSITION IN THE POLITICAL ADMINISTRATIVE REGION

5 Analysis of the Energy Transition in the Political Administrative Region

5.1 Overview on the Energy Transition Policies

5.1.1 Political system and context

A constituent nation of the UK, Wales is a devolved administration with its own parliament (Sennedd) and defined legislative powers. In 2022, Wales had a population of some 3.2m persons, approximately 5% of the overall UK population (67.1m) (Stats Wales, 2022). Since 1999, the UK has consisted of a national government (UK government) and devolved administrations in Wales, Scotland and Northern Ireland. The UK Government sits in Westminster in London and is comprised of elected representatives of the dominant political party. Since 2015, the UK government has been formed solely by the Conservative party (right wing). The government has the responsibility for forming and enacting laws and policy in all areas of public life in England and other key areas of public life across the whole of the UK. This includes fiscal and monetary policy, energy, transport, immigration, defence, and foreign affairs.

The Welsh Government is the devolved government for Wales. Representatives are elected to the Senedd (located in Cardiff) to represent their constituencies across the nation. As there has been a Labour administration (left wing) since the establishment of the Welsh Government in 1999, Wales has taken a different approach to the rest of the UK on devolved matters. In 2006, the Welsh Government (Senedd Cymru) gained the ability to pass primary legislation in those legislative areas that are not reserved by the government of the UK. The Welsh Government (Senedd Cymru) has control over a range of areas including economic development, business, the environment, health, and local government.

5.1.2 Decarbonisation process

While Wales has historically been dependent on extractive industries (especially coal) and manufacturing, both sectors have undergone significant restructuring during the past four decades in an ongoing process of de-industrialisation. This was most marked with the large-scale closure of the Welsh coal-mining industry in the 1980s (Bristow and Healy, 2015). This has acted to reduce Welsh carbon emissions. However, emissions remain high owing to the prevalence of farming activities and manufacturing in the economy. The UK was the first major industrialised nation to set a commitment to achieve Net Zero carbon emissions into law and published its strategy to achieve this in 2021. Welsh Government is bound by this strategy but has also set out its own approach and commitments with the publication of ‘Net Zero Wales’ in 2021.

5.1.3 Public participation

Public participation in Welsh CET deliberations has typically occurred via formal consultation processes. For example, in November 2021 the Welsh Parliament’s Climate Change, Environment and Infrastructure Committee opened a formal consultation (Welsh Parliament, 2021) whereby the public and other stakeholders were invited to comment on the Welsh Government’s ‘Net Zero Wales’ Plan (Welsh Government, 2021a). There has also been significant engagement between different layers of Welsh government and well-resourced actors in the private/third sectors, and civil society

(e.g. universities and research institutes). Welsh Government (2022a) has published its planned engagement approach, which aims to:

- generate timely and effective engagement of stakeholders on matters of climate change
- strengthen and grow the coalition of Team Wales to tackle the climate emergency

Evidence for active public participation is limited, with engagement strongest amongst motivated campaigners. It is notable that the focus of the Welsh Government approach is framed in terms of stakeholders and building 'Team Wales'.

5.1.4 Clean energy transition (CET)

In April 2019, the Welsh Government became the first nation in the UK to declare a climate emergency. It has also introduced unique legislation pertaining to the CET, including "The Well-being of Future Generations Act" (2015) and strategies to combat climate change. This has been outlined in "Prosperity for All: A Low Carbon Wales" (2019b) and "Net Zero Wales" (2021a). Following the election of new government in 2021, a new ministerial and deputy ministerial post was created with a portfolio covering climate change (Minister for Climate Change and Deputy Minister for Climate Change). This indicates the importance with which Welsh Government regards the issue of climate change. However, the UK government retains key powers in fiscal and monetary policy as well as in the realms of energy and transport policy. Crucially, for this case study, even though Port Talbot (in the CCT) is the largest steel production site in Wales - and is responsible for around 15% of Wales' carbon dioxide emissions - the steel agenda is controlled by the UK Government.

As carbon-intensive industries form a significant sector of the Welsh economy (especially in South Wales), business and industrial leaders are key participants in CET deliberations. These include individual small business owners in numerous sectors and those larger businesses involved in tech and industrial sectors represented by organisations, including the Swansea Bay City Deal and the South Wales Industrial Cluster (SWIC). A diversity of other civic society organisations are also active in Wales' CET, these include Universities, NGOs, advocacy bodies (environmental, business) and Trade Unions. However, none have developed a specific strategy for carbon phase out. In most cases they have signalled their commitment to the net-zero targets in principle.

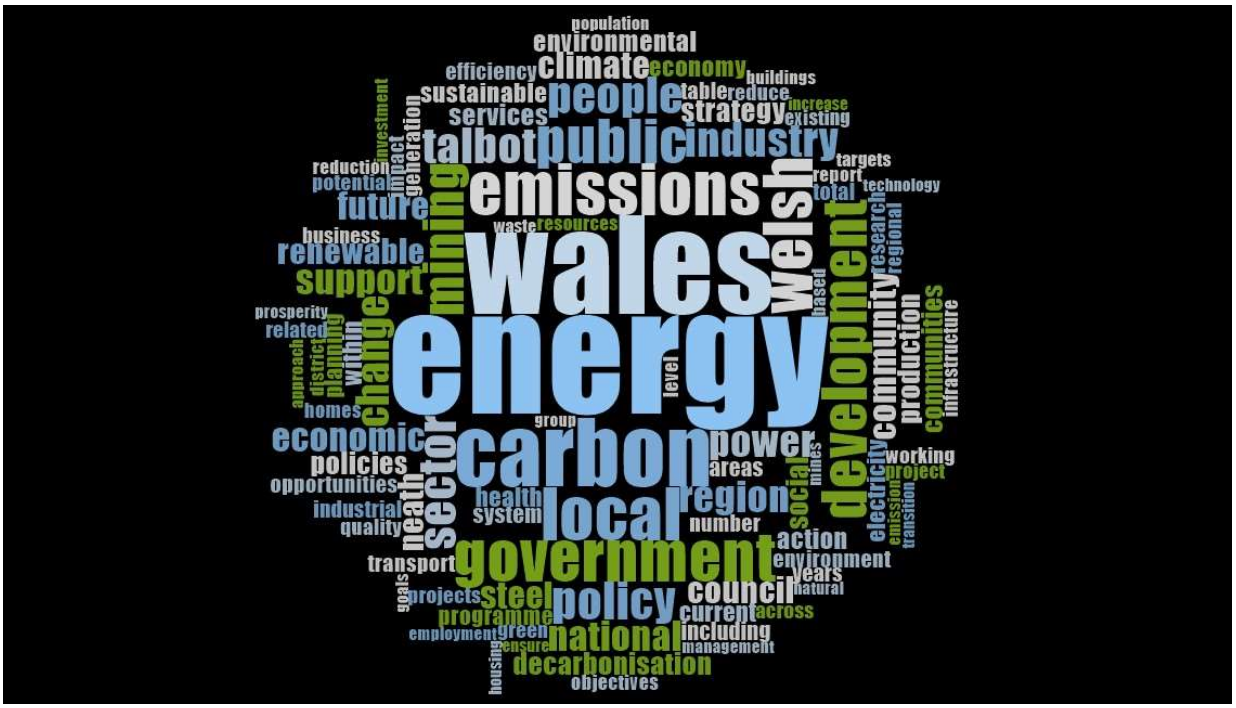
Academic writings have sought to conceptualise progress towards clean energy transitions as a staged process, with Rotmans et al (2001) categorising a four-stage trajectory stretching from a pre-development phase through take-off, to acceleration and culminating in stabilisation. Whilst conceptually neat, the evidence presented below suggests that transition processes play out in layers of multiple activities at different stages and with overlapping trajectories. This adds complexity to any attempts to neatly package a territory into a particular stage. The case study suggests that in terms of transitioning to clean energy production, South Wales has moved beyond a take-off stage, whilst policy and strategy might be characterised as falling somewhere in a take-off or acceleration phase, depending on the perspective adopted. Decarbonisation within the steel industry is however less visible and might be considered as gathering momentum at the beginning of a take-off phase. Challenges for this regime technology include the levels of investment and system changes required to transition to low carbon steel production. Our evidence demonstrates that there is a mobilisation of support across Wales and the UK to address this challenge.

5.2 Socio-political component

5.2.1 Summary of results

Based on analysis of 50 documents produced by national and local governments, academics, trade unions, business partnerships, and the media, the results of the socio-political component indicate that positive narratives of decarbonisation are dominant in South Wales. This positive narrative can be seen in Figure 10, a word cloud showing the 100 most prevalent words throughout the documentary analysis. The dominant use of constructive words across the documents, including "production", "investment", "sustainable", "prosperity", "development" and "opportunities", frames decarbonisation as an inevitable progressive change in Wales. The need for decarbonisation in South Wales is widely acknowledged throughout the documents, with "change" being the 16th most mentioned key word. There are varying reasons for this need to change and decarbonise the industry. These reasons are explicitly stated in "Prosperity for All: A Low Carbon Wales" produced by the Welsh Government (2019b).

Figure 10 - Word Cloud showing the top 100 words across the documentary analysis



Source: own illustration.

Firstly, the negative global and local environmental implications of carbon heavy industries form a strong narrative for change and decarbonisation. "Emissions", "Climate" and "Environment" all feature in the top 100 most mentioned words throughout the documents (Figure 10). The Welsh Government state that "the projections are showing an increased chance of milder, wetter winters and hotter, drier summers, rising sea levels and an increase in the frequency and intensity of extreme weather events. Changes to our climate and weather patterns will have a significant impact on well-being on both current and future generations. Increasing temperatures and extreme weather events caused by climate change are putting pressure on ecosystems, infrastructure, built environment and

our unique landscape and cultural heritage" (2019b, 11). Therefore, international, national and regional policies and practices must change to help slow and reverse the potentially devastating impacts of human induced climate change. These proposed policies and practices primarily focus on approaches to decarbonisation.

