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***European Funding and Regional Developmental
Transition in the Context of Energy Transition: The
Case of Western Macedonia and Megalopolis***

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To my partner, for his patience, encouragement, and steady support throughout the writing of this thesis.

Abstract

The present paper focuses on examining how financial tools provided by Europe have contributed to the post-lignite transition of Greek regions highly dependent on coal mining activities. The paper utilizes the method of comparative case studies for two case-studies, namely Western Macedonia (NUTS-2) and the Municipality of Megalopolis (NUTS-3 / LAU 1), aiming at answering the following research questions: (a) to what extent is European financing instrumental in allowing the transition process to occur, (b) to what extent does the Just Transition Mechanism and other cohesion policy instruments address structural and spatial inequalities, and (c) to what extent are governance issues hampering the implementation of a transition process which can be described as successful in being both effective and just. The theoretical underpinnings comprise insights from regional development theory, uneven regional development theories, territorial justice as well as EU cohesion policy and multi-level governance approaches. Methodologically, the research will use predominantly qualitative methods for examining primary sources such as EU and national regulations, TJTPs, development plans, evaluation reports and other relevant data and documents together with selective socio-economic indicators and projects. As to evaluation criteria, the analysis will consider fund absorption rates, early implementation results, economic diversification measures as well as institutional capacity of actors involved in the post-lignite process. The findings show that EU funds have been essential in setting new development trajectories in both case studies; nevertheless, the effects are relatively uneven and rather delayed due to high bureaucracy, weak absorption capacity, mismatch between education and available jobs, low local governance capacity and poor participation of stakeholders. The paper concludes that although financial tools are necessary for ensuring a successful post-lignite exit, they are not sufficient.

European funding; Energy transition; Just Transition Mechanism; EU Cohesion Policy; Regional development; Post-lignite transition; Territorial justice; Western Macedonia and Megalopolis.

List of Abbreviations

CCGT: Combined-Cycle Gas Turbine

EIB: European Investment Bank

ERDF: European Regional Development Fund

ETS: Emissions Trading Scheme

EU: European Union

GW: Gigawatt

GDP: Gross Domestic Product

GVA: Gross Value Added

ILO: International Labour Organization

JDTP: Just Development Transition Plan

JTF: Just Transition Fund

LAU: Local Administrative Units

MW: Megawatt

MLG: Multi-Level Governance

NECP: National Energy and Climate Plan

NUTS: Nomenclature Of Territorial Units for Statistics

OECD: Organisation for Economic Co-operation and Development

PV: Photovoltaic

PPC: Public Power Corporation

PSLF: Public Sector Loan Facility

RRF: Recovery and Resilience Facility

SMEs: Small and Medium Enterprises

TJTP: Territorial Just Transition Plan

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Chapter 1: INTRODUCTION

The European Green Deal and its objective of climate neutrality have led to significant transition pressure for coal-dependent regions throughout Europe. The thesis explores how European funding streams have been guiding the development of Greece's coal-based regions towards a new stage of evolution in the wake of rapid decarbonization at the national level. Specifically, with reference to Western Macedonia (NUTS-2) and Megalopolis (NUTS-3 / LAU 1), the thesis looks at the transition from the existing high-carbon, mono-economic structure towards a sustainable and diverse regional economy, and how this process is supported by EU funding. Particular attention is given to the concept of "just transition", meaning an equal allocation of costs and benefits associated with decarbonization to ensure that "no one is left behind". For the purpose of implementation of just transition objectives, the EU developed several instruments including the Just Transition Mechanism (JTM), which is a dedicated funding mechanism introduced as part of the Green Deal to provide specific support to coal-dependent regions. In Greece, JTM and Cohesion Policy tools were used to support the post-lignite transition.

In September 2019, Greece announced the decommissioning of its lignite-powered power plants by 2028. As part of the most ambitious plans of decarbonization in Europe, this strategy, which is inspired by European climate strategies and policies, has significant impacts on the development of both Western Macedonia and Megalopolis regions, which can be seen as the heart of the Greek coal industry. These territories in transition are structurally vulnerable, reliant on a single, declining sector and therefore highly exposed to economic changes. The urgency of Greece's energy transition presents essential insights into how public intervention can alleviate economic disruption and reshape development paths following industrial decline caused by external factors.

In Western Macedonia and Megalopolis, this transition brings significant challenges for socio-economic adjustment. While the lignite phase out puts pressure on local labour markets and production systems, it might also help promote economic diversification in regions historically characterised by mono-industrial dependence — provided there is effective policy support. At the national level, the transition will test Greece's commitment to territorial cohesion. Greece already exhibits sharp centre-periphery disparities, and failing to support coal regions during this transition could exacerbate existing inequalities.

Therefore, the “just transition” process in these cases is also a matter of “spatial justice”, because it aims to ensure that the challenges of the lignite phase-out do not disproportionately affect certain communities. Ultimately, the experiences in Western Macedonia and Megalopolis should highlight Greece’s ability to manage the lignite phase-out, facilitate economic adjustments, and promote new development paths without exacerbating regional disparities.

To address these issues, the research poses three core questions. First, how critical has European funding been in enabling the post-lignite transition of Greece’s coal regions? Second, to what extent have the EU’s JTM and associated policy instruments mitigated structural inequalities in Western Macedonia and Megalopolis? Third, what governance challenges and limitations have arisen in the effort to implement a transition that is both fair and effective on the ground? Taken together, these questions examine whether European financial and policy support can enable a post-lignite transition that combines effective regional restructuring with fairness, institutional capacity, and “territorial justice”, given the finite financing capacity of the national Public Investments Programme.

While the literature on just transition, Cohesion Policy and regional restructuring has expanded significantly in recent years, relatively limited attention has been paid to how European funding instruments operate in practice within Greece’s post-lignite regions, and especially to the comparative dynamics between Western Macedonia and Megalopolis. This thesis addresses that gap by examining not only the scale of European support, but also the extent to which such support is translated into territorially embedded outcomes under different local institutional and developmental conditions. Its added value lies in combining a comparative case-study approach with an analytical focus on territorial inequality, governance capacity, and the practical limits of externally supported just transition.

Methodologically, this thesis will apply a comparative case study approach to analyse the two cases of Western Macedonia and Megalopolis simultaneously in order to carry out an in-depth qualitative assessment of the similarities and disparities in their respective just transition policies. Predominantly qualitative data gathering constitutes the essence of the methodology proposed here, based on the analysis of relevant official documents, such as EU regulations, national just transition plans, and development plans, together with implementation data, like socio-economic statistics. Combining policy analysis and the analysis of documents with selected quantifiable data, the thesis will assess the post-lignite policy measures relative to established policy criteria.

Specifically, the following key areas will be evaluated: efficiency in fund management, timeliness in implementing the EU funds into practice, socio-economic impact of the projects, compliance with territorial justice and smart specialization principles within the cohesion policy, and institutional performance. Therefore, this research will rely on the methodological foundation of the qualitative evaluation of documents, instead of resorting to interviews or any other means of empirical research.

Overall, the data indicate that despite the role of the European economic aid in ensuring that the transitions of these regions took place relatively smoothly, there has not been a fundamental transformation of the economies in question. The injection of funds from the EU has been quite instrumental, and might have prevented a number of other adverse consequences, such as rising levels of unemployment, yet converting funds into economic growth has proven challenging thus far. There are clearly certain challenges regarding governance, including slow spending of the allocated funds and insufficient local capacity, which explain the current state of affairs. While the EU's Just Transition framework is an essential policy foundation, deep structural change in Western Macedonia and Megalopolis will remain elusive without stronger local institutional capacity and more participatory governance practices. European interventions have started the post-lignite transition, but their success will rely on how effectively financial resources are operationalised into regional socio-economic restructuring.