Secondly, there is a strong economic drive for the decarbonisation agenda, focusing on opportunities for growth rather than decline. The Welsh Government states that "UK Government analysis suggests the low carbon economy already supports over 430,000 jobs and is predicted to grow by around 11% per year to 2030 – four times faster than the average growth rate for the UK economy as a whole. It is estimated exports of low carbon goods and services could be worth between £60 billion and £170 billion by 2030 for the UK" (2019b, 12). The possibility of "deprivation" was only mentioned 13 times throughout the 50 documents analysed and similarly "victim" was only used on 11 occasions. Increased employment opportunities because of decarbonisation were argued in 22 documents analysed, whereas unemployment was only mentioned in five documents. "Business" was the 46th most popular word throughout the analysis.

Finally, through the environmental and economic security narratives of decarbonisation, it is thought that the removal of carbon from industries will ensure social well-being for the future, especially for local communities directly impacted by the change (especially in the Neath Port Talbot region). As seen in figure 11, the decarbonisation narrative places the local, people and community at its centre, emphasising social well-being and quality of life throughout. The Welsh Government state that "vulnerable communities are more likely to be exposed to the risks, and impacts of climate change, without the ability to cope with or recover from those impacts" (2019b, 11). This emphasis on well-being is a result of unique legislation in Wales: The Well-being of Future Generations Act (Future Generations Commissioner for Wales, 2015) which requires "public bodies in Wales to think about the long-term impact of their decisions, to work better with people, communities and each other, and to prevent persistent problems such as poverty, health inequalities and climate change". This focus on local community well-being is evident throughout regional and national policy documentation, including plans for the "UK Community Renewal Fund" (Neath Port Talbot Council, 2021a), the Strategic Plan for the Port Talbot Waterfront Enterprise Zone (2019), Neath Port Talbot "We Want Well-being Plan" (2018) and "Prosperity for all: A low Carbon Wales" (2019b) produced by the Welsh Government.

Overall, decarbonisation is framed as a positive development in South Wales, offering benefits to the global and local environment, economic and long-term employment security and social well-being for affected communities. Below we highlight five key findings from this component.

The dominance of technology-centric net-zero narratives (1)

In line with the 'net-zero' agenda - and its preference for technological solutions to the climate crisis (e.g. Anderson et al., 2021; Dyke et al., 2021) -, dominant decarbonisation narratives in Wales tend to place strong emphasis on the ability of future technological innovation to drive the CET. These narratives typically focus on speculative technologies such as carbon capture and storage, so called 'clean' coal, and hydrogen steel (West Wales Chronicle, 2019; Burkitt, 2021; Davis, 2021; Glaze, 2021). Many of these technologies are highly controversial, and their role in climate change mitigation is contested (e.g. Skelton et al., 2021; McLaughlin, 2018; Global Witness, 2021). Nevertheless, the aforementioned narratives tend to elide these controversies, framing such

technologies positively; not only in terms of their potential role in climate change mitigation, but also as key drivers of investment, jobs, and prosperity (e.g. Welsh Government, 2022a).

In line with the above, the Welsh government and Swansea Bay City Deal have promised to invest £58.7 million in research and development centres which will be located in the Swansea region, close to the Tata steelworks in Port Talbot (Powney, 2020). This includes the National Steel Innovation Centre (NSIC) based locally in Neath Port Talbot, offering more jobs through decarbonisation. The NSIC "aims to support the steel industry in Port Talbot and Wales as well as anchoring research and development into future steel making … in the region" (Powney, 2020). This project aims to directly create and safeguard over 1,300 jobs and indirectly protect as many jobs again in the wider economy (Powney, 2020). By investing in new infrastructure within communities directly affected by decarbonisation, the discourse suggests that these technologies will offer a "business as usual" scenario for workers currently employed in carbon-intensive industries, avoiding the negative impacts of deterritorialization and fulfilling the environmental, economic and social opportunities of decarbonisation. Throughout the documents analysed the closure of the Tata steel plant in Port Talbot is not implied or even suggested to fulfil the decarbonisation agenda. Conversely, the dominant narrative in South Wales strongly infers that 'clean' technology solutions will ensure long-term steel production in Port Talbot, even if those solutions have yet to be implemented - or even found (Burkitt, 2021, Davis 2021, Glaze, 2021).

The relative absence of alternative perspectives on net-zero (2)

The technology-centric narratives described above typify the net-zero approach to decarbonisation. This approach, which is dominant in Wales (e.g. Welsh Government, 2022a), the UK (UK Government, 2021), and internationally (e.g. Skelton et al., 2020; Dyke et al., 2021), is very much aligned with the ecomodernist paradigm. Ecomodernism, which tends to downplay the role of vested interests, power, and conflict in driving ecological crises, argues that future technological innovation is the most viable route to decarbonisation. According to this understanding, such innovation will enable society to achieve absolute decoupling; severing the link between economic growth on the one hand and resource use, carbon emissions, and environmental degradation on the other (e.g. Asafu-Adjaye et al., 2015). Meanwhile, within the climate science/research community, critics of the net-zero approach are more aligned with post-growth and degrowth perspectives (e.g. Skelton et al., 2020; Dyke et al., 2021). Pointing to the absence of empirical evidence to support the absolute decoupling thesis, these latter perspectives, which tend to place more emphasis on the role of vested interests, power, and conflict in driving ecological crises, argue that absolute decoupling is unlikely to be achieved; especially in the exceedingly short timeframes required to avert climate disaster. In the absence of such decoupling, these scholars argue that far more radical political economic transformations are required to drive down emissions and avert climate disaster (e.g. Stoddard et al., 2021; Hickel et al., 2021; Hickel and Kallis, 2021). However, with notable exceptions (e.g. Wales Centre for Public Policy, 2022), these critical perspectives appear to be largely absent from Welsh CET deliberations.

Narratives of exclusion (3)

The potential closure of the colliery at Aberpergwm exposes divergent narratives of decarbonisation within South Wales. As noted above, dominant narratives of decarbonisation depict it as an environmental, economic and social opportunity for Wales, with investment in clean technology solutions offering an improved "business-as-usual" scenario. This scenario is promised to create

more jobs within local communities rather than remove opportunities from those communities. However, the potential closure of the Aberpergwm colliery reveals that the reassurances of opportunities of decarbonisation are not universally accepted. Indeed, some within local community fear the closure of the colliery will remove valuable well-paid jobs from the area, causing an indirect negative impact on other local businesses. It is feared that these negative impacts will inevitably cause residents to move away from the area, having a devastating impact on community well-being. These fears are stated in an article published by the BBC (2021). When questioned what the impact would be if the colliery closed, local people in Glynneath stated "we need people to have jobs, we don't need anymore unemployment in this village. There is so much unemployment in the local area, we don't need any more of that... we need this as a community for everybody … it would be a huge thing to lose it" (BBC, 2021).

Narratives of "Just Transition" (4)

In contrast to these narratives of exclusion, a "Just Transition" aims to ensure that communities in Wales are not economically, socially, culturally disadvantaged by the decarbonisation process. Price (2020) defines a "Just Transition" as "it is about making sure that the impact of a transition does not impact one group of people unduly and attempting to use the resources and economic changes that decarbonisation will bring to improve conditions for the most vulnerable". This approach is strongly informed by the Well-being of Future Generations Act (Future Generations Commissioner for Wales, 2015) and the historical experience of economic transitions in the South Wales Valleys in the 1980's. The narrative suggests that an approach to decarbonisation led by the ethos of a "Just Transition" will prevent potential negative effects of decarbonisation. Therefore, the narrative in South Wales is strongly framed in narratives of justice, with keywords which include "Justice", "Just Transition" and "Social Justice". A key component of a "Just Transition" in South Wales is Environmental Justice, which aims to restore the local environment impacted by carbon-intensive industries. However, for a "Just Transition" to occur, Price (2020) argues that "a just transition would therefore need more than simply ensuring that the 'costs' of decarbonisation are dealt with through compensatory measures but should be seen as an opportunity for engaging with communities across Wales to discover what sort of economy, and what sort of society, they want to live in" (2020). As civil society is demanding to be involved in the "imposed" decarbonisation debate in South Wales, it is highly debateable if any/current engagement has been sufficient to achieve a "Just Transition".

As it is predominantly accepted that decarbonisation needs to happen in South Wales to secure environmental, economic and social longevity, a "Just Transition" has been strongly demanded by the Carbon Workers. This has been articulated by Steve Turner who is Unite' assistant general secretary who states that "the necessary transition to a new green economy must put workers and communities at its heart. Working people will only be won over when they're confident that no workplace or community will be left behind on our journey" (Barry, 2021). However, it is recognised that for a "Just Transition" to occur significant financial support is needed from the Welsh and UK governments. This narrative is dominant throughout the documents analysed, as "support" is the 19th most frequent word in this analysis.

Debates on devolution by proxy (5)

Just Transition in South Wales is highly dependent on the financial support offered from the UK government in Westminster and the Welsh government in Cardiff Bay. "Government" is the 6th most recurrent word in the document analysis and "policy" the 12th (Figure 11). However, this reliance and

unfulfilled past promises on large infrastructure projects has led to some scepticism from the local community that the significant investment needed will ever materialise (Williams et al, 2020).

It is widely accepted that the challenge of decarbonising the steel industry in South Wales is far too large for one business, initiative, or government. It is broadly accepted that the UK and Welsh governments, industry and unions must work together to deliver a Just Transition in South Wales (Glaze, 2021). Workers and unions are arguing for governments to commit the financial resources necessary to fulfil the long-term decarbonisation agenda and secure environmental, economic and social security for their local communities (Glaze, 2021). They argue that this delay is causing the UK steel industry to fall behind its international competitors, putting them at a competitive disadvantage (Glaze, 2021). In an interview with a national newspaper Alan Coombs, a trade union leader in Port Talbot Steel works, stated “Firms in Europe have already started the process and we have barely scratched the surface … In the next few years we have got to change drastically - and without a strategic plan, that leaves a lot of worry and unanswered questions for the workforce… We need to know what the collaboration is going to be between the steel industry and government, and we need to get on with it. Everybody else will steal a march on us and it would be nice to be at the front of the transformation” (Glaze, 2021). To combat this uncertainty, the union has proposed that the UK Government match funding for green steel projects (Glaze, 2021). Coombs further states “I don’t think anybody in Europe is going to be able to do the transformation without government support. It would be very difficult, if not impossible” (Glaze, 2021). In an article written by another steel worker from Port Talbot, Mark Davis concludes by calling to Governments “for our towns, our cities, our country and our planet – it is time for the government to step up and deliver” (2021).