Chapter 2: THEORETICAL FRAMEWORK

2.1 Theoretical Approaches to Regional Development

The present subsection outlines the main theoretical approaches that provide the foundation for comprehending regional development and spatial inequalities. A theoretical framework is needed because it offers the theoretical tools through which patterns of uneven development and policy intervention can be understood. In the context of this thesis, it is vital for connecting more general discussions in regional

development to the specific socioeconomic challenges of energy transition in Western Macedonia and Megalopolis.

This section adopts a selective theoretical framework focused on the theories most relevant to regional restructuring, spatial inequality, and transition in former carbon-intensive territories. In terms of the theoretical background, it should be stated that the thesis draws on a number of different theoretical frameworks, from the earlier spatial theories and the neoclassical approach, to more recent endogenous and place-based theories. Thus, through an examination of the necessary theoretical background, it will be possible to demonstrate the interaction between theory and practice, particularly as far as the region's evolution discussed in the two case studies.

Regional science has evolved as a result of efforts aimed at understanding the differences in economic development and prosperity of various regions as well as finding the means that would make it possible to resolve the differences (Anselin, 2001; Krugman, 1991). According to Chatzimichalis (1979), regional development has featured serious inequalities where some regions experienced progress throughout history while others were lagging behind. In light of this, the theories covered in subsequent chapters can explain both the uneven growth of regions and the means that have been developed to address the disparities.

2.1.1 Neoclassical Theories of Regional Development

A “neoclassical” framework considers regional development from the perspective of convergence due to market dynamics. As Massey (2001) states, such theoretical paradigms are based on the assumption that economics are rational, that there is a market, and that there is equilibrium, where labour and capital move between regions depending on their differences in wages and profits. Thus, regional divergences are viewed as transitory phenomena that can be gradually overcome through the operation of market mechanisms.

At the same time, the neoclassical paradigm has been criticized for failing to consider regional persistence and uneven development (Anselin, 2001; Konsolas, 1997). The problem is especially relevant when speaking about Greece, since the lack of convergence and regional disparities within the country point at the inability of market

mechanisms and external investments to ensure balanced development (Petrakos and Psycharis, 2016).

2.1.2 Keynesian Theories of Regional Development and Cumulative Causation

In contrast to neoclassical expectations, Keynesian approaches reject the notion of automatic convergence resulting from market forces. Instead, regional disparities tend to persist unless addressed using government actions. Keynesian approaches are founded on the premise that market is not a self-corrective entity that always reaches equilibrium and equality (Petrakos and Psycharis, 2016). Regional disparities are considered to arise due to the inability of the market to reach equilibrium and due to regional differences in growth potential rather than because of regional imbalances that would be automatically eliminated in the future. The failure of markets to equalize regional economies results in structural disequilibrium and demand-side problems (Petrakos and Psycharis, 2016).

Effective demand plays an essential role in the determination of regional growth rates. As Kaldor (1970) suggests, regional development depends mainly on external demand coming from sectors producing exports and thus creating incomes for the economy. In this framework, growth in the export sector promotes production and employment while shrinkage of this sector creates negative multipliers for regional activity. This is especially valid for mono-industrial regions where dependence on one dominant sector increases the vulnerability of a region to external changes (Kaldor, 1970).

Unlike neoclassicism, Keynesian approaches present markets as non-perfect entities characterized by asymmetries, rigidities, and lack of even development. As per Kaldor (1970), state intervention is used as a means to develop rather than a mechanism to correct structural imperfections in the market. State investment, financial flows, subsidization, and regional planning help boost local demand, strengthen weak regions and overcome spatial growth concentration (Kaldor, 1970).

It can be observed how these arguments are developed in the theory of “cumulative causation” as developed by Myrdal (1957) and further elaborated on by Kaldor (1970). The cumulative causation concept implies that regional development proceeds as a series of feedback processes during which advantages create further advantages based

on increasing returns to scale, labour specialization, intersectoral connections, knowledge spillovers and other similar elements. Rather than tending to equilibrium, regional development usually follows cumulative trends with growth leading to further advance in already developed regions and continuing decline in lagging regions.

One of the central elements in the analysis of regional growth provided by Myrdal (1957) is a distinction between “backwash effects” and “spread effects”. “Backwash effects” refer to the outflow of labour, capital and other resources from less developed regions to more developed ones while “spread effects” indicate the positive impact of regional growth on peripheral regions. As argued by Myrdal (1957), without any counterbalance measures, the backwash effect dominates. This means that regional inequality is a natural phenomenon and a structural result of uneven development.

From this perspective, the theory of cumulative causation also explains why regional growth often follows path dependent patterns (Myrdal, 1957; Kaldor, 1970). Early advantages help maintain advantages in regions with favourable structure while structural weaknesses lead to declining positions. Therefore, territorial intervention is needed to compensate for disadvantages, support lagging regions and set favourable conditions for development (Myrdal, 1957; Kaldor, 1970).

2.1.3 Uneven Regional Development, Growth Poles, and Core–Periphery

The “growth pole” model proposed by François Perroux (1955) makes an essential contribution to the analysis of regional development (Filenta, 2025). According to the theory, economic growth is not evenly spread over space but tends to concentrate in a number of particular growth poles that exhibit high levels of propelling power within an interdependent production complex (Filenta, 2025).

Indeed, according to Perroux, the economy is perceived as a system comprising interlinked productive units, where some dominant industries act as growth drivers (Filenta, 2025). As noted by Anselin (2001), sectors distinguished by innovative character, external demand, and high interlinkages between each other can create additional secondary growth effects in associated industries. Simultaneously, the process under discussion is highly uneven: growth concentrates in certain nodes, while peripheral territories may either experience secondary growth impacts or not benefit from

the phenomenon at all (Lagos, 2007; Konsolas, 1997). In this sense, the “growth pole” theory helps to explain why growth can be both dynamic and spatially concentrated.

This theory relates to core-periphery approaches to regional development as well. Unlike the former, the latter argue that the inequality in a region is self-reinforced because it results not just from temporary disproportions but rather from a combination of various structural differences and path dependencies (Martin & Sunley, 2006; Triantafyllou, 2016). Accordingly, core regions have a comparative advantage in attracting financial, infrastructural, innovative, and labour resources, while peripheries are prone to being dependent and less diversified (Triantafyllou, 2016).

These views prove useful when analyzing economies marked by mono-industrial specialization. In such cases, even if initially growth appears highly dynamic, it can create significant structural vulnerabilities. Dependency on one particular sector restricts diversification, increases geographical imbalances, and complicates adaptation in case of decline if that sector fails. In this respect, the notions of “growth poles”, “core-periphery”, and “path dependence” are particularly relevant for explaining uneven regional development.

2.1.4 Place-Based development and the limits of competitiveness-led transition

As a reaction to the disadvantages and inefficiencies of “top-down” regional development models, the concept of “New Regionalism” emerged during the 1980s. According to Hadjimichalis (2011), these models advocate for endogenous and bottom-up development policies that support innovation, adaptability, and institutional capacities. Within this framework, the factors contributing to regional competitiveness and sustainability have been considered to include local assets (such as local technological capability, entrepreneurship, and knowledge infrastructure) (Hadjimichalis, 2011).

However, this shift from previous approaches also faces criticism. As stated by Hadjimichalis (2011), the approach to uneven development was redefined by “New Regionalism” by being interpreted as a technical issue of local size rather than as an outcome of wider political-economic power relations.