5.2.2 Interpretation

In the context of Welsh CET debates, technology-centric narratives associated with the net-zero approach to decarbonisation remain dominant, while important scientifically-grounded critiques of this approach barely register. This is problematic. When deciding on the best course of action, it is important to consider competing arguments and perspectives. In the context of climate change mitigation policy, this is especially important given that there is very little margin for error. Indeed, it is no exaggeration to say that incorrect choices today have the potential to lock-in catastrophic consequences further down the line. That is not to say that all perspectives should be given equal consideration. For example, when it comes to CET deliberations, climate denialism should have no place at the table. However, when a significant proportion of the climate science/research community have substantive empirically informed critiques of the dominant approach to climate policy (e.g. Stoddard et al., 2021; Hickel et al., 2021; Hickel and Kallis, 2021), it would seem prudent for policy makers and other key actors in (Welsh) CET deliberations to constructively engage with these critiques.

Another key finding is the presence of narratives of exclusion. These narratives were principally identified in the context of the dispute over the future of Aberpergwm colliery. Such narratives express concerns, principally from local residents, that proposals to close the colliery on climate change grounds will result in more unemployment, further disinvestment and place decline. Given that this community - like many others in the South Wales valleys - are already struggling with high levels of unemployment, a painful legacy of the pit closures that occurred during the 1980s and 90s), these concerns are highly understandable. Although these narratives are relatively marginal in Wales, there is potential for them to become more prevalent in the future; especially if

decarbonisation policies are not carefully designed to ensure that livelihoods and communities are protected.

To pre-empt this eventuality, “just transition” narratives argue that decarbonisation need not leave any worker or community worse off. On the contrary, just transition narratives argue that - if financed, planned, and executed correctly - decarbonisation has the potential not only to protect livelihoods and the environment, but to improve people’s lives. These narratives typically place strong emphasis on the need for investment in low carbon technologies to protect existing jobs (e.g. in the Welsh steel industry) or to create new ones (e.g. in the renewable energy sector). In this respect, just transition narratives are closely related to the technology-centric narratives outlined above. Importantly, by framing decarbonisation as an opportunity (rather than a threat), these narratives help mobilise public support for the CET. However, linked with the aforementioned risk whereby narratives of exclusion become more salient, the future success of just transition narratives - and the CET - is contingent on the implementation of policies that make them a reality.

Finally, another important finding is that the success or failure of Wales’ CET is heavily dependent on decisions made beyond Wales; most notably by the UK Government. This is because the latter retains key policy making powers in areas of importance to the CET (e.g. monetary, fiscal, energy, industrial, and transport policy). When it comes to these domains then, the Welsh Government’s room for maneuverer is especially limited. Moreover, as illustrated by the dispute over who has responsibility for coal mining, because the UK and Welsh governments are run by competing political parties with divergent interests and ideologies, collaboration is disincentivised. This is especially problematic given that successful climate change mitigation will likely necessitate unprecedented levels of societal cooperation.

5.2.3 Gender dimension

It can be concluded that the dominant voice in the decarbonisation debate is male, and that a technocratic approach has the potential to ingrain or exacerbate gender inequalities, particularly in an era of austerity where governmental money invested in one project means that it cannot be invested elsewhere. A technocratic approach will also curtail the transformative potential of the transition. Therefore, it could be considered essential that those who drive decarbonisation and transition within the region are cognisant of the legacy of past economic and gender structures and acknowledge the continued risk of limited economic complexity. The decarbonisation process should not focus only on the decarbonisation of the steel plant as a site, but on a wider regional system-based approach to being less-carbon intensive. This should include diversification into other industries and a system to better encapsulate inequalities that may be notable, but not remarked upon.

This emphasises the need to continue to question the likely impact on gender dimensions within the region as a result of decarbonisation. It could be advanced that a continued technocratic approach to decarbonisation has the potential to continue or exacerbate structural gender disparities. Whilst the evidence shows that respondents do not identify gender with relation to a just transition, the gender impacts in Port Talbot are dominated by economic framing – deindustrialisation, the legacy effects of economic structure, and limited economic complexity. With reports in July 2022 that Tata Steel were seeking some £1.5bn as 50% of the investment needed for electric arc furnaces, questions must be asked as to how this money could be best utilised for the region to address inequalities (gender, health, intergenerational) in an era of austerity and limited economic variety.

Indeed, with a continued focus on preserving primary steel making and technology to address decarbonisation, there is a risk that these jobs will continue to be primarily 'male' jobs.

5.3 Socio-ecological and technical component

This section provides an overview of the transformative capacity of the region to shape its decarbonisation pathway. The focus on transformative capacity allows us to discern the extent to which a region is actually capable of deviating from its current (carbon-intensive) trajectory towards sustainable outcomes. Transformative capacity is understood in this context as an evolving collective ability to conceive of, prepare for, initiate and perform path-deviant change towards sustainability within and across the multiple complex systems that constitute the regional or urban area undergoing a 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. Wolfram (2016) identifies ten interdependent components to assess the transformative capacity of a region. These components are selected based on a literature review. Transformative capacity is strongly influenced by the governance of the regional decarbonisation or clean energy transition in question. Three governance and agency components are critical to the ability of a regional development apparatus to foster transformability of a system: the inclusiveness and multiformity of governance arrangements (C1); polycentric and socially embedded transformative leadership (C2); and the empowerment and autonomy of relevant communities of practice (C3). These elements are preconditions for the transformability of a system: there needs to be connectivity and responsiveness built into governance, effective leadership able to bring people together around a vision and actors empowered to experiment and innovate. These three attributes must be developed by stakeholders in capacity development processes to enhance their transformative potential, including enhancing understanding of the systems of which they are a part (C4), engaging in participatory visioning and alternative design scenarios (C5), experimenting with novel solutions to social needs (C6) and ensuring that these innovations can be embedded (C7). Ideally, this can be seen as a learning loop, where system(s) understanding helps inform visions and pathways, which in turn orient experimentation, with successful innovations being embedded and better system understanding resulting from this process. These processes should be fed back into governance through social learning (C8) as well as effective involvement of actors at different scales (C9) and levels of agency (C10). These components were assessed through mixed quantitative and qualitative interviews with various stakeholders engaged in the CET.

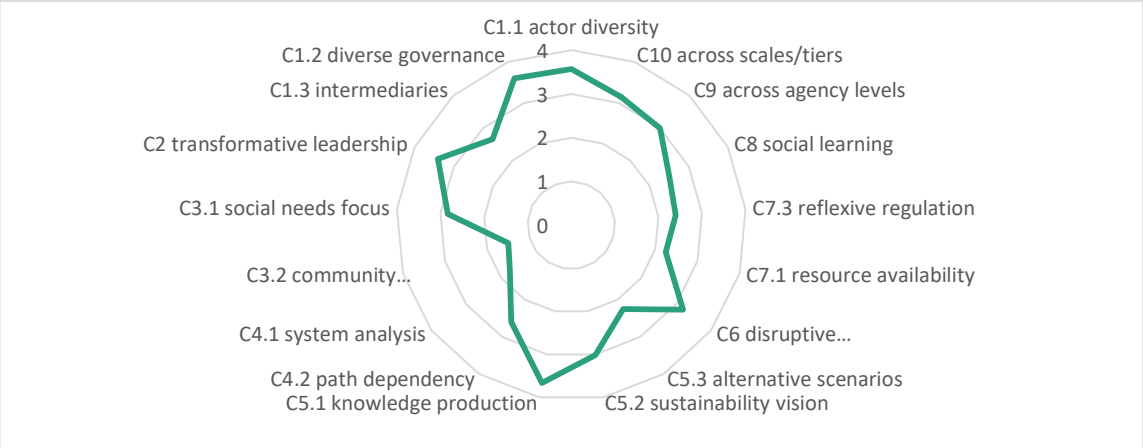
5.3.1 Summary of results

Overall Assessment

This component, which is based on eight interviews with key stakeholders in Wales CET, consisted of a quantitative aspect and a qualitative aspect. The quantitative aspect is based on stakeholders' numerical assessment (1-5) of Wales' transformative capacity in a range of areas. 1 = low capacity, while 5 = high capacity. While the qualitative aspect was primarily based on stakeholders' justification for the numbers they selected, it also drew on secondary data from online sources (e.g. news media, government documents, industry body websites etc.).

Of the eight stakeholders interviewed seven responded to the quantitative aspect of the socio-ecological and technical component. Stakeholders' quantitative assessment of transformative capacity made it apparent that no factor was highly rated by stakeholders. Indeed, the highest rated factor – 'knowledge production' - only received a score of 3.7, while the next two highest – 'actor diversity' and 'diverse governance' - were both rated 3.6, respectively. The factors stakeholders rated lowest were community empowerment (1.5), system analysis (1.8), and resource availability (2.3). Ratings for the remaining factors occupy the middle ground between these highs and lows. As no score of 5 was achieved for any factor the following graphic uses the scale 0-4.

Figure 11 – Quantitative Assessment of Transformative Capacity, Stakeholders (Aggregated Mean)



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

Although we also compared stakeholders by group, the sample sizes were too small to draw any strong conclusions from them. The three groups we compared were Public sector (n=3), Third sector (n=3), and Private sector (n=1). In the following section we highlight some key findings, further details are available in the accompanying Thematic Analysis.