Another complementary body of thought centres on innovations and learning processes as factors behind endogenous regional development. According to Lundvall (2007),

feedback between firms and universities becomes particularly important for innovation, whereas Cooke (2004) pays particular attention to the contribution of institutional infrastructure such as universities, institutes, and state bodies to innovations. Regarding this approach, the key conditions underlying regional development include not only the presence of resources, but also a high level of institutional network density and social learning (Lundvall, 2007; Cooke, 2004).

Within this wider place-based agenda, the concept of “smart specialisation” has become particularly influential in EU regional policy. Halleux (2016) presents it as a process by which the regions identify their comparative advantages and channel investments into those areas using participatory governance through enterprises, research institutions, and local organizations. Similarly, the European Parliamentary Research Service (2016) describes “smart specialization” as the key focus of the EU’s approach to development based on innovation and knowledge. Nevertheless, according to McCann and Ortega-Argilés (2013), such approaches may benefit the regions that have an advantage, but fail to consider the underlying challenges faced by lagging regions.

Taken together, these approaches are useful because they draw attention toward place-based development, institutional capacity, innovation systems, and locally embedded forms of restructuring. At the same time, their limitations are equally important for this thesis. It is not automatically assumed that the competitiveness paradigm addresses issues of vulnerability, path dependency, or redistribution within regions undergoing change (Hadjimichalis, 2011; Triantafyllou, 2016; McCann and Ortega-Argilés, 2013). For this reason, the post-lignite development of Western Macedonia and Megalopolis must not be viewed through the prism of innovation alone, but rather through the wider frame of diversification coupled with state involvement, institution-building, and territorial justice.

2.2 EU Cohesion Policy and MLG: addressing spatial inequalities

Drawing on the regional development theories outlined above, this section examines the mechanisms by which spatial disparities can be addressed through EU Cohesion policy and its MLG mechanism. To be more specific, a conceptual introduction to Cohesion Policy and its particular concepts like “territorial cohesion”, “solidarity” and “place-based” policy will be presented along with the discussion of MLG and “partnership principle”. The importance of institutional capacity for effective regional funding will also be

highlighted. In this way, the segment establishes the analytical link between regional development theory and the governance arrangements through which territorial restructuring is pursued in practice.

EU Cohesion policy: territorial cohesion, place-based theory, and spatial justice

The EU Cohesion policy is the Union's principal regional development and investment policy, specifically focusing on reducing regional disparities and ensuring balanced growth throughout Europe (European Court of Auditors, 2022). Its legal basis is established in Articles 174-178 of the Treaty on the Functioning of the European Union, through which the EU supports economic, social, and territorial cohesion via the Structural Funds and the Cohesion Fund (European Parliament, 2018). Essentially, Cohesion policy redistributes resources toward less developed territories and thereby institutionalizes the principle of solidarity (European Court of Auditors, 2022).

Its wider constitutional setting is formed by the principles of conferral, proportionality, and subsidiarity. As Verdolini *et al.* (2024) explain, EU may only take actions within its competence provided by the Member States, must not exceed its actions beyond what is required for fulfilling treaty objectives, and intervenes in shared competence matters only where objectives cannot be sufficiently achieved by Member States alone. For the purposes of this thesis, the most significant implication is that Cohesion policy combines EU-level strategic direction with national and regional responsibility for implementation, thus giving the policy not only a "place-based" but also a "MLG" character (Verdolini *et al.*, 2024).

From this point of view, it can be seen that the Cohesion policy has been developed from a specific redistributive tool into a complex development policy covering economic, social, and territorial dimensions (European Parliament, 2018; European Court of Auditors, 2022; Lazaridou, 2021). In this context, one may note that the strengthening of such concepts as "concentration," "multi-annual programming," "partnership," and "additionality" (especially after the reforms in 1988 for the Structural Funds) plays a particularly important role (Lazaridou, 2021).