Actor diversity

There is evidence to suggest that, in the context of Wales' CET, a range of actors are participating in deliberative actions with public sector actors. Most notably, there is significant engagement between different layers of Welsh government, the private sector, and civil society organisations such as universities and research institutes. The FLEXIS consortium - a collaboration between Cardiff University, Swansea University, The University of South Wales, Neath Port Talbot Borough Council and Tata Steel UK - is one notable example of such engagement. Part-funded through the European Regional Development Fund, a key aim of FLEXIS, which has been operating since 2016, is 'to successfully develop and create an energy systems research capability in Wales' (FLEXIS, 2022). FLEXIS also aims to 'produce the graduate research engineers that are needed to make Wales one of the global leaders in energy research and…drive forward net zero solutions to help achieve 2030, 2040 and 2050 targets' (ibid.). Unsurprisingly perhaps, given Tata Steel UK's presence on the consortium, FLEXIS and other emerging CET initiatives/formations (e.g. The South Wales Industrial Cluster, Net Zero Industry Wales etc.) are strongly oriented towards the decarbonisation - and growth of - existing industry (ibid.).

There was a consensus amongst interviewees that while no groups are being purposefully excluded from CET deliberations in Wales, many are not participating. In this regard, more than one interviewee noted a lack of engagement from the public (beyond a minority of motivated climate campaigners), while some emphasised the challenge of persuading people that far-reaching changes are required. One interviewee argued that the voices of powerful groups tend to dominate CET deliberations, while not enough effort is being made to ensure the voices of less powerful actors are included. Somewhat in line with this latter point, one interviewee noted how larger businesses have more resources and capacity to engage with the CET than SMEs who are often just struggling to survive. These observations chime with the recent developments described above (e.g. The South Wales Industrial Cluster) where larger companies have come together with government and certain sections of academia to work on the decarbonisation of industry. Interestingly, one interviewee noted how some groups fear being excluded from CET deliberations. While placing groups linked to the old coal-based industries in this category, they also cited the names of specific organisations involved in the distribution industry.

Finally, one interviewee argued that the Welsh government's territorial (Net-Zero Wales) approach uses tools and discussions which are much more amenable to action from people and organisations who are specifically Welsh. However, they suggested that this territorial approach is less adept at engaging businesses and organisations that emit carbon in Wales but, which have headquarters and - crucially - decision-making powers located elsewhere. This interviewee argued that while such organisations may be engaging with the decarbonisation agenda in some shape or form, they are less likely to do so under the aegis of Net-Zero Wales.

Experimentation and pilots

While a significant amount of CET-minded experimentation is occurring in Wales, how disruptive - or joined up - these experiments are remains to be seen. In this regard, stakeholders identified several barriers to the scalability of CET experiments. One key barrier identified by interviewees was the challenging financial landscape in which experiments are undertaken . In addition to the absence of adequate funding to scale up CET-minded initiatives, the short-term nature of funding models was also identified as a problem. For example, one interviewee argued that such funding models disincentivise risk-taking and long-term planning, while forcing actors to prioritise projects they are confident can be delivered within the timeframe stipulated by funders.

Related to the above, prohibitive costs were also identified as a barrier to scaling up experiments. To illustrate this point, one interviewee referred to the Caerau Heat Scheme project, which has received financing from the European Regional Development Fund via the Welsh Government. Spearheaded by Bridgend County Council, but supported by a range of stakeholders including Welsh Government, Valleys to Coast Housing, Cardiff University, and The Coal Authority), this project originally aimed to provide heating and hot water services to properties in Caerau by drawing on thermal energy contained within flooded former coal mine workings. However, these ambitions were scaled back after early appraisals indicated that the project could be prohibitively expensive. Under the revised plans, thermal energy from the flooded coal workings will heat a local school, but significantly fewer residential dwellings than originally envisioned (Bridgend County Council, 2022).

Related to the above, the complex regulatory environment in which CET-minded experiments take place was also identified as a barrier; not only to scaling up CET-minded experiments, but to getting projects started in the first place.

Absence of clear roadmap

In general, there is widespread acceptance amongst the Welsh public of the need for a CET to decarbonise society and combat climate change. Similarly, there is also a general consensus - rhetorically at least - that decarbonisation policies should seek to improve people's lives; especially those of more vulnerable groups (Welsh Government, 2021b). These sentiments were reflected in the stakeholder interviews.

Nevertheless, despite this broad consensus, an explicit, far-reaching, collectively produced vision regarding what a Welsh CET would mean in practice is notable. To some extent, this absence was illustrated by some of the divergent opinions articulated within the interview sample. For example, some interviewees argued that - due to its disproportionate carbon footprint and the huge challenge of decarbonising steel production within the necessary timeframe - the Port Talbot steelworks may need to close. Conversely, others argued that - with the necessary financial and policy support from the UK and Welsh governments - the Port Talbot steel works could play a key role in the CET. Unsurprisingly, this latter position is shared by Tata Steel and the trade unions representing their employees (e.g. Dickins 2021). These divergent positions on the future of the Port Talbot steelworks speak to broader tensions between competing ideas regarding what Wales' CET will look like and the scale and nature of the political economic and social changes this will require.

The fact that the Welsh and UK governments are relatively silent on the future of the Port Talbot steel works speaks to a common criticism that came up frequently during the interviews: namely, that despite it being their responsibility to articulate an explicit far-reaching sustainability vision of what the CET will mean in practice, both governments are failing to publicly articulate such a vision.

Dearth of systems analysis

In the context of Wales' CET, there appears to be a dearth of systems analysis being used to inform policy and practice. There was a strong feeling amongst interviewees that it is at the governmental levels (both UK and Welsh) where such analysis is both most necessary and lacking.

During the interviews, several reasons were suggested to explain this situation. Some interviewees noted that the cabinet-based government model - where ministers are responsible for individual portfolios (e.g. climate change; economic development; health; transport etc.) - is not conducive to joined up policy making that foregrounds the interdependencies between different domains. For example, one interviewee lamented the fact that the Welsh Government's Department of Health and Social Services had overseen the construction of new hospitals on the outskirts of Welsh towns, locking hospital staff and patients into dependence on fossil-fuelled transport for decades to come. Under a more climate conscious approach, these hospitals would have been built in town centres, making active travel options such as walking and cycling more viable, they argued. Austerity and budgetary constraints/time constraints, a dearth of skills and knowledge, and the conservatism of siloed professions were also identified as potential barriers to systems analysis.

Devolution of politics frustrating cross-scalar collaboration

Another clear finding concerns the complexities of UK devolution politics and their role in frustrating cross-scalar collaboration on the Welsh CET. This situation is most apparent in the fraught relations between the UK and Welsh governments. Several interviewees identified these fraught relations as a key barrier to a successful CET.

In addition to contestation over who has - or should have - responsibility for which policy areas (e.g. the dispute over who has the power to rescind the mining license for Aberpergwm Colliery), the UK and Welsh governments divergent political interests and agendas also manifest in other ways. Another key point of contention concerns the Welsh government's monetary and fiscal dependence on the UK government. Indeed, because the UK government reserves key powers over fiscal and monetary policy, the overall budget the Welsh government has to spend on the CET is heavily circumscribed by the amount of money it is allocated each year from the UK government via 'the block grant'. The Welsh Government does have some powers to raise funds through specific forms of taxation (e.g. Welsh income tax, land transaction tax, landfill disposal tax) and limited amounts of borrowing. Nevertheless, around 81% of its budget still depends on the 'block grant' (Welsh Government, 2021c). Echoing a point regularly made by the Welsh Government (e.g. Welsh Government, 2021d), several interviewees argued that the UK government needs to provide more funding for the CET.

Linked to the above, the UK's exit from the European Union has, arguably, also altered the balance of power within the UK. For example, one interviewee argued that this exit had impacted upon the Welsh Government's ability to mediate between actors working at the European and local levels. When Wales was able to bid for EU structural funds, this empowered the Welsh Government to play an active role in fostering such collaboration. However, with this type of funding no longer available, Welsh local authorities must now go directly to the UK government to fill the gap. In the context of the strained UK-Welsh government relations outlined above (not to mention former's fiscal power viz a viz the latter), this situation has weakened collaboration between local authorities and the Welsh Government, while strengthening the hand of the UK government in domestic politics, they argued. Linked to this, one interviewee argued that UK Government's competitive funding model was another barrier to effective cross-scalar collaboration.

5.3.2 Interpretation

A key finding of this report is that, relative to other areas of activity, the Welsh Government has done a reasonable job of promoting actor diversity in CET deliberations. In this regard, most interviewees agreed that the Welsh Government has sought to include a range of voices in such deliberations. Nevertheless, as indicated by the 3.7 rating which interviewees collectively assigned to this factor, there is still room for improvement. Indeed, a common theme from the interviews was that while better resourced actors (e.g. larger firms) tend to have more capacity to engage the decarbonisation agenda, more needs to be done to facilitate engagement from the general public who, beyond a minority of committed campaigners, are generally not involved. Correcting this engagement deficit will not be easy, especially in the current inflationary context, which is not only squeezing the Welsh Government's already limited resources, but is also likely to further reduce the Welsh citizenry's capacity to engage in CET deliberations. However, if the Welsh CET is to be successful in its stated aim(s) of combatting climate change and social injustice, it is imperative that ordinary citizens are engaged actively in the process. While such engagement would increase the legitimacy of subsequent CET policy decisions, it would also help ensure the latter meet people's needs. Moreover, democratising CET deliberations even further should also dilute the influence of more powerful actors whose narrow organisational interests do not necessarily align with the imperatives of decarbonisation.

Another important finding concerns the proliferation of CET experiments and pilot projects. Indeed, there appears to a substantial amount of innovative CET experimentation in Wales – especially around the development and deployment of new technologies. However, there remain significant barriers to scaling these experiments up. Chief amongst the barriers is the huge amount of capital investment this scaling would require, and the (current) inability of the Welsh Government to provide this due to its fiscal reliance on the UK Government. However, whether or not the UK Government will provide this investment remains to be seen. On this front, there are reasons to be sceptical. Firstly, because the free market ideology that is pervasive within the ruling Conservative Party is not permissive of such investment. Second, as our next key finding indicates, the strained relationship between the Welsh and UK governments is another important barrier.

Our next key finding concerns tensions and disagreements between the Welsh and UK governments regarding the politics of devolution and the negative impact this has on their ability to collaborate effectively on CET issues. Given their divergent political interests and ideological orientations, this failure is not overly surprising. Nevertheless, surprising or otherwise, it is imperative - given the gravity of the climate crisis - that both governments put their differences to one side and collaborate as effectively as possible to deliver a just CET for Wales and the rest of the UK.

If the Welsh and UK governments were to collaborate effectively on CET issues, it would be useful for them to have a shared vision or roadmap regarding what this would entail and the type of society and economy that will result. However, another important finding from this report is that such a vision is noticeable by its absence. Given the scale and complexities of the decarbonisation challenge, the difficult choices this challenge entails (not to mention the influence of entrenched vested interests), this absence is not overly surprising. In a certain sense, the vagueness of present decarbonisation plans is useful to the extent that it enables a broad spectrum of society to support the CET. However, it is also problematic for at least two reasons. Firstly, it is governments' (UK and Welsh) responsibility to enact policies, laws, and regulations that enable (and constrain) other actors in ways that facilitate investment and actions that drive the CET forward. However, if these are instituted in an ad hoc manner, untethered from a broader vision of socio-economic and ecological transformation they are less likely to be successful. Second, in the absence of an explicit sustainability vision, which society has debated and critically examined in light of alternatives options, there is a real risk that decarbonisation proceeds according to an implicit vision which has not received this level of scrutiny. Indeed, as our last finding indicates, there is evidence that something akin to this is occurring in Wales.

Linked with the previous finding, the report also identified a paucity of systems analysis within the Welsh CET. This is arguably reflected in the unchallenged hegemony of the 'net-zero' approach to decarbonisation, which is favoured by the UK and Welsh governments but also supported by a range of actors in business, trade unions and academia. While this approach contains several core assumptions regarding the decarbonisation of social/political-economic systems, in the context of Net-Zero Wales, these assumptions remain mostly implicit and are rarely scrutinised or critically examined publicly. This is concerning because the net-zero agenda and its underlying assumptions are strongly contested by sections of the global climate change/sustainability research community (e.g. Skelton et al., 2020; Anderson et al., 2020; Bragg et al., 2020). In line with the net-zero approach more generally (e.g. Anderson et al., 2020), Net-Zero Wales assumes that economic growth is an unquestionable necessity that is required to deliver societal wellbeing (e.g. Welsh Government,

2021e). However, leaving aside the many critiques that have been levelled at growth and its assumed relationship with 'the good life' (e.g. Jackson, 2016), from purely a climate change mitigation perspective, this assumption is problematic: for 'growth is projected to drive a significant increase in energy demand over the coming decades, making it more challenging to decarbonize the economy' (Hickel et al., 2021; 766). To reconcile such growth with climate change mitigation, net-zero approaches 'gamble on dramatic technological change, particularly negative emissions technologies and productivity improvements big enough to drive absolute decoupling of gross domestic product (GDP) from energy use' (ibid: 766; see also Anderson et al., 2020; Skelton et al., 2020). However, it is far from clear that negative emissions technologies (untested as scale) or the absolute decoupling of GDP from energy use (hitherto unrealised) are feasible strategies for addressing the climate crisis (Hickel and Kallis, 2020; Anderson et al., 2020; Larkin et al., 2021). Such critiques are often accompanied by calls for governments to embrace post-growth policies to mitigate the impacts of climate change and ecological overshoot while meeting social needs (e.g. Hickel and Kallis, 2020). While post-growth ideas may not be regarded as feasible - or desirable - by the UK and Welsh governments, it is important that they reflect on the feasibility of their own strategies. Engaging with the above critiques should form an important aspect of this process, if only to stress-test their own assumptions and facilitate the development of more robust systems analysis, public debate, and CET policies.

5.3.3 Gender Dimension

Data is not available on the representation of gender in the decarbonisation debate in Wales. It is known that women currently hold two of the public roles most directly related to decarbonisation in Wales. Julie James MS was appointed as Wales's first Minister for Climate Change in May 2021. Sophie Howe was Wales's first Future Generations Commissioner (FGC), a position she held between 2016 and 2022. At the time of this report, a new FGC is in the process being appointed. However, the socio-political analysis found a dominance of male voices in the decarbonisation narrative, with a focus on technological responses to decarbonisation of the steel industry. When viewed from the perspective of transformative capacity (socio-technical and ecological analysis), the gender component is also understated. Here, the emphasis appears to focus more strongly on securing the desired environmental outcomes rather than consideration of differential impacts by gender.

5.4 Conclusion

The socio-political, ecological and technical components all found a focus on technological responses to the challenges of decarbonisation, with a desire to retain primary steelmaking whilst reducing carbon. This introduces a number of challenges, particularly for a "just transition" where an adherence to the existing territorial narrative may entrench exclusion – women are paid below the Welsh and UK average whilst men are paid above the average. A continued technocentric, steel-orientated response will limit the path-breaking transformative potential of any transition. So too will an absence of co-ordinated activities. Whilst the evidence uncovered the range of actors engaged in decarbonisation, the absence of an agreed roadmap that guides policies and experiments was commented upon by participants.

CHAPTER 6

CHALLENGES, COPING STRATEGIES & GENDER

6 Challenges, Coping Strategies & Gender

6.1 Challenges in South Wales

There are five key challenges identified in the case study of decarbonisation in South Wales, focusing on the Port Talbot Region, these are summarised in Table 12. Due to the interwoven nature of these challenges and coping strategies, this section will discuss the causes and outcomes of witnessed phenomenon collectively.

Table 12 – Inclusive and multiform governance

Challenge	Coping strategy
Economic restructuring and lack of industrial complexity	• Out migration • Lower order economic activities • Regeneration • Economic stimulation efforts
Distributed governance	• Devolution of opposition • Each sector doing own thing • Pilots/innovation project • Resistance to non-local initiatives
Loss of place identity and control	• Voice emerging to reclaim identity • Community-based cultural activity
Decarbonisation trade-offs and benefits	• Acceptance of change/self-reliance outlook • Regeneration • Technological/green investment
Gaps in capacity, skills, and resources	• Institutional rather than territorial issue • Actors focus on what can be controlled • Prioritisation of actions and engagement with training

Significantly, Port Talbot has been undergoing **economic restructuring** for many years as a result of transition instigated by deindustrialisation and globalisation. Overall, there has been a significant reduction of employment at the steel works and other manufacturing employers. This presents a territorial challenge for those that live in the locality due to low job density and coping strategies include a need for commuting or ultimately out-migration. In turn, with reduced citizen numbers coupled with advancing digital technologies, demands for services are reduced and may contribute to community infrastructure degradation. One such example is the closure of one of the local banks (Strain Situation 2).

The existing **limited industrial or sectoral complexity** makes the challenge of continued out-migration due to economic restructuring even more pronounced in light of ongoing decarbonisation of industrial activities. Currently, the major employers in the region are Tata steel and public administration, with the former at risk from decarbonisation and the latter at risk from austerity. Further, the data shows that there are limited opportunities for managerial, professional, or senior

official roles with a documented coping strategy being the undertaking of lower order economic activities. These are factors that may contribute to further out-migration due to the personal challenges this introduces. Quality of life is also important, where Port Talbot has a higher-than-average level of long-term sickness, pointing to a range of other potential strains in the area that relate to working conditions, environmental factors, and deprivation. The challenge for the region lies in addressing these existing inequalities whilst also planning what may happen to this industrialised region during decarbonisation processes.

A further coping strategy for this ongoing economic restructuring and limited industrial diversification is investment in regeneration and economic stimulus initiatives. These projects are being undertaken by local and national government in recognition of the potential impact they could have on addressing challenges in the region. However, this in turn leads to an additional challenge of **distributed governance** where multiple actors that seek to promote energy transition in Port Talbot and contiguous areas have overlapping but not identical geographical remits that do not align neatly with statistical geographical units (NUTS).

The challenge of distributed governance instigates numerous coping mechanisms. Principally, each sector seeks to mitigate the scenario in individualistic ways which in turn brings into question the level of shared goal - something considered important for effective system transition. Some actors seek to stimulate economic growth through competitive funding (the Swansea Bay City Deal) and others seek to tackle decarbonisation and clean growth (The South Wales Industrial Cluster (SWIC). This perhaps suggests that to address existing challenges without creating future problems, a more cohesive approach is needed in the region respecting the concurrent challenge of residents feeling that they have little control over decisions made within the territory. Indeed, the scale at which activities take place is another cited challenge within the region. The evidence shows that much of the approach to a just transition is at a generalised Wales-level, rather than directly governing the regions that will lose most from decarbonisation processes. Calls are made for a higher level of granularity for policy and a specific roadmap for Port Talbot.

At the same time, these multiple actors from within and without the region stimulates another challenge, with survey evidence highlighting how Port Talbot residents are concerned with the **low level of influence that they have on high-level decision making**. This key message emerging from the mapping of strain situations has catalysed coping activities that focus on developing a voice to reclaim place identity and includes community-based cultural activity. Whilst Port Talbot is historically synonymous with steel production and the steel works has been the major employer for many decades, the survey data identifies that citizens are poised to embrace a new identity in the decarbonisation process and the ensuing **loss of place identity**. Previous deindustrialisation activities in Wales have evidenced places must have an evolving identity, rather than considering themselves “former” industrialised town as is the case with much of the coal industry. Respondents recognised that the area will be adversely affected by decarbonisation, and that Tata is no longer as prolific an employer as previous years. However, there is a prevailing sentiment that innovation and processes of Eco modernisation will protect the current workforce. Indeed, very few research respondents were planning to undertake additional training and reskilling.

This coping strategy that relies on pilot projects and innovation also falls foul of resistance by residents to non-local initiatives, tying to the ongoing sentiment that limited control is given to the community to shape the future identity of their region. The challenge of **decarbonisation trade-offs**

and benefits is recognised by respondents and is met with acceptance and a community outlook of self-reliance. However, the evidence suggests that there is no political will to see the end of primary steelmaking in favour of recycled steel, perhaps supporting the technocentric approach that the steel works will continue. Indeed, the Net Zero narrative is utilised to reinforce the need for primary steelmaking in Port Talbot as opposed to 'exporting' carbon emissions to other locations. Further, with local primary steel production it is possible to enforce the use of more environmental manufacturing processes, thus the Net Zero debate becomes linked to a technocentric approach and place identity.

A particular challenge for the steel industry in Port Talbot are **gaps in capacity, skills and resources**. This is an institutional rather than territorial issue but means that difficulties can be encountered when engaging with economic restructuring and decarbonisation. The need for extant capacity to engage with such processes means that existing power-imbalances tend to be reinforced excluding smaller, more locally based groups and businesses. In response, actors focus on what can be controlled, potentially leading to the fragmented approach that is documented earlier. It is also necessary to prioritise actions and engage with training, although the evidence suggests that this is happening in a limited way in Port Talbot.

The presence of multiple actors and initiatives can pose a greater challenge for ensuring a **'Just' transition,** it is widely accepted by respondents that decarbonisation processes are likely to have uneven regional impacts, with the Port Talbot region 'paying the price' whilst other regions benefit. Despite this, respondents were supportive of decarbonisation as they considered the overall benefits outweighed the local cost. Few respondents sought to engage with protest against decarbonisation within the region, but also were not hopeful about the short-to-medium term prosperity of the region. At the same, those that are reliant on carbon-intensive activities are concerned that they are being overlooked. Some respondents suggested that this need for existing capacity to be able to engage means that change would be business-led, resulting in a less transformative change as might be desired.

Further, whilst there pay disparities within the region that are likely attributable to male employment in the steel industry, research participants did not highlight any ongoing challenges based on gender. This is due, perhaps, to the declining importance of the steelworks as an employer in the region. Concerns were raised around inter-generational justice, with the lack of industrial complexity and reduced numbers of job from these employers posing a greater challenge for the region. This suggests that alongside the need to 'cope' with territorial challenges it is also essential to build in the capacity to adapt and transform, where purposive transformation is more likely to achieve a more equitable transition. Achieving a 'just' transition can therefore be considered a local and national challenge.

6.2 Interactions among different components

Exploring the interactions amongst the various components of the MAF highlights the importance of the complex inter-relationships revealed. As sites of both situated knowledge and practice (Rodina et al, 2017) and locations of activity with physical, social, economic and institutional characteristics urban centres create unique and complex spaces of coupled relationships (Bristow and Healy, 2014; Coenen et al, 2012). This is particularly evident in the case of Port Talbot, as our conceptual framework illustrates. Clear trends are identifiable under each of the main themes of the framework

(socio-economic, socio-technical, socio-ecological, socio-cultural, socio-political, socio-psychological), yet their interactions are complex.

Port Talbot has **been a town in transition for many years**. Deindustrialisation and globalisation trends have led to an economic restructuring that has reduced levels of employment at the Port Talbot steelworks and in other manufacturing employers. Low job density limits opportunities for local employment which has contributed to the strain of out-migration, which in turn reduces local demand for services and may contribute to the reported loss of community infrastructures. Out-migration may also be fuelled by the limited opportunities for managerial, professional or senior officials' roles, suggesting that those who wish to find higher level employment need to leave the area. b

The economy is also reliant on manufacturing employment and public administration roles. This lack of diversity leaves the **economy exposed to the effects of negative economic shocks**. Whilst unemployment in Neath Port Talbot is currently low and male wage rates are above the Welsh average, there is a pervasive concern regarding the future economic outlook for Port Talbot amongst surveyed residents. In part, this concern emanates from a sense of uncertainty and dependence on external decision-making over which residents have no control – a key message emerging from the mapping of strain situations. Higher than average long-term sickness levels point to other potential strains in the area, such as poor working conditions, a poor environment or socio-economic deprivation. Respondents also suggest that the area is likely to be adversely affected by the process of decarbonisation, yet **few are undertaking, or plan to undertake, retraining** or develop new skills. This shows one of the responses to the challenge – apathy, not uncommon or maybe a hesitancy due to the techno approach with no finished/chosen technology – what exactly do they retrain for? Further, overwhelming majority is now employed by gov, stable job – security, no need to do so, following paragraph reinforces 'she'll be alright' outlook

Steel remains a key industrial sector and, unlike the experience of the coal industry in Wales in the 1980s, there is little suggestion that there is a political will to see the end of primary steel making. Indeed, arguments in favour of retaining primary steelmaking (as opposed to steel making using recycled steel) in the UK now often reference the importance of not 'exporting' carbon emissions to other locations through closing local steel-making capacity and raising steel imports – utilising net zero argument to support techno approach, perhaps tied in with local identity too. This argument of taking responsibility for carbon emissions has also been evident in the debate over the removal of mining licenses for the Aberpergwm mine. It is against this background, of the significance of steel, that the **dominance of the technocentric narrative** of decarbonising steel production might be read.

There is, as yet, no sign that, as an economy or society in the UK, we are pursuing alternative energy futures or transformative 'degrowth agendas' advocated by some within academia and civil society (e.g. Mastini et al., 2021). As with steel, a technocentric narrative for delivering a net-zero carbon future, coupled with behavioural changes amongst consumers, underpins the policy approaches and strategies published in Wales. From our survey work, there is evidence that this pursuit of decarbonisation is accepted by local residents. **The benefit of** decarbonisation **for the environment is recognised, supported, valued and perceived to be a fair process**. There is a belief that Port Talbot will bear the costs of this transition, whilst others are likely to reap the benefits. This is not

though a focus for resistance, and most respondents to the survey did not engage strongly with protest movements or debates.

Two strong **examples of resistance** to elements of the energy transition could be found in the local area. One was led by the Trade Union movement advocating for the retention of coal mining licenses at Aberpergwm colliery, citing the potential for adverse employment effects, high levels of local unemployment and the environmental cost of importing coal. The second was local resistance to the Y Bryn windfarm, citing loss of environmental amenity and limited local employment benefits.

Across Wales there is a **strong consensus** on the need to meet agreed targets for a decarbonised economy. There has been active engagement with a diverse group of actors and the emphasis on securing a '**just transition**' is an important element in the consensus building approach. However, this approach tends to have been focused on a 'Wales'-level conversation, and so relies on those bodies that have the capacity to engage. Whilst there is broad agreement on the strategic goals and ambitions, criticisms have been raised regarding the limited granularity of policy documents and the absence of a roadmap to guide actors along agreed pathways. Policy commitments are also not always matched by financial commitments. In part this reflects the complex political geography of the UK, whereby Welsh Government has limited financial resources to invest in the decarbonisation agenda, a situation that has been exacerbated by the financial settlements following the UK's exit from the EU. Stakeholders also commented that the competitive nature of much of the UK's funding environment also works against supporting the major investment shifts required to achieve the energy transition in a socially-just manner.

There are numerous examples of actions being taken to support the energy transition; to alleviate its potential negative consequences, and promote the regeneration and diversification of the Port Talbot economy. Investments are made in support of skills development, property and facilities, new businesses and business expansion and research and innovation activities. Much of this investment is made in and around Port Talbot and/or is connected to core actors, such as Swansea University, Cardiff University and major businesses, such as Tata Steel Wales. However, our research suggests that many regard the actions being taken as **fragmented, lacking collective coherence and focused on innovative pilot actions** that are time-limited. In part this reflects a disjointed funding landscape, the short-term nature of much financing and the commitment to competitive funding procedures. It favours those with the capacity to bid for funds and to implement projects. A potential contributory factor to the fragmented landscape is the nature of the dynamic contestation of devolved governance arrangements in the UK. At times the decarbonisation agenda in Wales appears to represent a devolution debate by proxy, with the distribution of powers between Welsh Government and the UK government disputed and even uncertain.

One consequence of a reliance on groups with an extant capacity to engage is that it **tends to reinforce existing power-imbalances**. This has privileged traditional actors, national bodies and particular business interests. It tends to have excluded smaller, more locally-based groups and smaller businesses. There are also concerns amongst some actors, particularly businesses, who are reliant on carbon-intensive activities as to whether their voice and interests are being over-looked, with the **risk of creating new categories of exclusion**. Some stakeholders suggest that the reliance on existing capacity to act means that the effective agents of change will be business-led, resulting in a transition that may not be as 'just' or as transformative as some actors wish to see. One reflection of the capacity-framed approach is that Local Authorities in Wales (as part of the

Welsh public sector) have until 2030 to establish carbon-neutrality in their own operations. In the presence of their own capacity constraints many Local Authorities are likely to focus on delivering their obligations, rather than leading a wider transformation across their area. Overall, the impression formed through the case study is of actors focused on delivering their obligations/priorities within a broad overarching strategic ambition encapsulated by the net-zero carbon target. Several interviewees reflected that this was **resulting in a transition that, in practice, was being driven by atomised interests**, with the risk that the form of the transition was being dictated by those with the resources to act in their own interests, rather than the goals of a 'just' transition.

An important finding of the research has been the **strong sense of attachment to Port Talbot** reported in the survey. Respondents valued its location and the strong ties with family and friends. Most are not considering leaving the area. This sense of place was confirmed in the Virtual Focus Group, however, the group also emphasised the sense that the area has been progressively losing control over its own destiny, with a **strong message of deterritorialisation** emerging through the successive ownership structures of what is now Tata Steel Wales; the amalgamation of political administrative units in the name of efficiency and the increasing dependence of the area on external (dis)investment decisions. It is in the light of this loss of control and the economic buffeting that has affected Port Talbot over recent decades that the **self-reported resilience of respondents** to the online survey can be read. Interestingly, whilst a narrative of a geographical shift in the locus of control away from the locality can be made, this is not felt at the personal level. Individual survey respondents generally reported feeling in control of their own futures. Significantly, an important minority do not feel in control or resilient to changing circumstances highlighting the distributional effects of circumstance and outlook.

The strength of place attachment, strong social identity and sense of managing one's own future underpins a process of re-emergence within Port Talbot. This builds on the heritage of the area whilst also embracing new visions. As such it represents a process of continuity but also reinvention. Crucially, there is a strong impression of these emergent futures being self-narrated, whilst supported by external actors. Examples such as Michael Sheen's 'Passion' and ARTwalk embody the confidence and pride present in Port Talbot. Similarly, the embracing of environmental and biodiversity narratives at the local level speak to the value placed on the quality of the local environment, which is particularly pertinent in an area that is typically characterised as experiencing poor environmental quality. Whilst local residents acknowledge the challenges the area faces, they do not regard this as a 'stigma', rather they hope that by developing new visions others will see through the somewhat simplistic tropes often used for Port Talbot.

Overall, the impact of the energy transition on Port Talbot remains uncertain, yet its shadow looms large. Port Talbot is vulnerable to a transition that potentially has negative consequences for local employment, yet the energy transition is just one of many transitions that have their intersection in Port Talbot. These include political transitions (to larger administrative structures and devolved arrangements) and globalisation/deindustrialisation transitions. Whilst past transitions have resulted in deterritorialisation processes being in the ascendency, clear signs of an emergent reterritorialization through local action, co-created with external support, can be identified. At present, however, the current dynamic of the energy transition in Wales appears to reinforce a process of deterritorialization which raises questions of spatial justice and the spatiality of a 'just transition'.

6.2.1 Interaction among different units of analysis

The ENTRANCES project divides the case study into three units of analysis: the Coal and Carbon Territory, a wider Labour Market Area and a Political and Administrative Region. Our analysis demonstrates that this overly simplifies the units of analysis to be considered in the context of the Port Talbot case study. For the purposes of this section of the report the following seven units of analysis are particularly pertinent in the context of the energy transition:

1. Port Talbot
2. Neath Port Talbot County Borough Council
3. Swansea-Neath Port Talbot-Bridgend local authority areas
4. Swansea Bay City Region
5. South Wales (such as the South Wales Industrial Cluster)
6. Wales (Welsh Government)
7. UK (UK Government)

Without entering into the details of their overlapping geometries in terms of detailed policies and practices, we highlight firstly the complex, multi-layered governance arrangements that characterise the energy transition as it affects Port Talbot. We then seek to consider the role of Port Talbot in the energy transition and its affect on the energy transition.

The literature on sustainability transitions has rightly been critiqued for an assumption that actions are led by governmental actors or other institutional stakeholders operating at the national scale (Coenen et al, 2021). Authors such as Coenen et al seek to counter this by bringing the role of sub-national actors to the fore, particularly local and regional government. Our analysis demonstrates that, in the case of Port Talbot, there are numerous agents of change operating at multiple spatial scales. Drawing on the work of Hooghe and Marks (2003), we interpret the energy transition in the case of Port Talbot as representing a Type II form of governance, where there are many task-related activities, delivered by numerous (and intersecting) sites of governance, with little co-ordination amongst actors. This produces an emergent form of governance. In their seminal work, Hooghe and Marks (2003) suggest that the form multi-level governance takes is determined by a tension between community (a sense of belonging) and scale (which promotes efficiency). In practice, we have witnessed this tension in the aggregation of political administrative functions from Port Talbot to Neath Port Talbot.

The Port Talbot case study draws out the tensions of multi-level, task-related, governance very strongly. At one level we witness this in the mobilisation of the energy transition has part of the ongoing debate as to the distribution of powers between the UK government and Welsh government. This is an ongoing and highly dynamic tension that both precedes and transcends the debate around the delivery of a net-zero carbon agenda. Under the UK's devolved governance arrangements, reserved powers are those for which decisions are made by the UK parliament and government. Devolved powers are those where decisions, in Wales, are taken by the Senedd and Welsh Government. The devolution settlement is complex however as some aspects of a policy area can be reserved and some can be devolved. Or, conversely, the policy area itself can be reserved, while elements of its delivery can be devolved. In the case of Wales, energy policy is a reserved power, meaning that it is the responsibility of UK government. However, certain elements are devolved. In contrast, economic development policy is wholly devolved, although UK government may set the framework for the funds used to finance this activity. Trade and competition policy is largely a

reserved power, influencing topics such as energy price-setting or import tariffs for the steel industry. The consequence of this power dynamic is that the policies of UK Government and Welsh Government, whilst aligned around a central goal, may prove distinctively different in the chosen routes to implementation.

Similarly, we find that actions to promote the energy transition are being stimulated through a range of actors, with overlapping, but non-identical, geographical remits. As examples, the Swansea Bay City Deal (covering the local authority areas of Swansea, Neath Port Talbot, Pembrokeshire and Carmarthenshire; but not Bridgend) supports projects to stimulate economic growth through competitive funding. The South Wales Industrial Cluster (SWIC) is a grouping of major industrial companies located along the South Wales Corridor of the M4 aiming to collaboratively tackle common challenges of decarbonisation and clean growth. Membership of SWIC also includes local authorities (such as Neath Port Talbot County Borough Council), Welsh Government and national UK governance institutions (such as UK Research and Innovation). These geographical units do not align neatly with our own LMA (Neath Port Talbot, Bridgend and Swansea), which is based on statistical geographical units (NUTS3).

Although Port Talbot has been the focus of our case study, it is not an island but is an integral part of wider geographies. It is firmly embedded in the global geography of steel markets and supply chains. It is also part of a wider global economy – as the effects of changes in banking practices and retail practices illustrate. At the level of the labour market, residents make decisions about daily commuting preferences. Port Talbot sits within a wider labour market, with alternative employment opportunities available in Swansea and, potentially Bridgend and Cardiff. However, these are areas with their own economic challenges, leading some residents of Port Talbot to look further afield. These multiple geographies highlight how Port Talbot sits at the intersection of a complex and adaptive system of economic and political forces. The intersectionality of place is a core concept emerging from this work, however, what also emerges is how the place of Port Talbot is only now narrated through the socio-cultural activities of the community. Much of its previous political and economic voice has been lost through processes of de-territorialisation.

As Zürn (2020) recognises, a community requires borders (whether physical or imagined). There remains a strong sense of place around the old district borders of Port Talbot and a sense of identity/belonging (see also Hooghe et al, 2019). Within the community there is acknowledgement of the importance of promoting decarbonisation, alongside a recognition that this will have costs for Port Talbot whilst any benefits are likely to be realised elsewhere. In practice, it is not yet clear how the energy transition will affect Port Talbot. To date, the area has been the site of significant renewable energy capacity investments, whilst the one significant carbon producer (the Aberpergwm colliery) continues to operate. The future of the steel plant, which is the most significant carbon emitter, remains a topic for debate, with strong support at the national level to retain production and secure technical means to reduce emissions. As a corollary, the future form of steel production in Port Talbot may not shape the energy transition in Wales, but it will have a fundamental impact on carbon emissions emanating from Wales.

6.2.2 Gender dimension

Overall, the study has proved able to maintain a gender balance across most elements. The exception to this was the stakeholder interviews undertaken as part of the Socio-Technical element. Here the study interviewed one female and seven males. This was reflective of the availability of potential interviewees as well as an imbalance in the overall gender mix of stakeholders in the categories identified. Three of the researchers working on the ENTRANCES project identify as female and two identify as male.

Gender has not featured strongly in the analysis of the discourse of the energy transition, decarbonisation or the move towards net-zero carbon. The statistics do show, however, that the labour market in Neath Port Talbot is unequal, with male earnings substantially above female. Whilst this wage disparity is significant, it is beyond the scope of this project to interrogate the full range of causes. The disparity is likely attributable to the different employment opportunities available within the region, with steel and manufacturing continuing to be well-remunerated jobs. It has been noted that there are limited opportunities for managerial jobs and advancement which perhaps also contribute to these inequalities.

This, and other evidence gathered in the course of this study points to the presence of structural inequalities in the region. 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. Respondents made limited comment on gender inequalities or challenges within their responses, even when directly asked. Deeper investigation of the causes of the disparities and consideration as to how it may be rectified is warranted if the goal of local actors is to address these inequalities. The limited economic diversity in the region is likely problematic and the decarbonisation process is an opportunity to close the wage and opportunity gap. In this light, the technocratic approach to steel decarbonisation is likely to limit the potential and reach of any transformative change that could be achieved through decarbonisation.

6.3 Conclusions

It is notable that the steel works continues to be at the focus of attention, with Tata Steel engaging with the UK Government to seek support for the decarbonisation process. The plant in Port Talbot is important in the UK steel industry, but has a proportionally larger role in the Welsh Economy. This highlights the multiple scales that must engage with decarbonisation. With relation to the region, this technocratic approach and desire to continue solely with primary steelmaking introduces a series of risks that will likely not be resolved in the short term. However, resident's appetite for decarbonisation is apparent, as well as their significant attachment to place.

CHAPTER 7

CONCLUSIONS

7 Conclusions

The South Wales case study has taken as its focus the town of Port Talbot, owing to its significance as the location of a carbon-intensive industry. The town is synonymous with steel making in Wales and the Tata Steel Wales steel plant is the single largest source of carbon emissions in Wales. The case study has addressed three research questions:

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

In considering the **challenges** facing the region the commitment to decarbonising the economy is doubtless one of the primary challenges currently faced by the area. The implications of this for steel production in the area is, at present, ambiguous and throws a shadow of uncertainty over the future. The shadow of decarbonisation acts to intensify the pre-existing vulnerabilities of the area, including trends of de-industrialisation and the globalisation of production networks and supply chains. Our research has highlighted the fragmentation of approaches towards achieving the goal of decarbonisation by 2050 and the focus of individual actors on achieving their organisational targets/goals rather than a holistic and strategic approach. One challenge for the energy transition in this situation is to embrace a systems-perspective rather than falling back on more siloed approaches; highlighting the challenge of leadership in a multi-level governance structure. An associated challenge is the limited capacity (including skills) and resources available to many actors, particularly when set against the scale of the investments and new approaches required for the transition. A decade and a half of public sector austerity has been particularly challenging in this regard. At the institutional scale, the lack of a clear spatial perspective to narratives of transition also work against the development of more holistic approaches focused on the context of particular places. Related to this limited spatial focus is, perhaps, the sense of a diminishing level of control amongst the local community as decisions are taken about Port Talbot, rather than in Port Talbot.

Multiple **'coping' strategies** have been identified through the study. In the first instance there are examples of initiatives promoting economic diversification and the economic regeneration of deindustrialised spaces within and around Port Talbot. Similarly, there are initiatives promoting research and innovation allied to steel-making and related technologies. Support for research and innovation activities is also associated to the technological narrative that has been identified as underpinning the desired path to achieve agreed net-zero carbon targets. These strategies are broadly aligned to an overall desire to maintain employment opportunities and support the economic prosperity of the local community. At the community level, coping strategies appear more limited. A classic coping strategy has been the outmigration of those in search of (better) employment opportunities. An alternative coping strategy could be the uptake of retraining/reskilling activities, but

our survey shows limited evidence of this, possibly owing to a lack of perceived urgency amongst respondents (most felt positive about their ability to cope). An emergent coping strategy may be visible in the early efforts by local residents to reclaim an influence on the narrative development of Port Talbot, with support from external actors, as epitomised by Michael Sheen's Passion. What is also apparent from the Port Talbot case is the absence of coping strategies centred on concepts of resistance, aside from some limited and specific cases. In this regard it may be useful to distinguish between those strategies addressing the generality of the energy transition and those that relate to the very specific (real in place) outcomes of particular elements of the energy transition – such as the mooted closure of the Aberpergwm Colliery.

On the evidence available it is problematic to speak of certain variables as more influential than others. The deterritorialization process is a combination of techno-socio-economic trends, particularly the pursuit of economic efficiency, in both the business realm and the realm of public administration. These trends are particularly visible in the context of Port Talbot, where the presence of a global steel-maker highlights the significance of globalisation and de-industrialisation. Yet, we should be cautious not to over-emphasise these economic variables as they may be an artefact of how the study has been constructed. In looking for the socio-economic effects of the energy transition it is not surprising to find these. A strong finding of the study has been the strength of place attachment amongst the local community, coupled with a move towards self-narrated identities. Similarly, there is a strong finding of support for the environmental benefits of the energy transition and an apparent willingness to bear the cost of this. This suggests that socio-psychological socio-cultural variables are equally influential in determining the re-territorialisation of place. These findings echo experience in the former Welsh coalfields where attachment to place remains, despite a lack of economic opportunity. This has led to new strategy approaches, focusing on the foundational economy, as a means to restore economic vitality to places. The experience of the Welsh coalfields also acts as a warning of the long-lasting, multi-generational effects that poorly managed transitions can have. The effects of a diminishing locus of control locally can be experienced in reduced capacities of communities to act as their access to resources declines, imperilling the ability of communities to actively engage in developing new visions for their future. It is telling, that the examples of self-narration highlighted in the study all required support from external actors with access to resources.

Consideration of the policies or combination of policies that would be most appropriate to recover the ties of the territory and community in coal and carbon-intensive regions while fostering their transition toward clean energy is complex. For steel-making it is not simply clean energy that is required in transitioning towards a net-zero carbon future. The challenge of promoting net-zero carbon steel production is illustrative of the wider challenges facing society as it grapples with the implications of a more widely-defined sustainability transition. Indeed, an emphasis on clean energy may overlook many of the true challenges facing carbon intensive regions and the net-zero carbon transition more broadly (as critical reviews of electric vehicles demonstrate). One implication of a focus on 'clean' energy is to support the technological narrative that underlies much of the current discourse on the decarbonisation agenda and obscures alternative narratives, such as those emphasising (unequal) global political economic power relations and systemic patterns of over-consumption in high income economies (e.g. Hickel et al., 2022). Consequently, critical perspectives that regard the dominant technocentric approach as both misguided and highly risky (e.g. Stoddard

et al., 2021) are marginal within Welsh decarbonisation debates. Given the high stakes involved, this could have far reaching implications for the success/failure of Wales' decarbonisation efforts.

The Port Talbot case study also highlights the importance of recognising how place 'sits' at the intersection of multiple trends and transitions, all with overlapping geographies and dynamics. At present, this geographic focus is lacking. The limited spatial congruence of the units through which policy is being promoted perhaps provides one element in the limited geographical narrative of the energy transition in Wales. The focus is one of net-zero targets, just transitions (broadly defined) and economic visions. Similarly, business units and public sector bodies are focused on achieving organisational goals in the first instance, which, when aggregated, have territorial impacts that are not always evident *a priori*.

Recognising the role of place in complex and adaptive systems is a first step in developing policies that may help to recover the ties of territory and community. Our research suggests that to recover these ties, place-based communities need to be enabled to engage in effective co-governance arrangements, particularly where current administrative government is not synonymous with the territorial community concerned. This is not an approach that has been developed in the case of Port Talbot, but opens interesting possibilities. Recent experience demonstrates a potential for collective agency within the community and seeking to strengthen this element, including incorporating new actors, might help to overturn the current default to individual agency, which is inherently unequal.

The intersectionality of place in the context of limited place agency intensifies the risk of deterritorialization. However, in the case of Port Talbot, the emergence of a re-territorialisation of symbols and identity offers insights to the potential for an alternative (self-narrated) future. What is emblematic in this case study is that the conflicts are less around questions of the energy transition or environmental futures, but more around where the locus of that decision-making lies.

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APPENDIX

Appendix

Table 13 – NACE Rev. 2 Classification

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

Source: Eurostat, 2008, p.47.

Table 14 – Employee jobs by occupation (2020)

	Neath Port Talbot (Employee Jobs)	Neath Port Talbot (%)	Wales (%)	Great Britain (%)
Total Employee Jobs	50,000		-	-
Full-Time	33,000	66.0	66.3	67.9
Part-Time	17,000	34.0	33.7	32.1
Employee Jobs By Industry				
B : Mining And Quarrying	350	0.7	0.2	0.2
C : Manufacturing	9,000	18.0	11.2	7.9
D : Electricity, Gas, Steam And Air Conditioning Supply	175	0.4	0.6	0.5
E : Water Supply; Sewerage, Waste Management And Remediation Activities	1,750	3.5	1.0	0.7
F : Construction	2,250	4.5	5.5	4.8
G : Wholesale And Retail Trade; Repair Of Motor Vehicles And Motorcycles	5,000	10.0	13.4	14.9
H : Transportation And Storage	3,000	6.0	3.7	5.1
I : Accommodation And Food Service Activities	3,000	6.0	8.5	7.2
J : Information And Communication	700	1.4	2.2	4.5
K : Financial And Insurance Activities	250	0.5	2.3	3.5
L : Real Estate Activities	800	1.6	1.5	1.8
M : Professional, Scientific And Technical Activities	1,500	3.0	5.5	8.7
N : Administrative And Support Service Activities	2,500	5.0	7.3	8.8
O : Public Administration And Defence; Compulsory Social Security	5,000	10.0	8.1	4.6
P : Education	4,500	9.0	9.2	9.0
Q : Human Health And Social Work Activities	8,000	16.0	15.9	13.6
R : Arts, Entertainment And Recreation	1,250	2.5	2.3	2.2
S : Other Service Activities	500	1.0	1.6	1.9

Notes: % is a proportion of total employee jobs excluding farm-based agriculture; Employee jobs excludes self-employed, government-supported trainees and HM Forces; Data excludes farm-based agriculture;

Source: ONS Business Register and Employment Survey : open access; - Data unavailable; https://www.nomisweb.co.uk/reports/lmp/la/1946157394/report.aspx?town=neath

Table 15 – Employment by occupation (Jan 2021-Dec 2021)

	Neath Port Talbot (Numbers)	Neath Port Talbot (%)	Wales (%)	Great Britain (%)
Soc 2010 Major Group 1-3	25,200	39.5	44.7	49.7
1 Managers, Directors And Senior Officials	4,800	7.4	9.4	10.5
2 Professional Occupations	12,300	19.1	20.4	23.7
3 Associate Professional & Technical	8,100	12.5	14.7	15.3
Soc 2010 Major Group 4-5	15,900	24.9	20.3	19.0
4 Administrative & Secretarial	9,400	14.5	9.9	10.2
5 Skilled Trades Occupations	6,500	10.1	10.3	8.8
Soc 2010 Major Group 6-7	12,000	18.8	17.9	16.2
6 Caring, Leisure And Other Service Occupations	7,800	12.1	10.4	9.2
7 Sales And Customer Service Occs	4,200	6.5	7.4	6.9
Soc 2010 Major Group 8-9	10,800	16.8	17.1	15.1
8 Process Plant & Machine Operatives	4,800	7.4	6.4	5.5
9 Elementary Occupations	6,000	9.3	10.5	9.6

Source: ONS annual population survey
Notes: Numbers and % are for those of 16+
% is a proportion of all persons in employment

Source: https://www.nomisweb.co.uk/reports/lmp/la/1946157394/report.aspx?town=neath

ENTRANCES

ENergy TRANsitions from Coal and carbon: Effects on Societies

UNIVERSIDADE DA CORUÑA

ENEA

K&I Knowledge and Innovation

IWH Halle Institute for Economic Research
Member of the Leibniz Association

Leibniz Institute of Ecological Urban and Regional Development

ZSI

NTNU

eurada

Mineral and Energy Economy Research Institute
Polish Academy of Sciences

spi Sociedade Portuguesa de Inovação

wecf France

CARDIFF UNIVERSITY
PRIFYSGOL CAERDYDD