A main concept in said change is the one of "territorial cohesion". Formally recognized as an EU objective with the Lisbon Treaty, "territorial cohesion" extended the prior emphasis on economic and social convergence by introducing a robust spatial dimension

to fairness and development (Madanipour, Shucksmith and Brooks, 2021). This perspective stresses that geographic location significantly effects an individual's access to socio-economic prospects, essential services, and developmental outcomes. Therefore, it aligns Cohesion policy with the principles of "spatial justice", stating that equitable resource distribution across territories is fundamental to systemic fairness (Madanipour, Shucksmith and Brooks, 2021).

The aforementioned territorial aspect of development is highly related to the place-based approach suggested by Barca (2009). According to Barca, "one-size-fits-all" approaches are ineffective as development constraints and opportunities are territorially specific. Therefore, there is a need to introduce policies that take into account local conditions and are informed by local knowledge (Barca, 2009, pp. 3-12). From the perspective of the place-based approach, any intervention is not only economically justified but also serves as a means to promote social equity. The idea of equalising development opportunities regardless of geographical origins helps to ensure that all citizens have the opportunity to achieve a dignified standard of living (Barca, 2009, pp. 3-12).

Taking into account the above theoretical framework, it can be said that the EU Cohesion Policy serves as an institutional response to the uneven development dynamic considered within the regional development theory. Practically speaking, it aims at reducing the impact of "core-periphery" asymmetries and "agglomeration" through financial redistribution, targeted interventions, and MLG. Following the idea of solidarity, the majority of funds provided under Cohesion Policy are spent on enhancing the potential of less developed regions (European Commission, 2022; European Court of Auditors, 2022). In 2021-27, €202.3 billion (in 2018 prices) will be distributed among less developed regions, while regions in transition and more developed ones will receive €47.8 billion and €27.2 billion correspondingly (European Parliament, 2026, p. 3). In this sense, Cohesion Policy represents the application of the idea of "spatial equity".

The above redistribution function is closely linked to the broader objective of "spatial justice". As explained by Madanipour, Shucksmith and Brooks (2021), it is possible to consider the EU Cohesion policy from the perspective of spatial justice as it addresses both results and processes. This is also reflected in policy approaches that evaluate success not only in terms of aggregate growth, but also in terms of reduced disparities and improved quality of life in lagging territories (Holder and Layard, 2010).

MLG: institutional capacity, and policy effectiveness

The European Union is widely regarded as a model case of MLG. In broad terms, MLG refers to the diffusion of decision-making authority across supranational, national, regional, and local levels of government (OECD, n.d.; Hooghe, Marks and Schakel, 2020, p. 1). EU Cohesion Policy serves as a primary display of this framework, since it operates through shared competence and shared management, with responsibilities distributed among EU institutions, national governments, and subnational authorities.

In terms of supranational decision-making processes, the European Commission sets up the regulation, participates in the negotiations for Partnership Agreements, authorizes the approval of Operational Programmes, and supervises the process (European Union, n.d.). Yet, the choice of projects is not made at this stage. The Commission is not directly responsible for project selection and implementation, which is the result of shared management. These functions are delegated to national and regional authorities, who adjust the priorities set by the European Union in line with their specific national territorial and institutional conditions (European Court of Auditors, 2025, p. 14).

Theory-wise, MLG is relevant not only in terms of its administrative nature, but also but also as a condition for policy effectiveness and legitimacy. By incorporating various levels of governance, and a wider range of shareholders, Cohesion policy can better integrate local knowledge and ensure a closer alignment between the policy and territorial conditions (European Parliament, 2014, p. 31). This is why the partnership principle occupies such an imperative place in the governance architecture of Cohesion policy. According to the European Parliament (2014, p. 10), meaningful multi-level participation can contribute to greater policy effectiveness, greater legitimacy in decision-making, and greater commitment to policy outputs.

Moreover, since the challenges faced by territories vary considerably and unevenly across different places, local and regional actors cannot simply be considered as passive receivers of the programmes designed elsewhere. On the contrary, their involvement is required both for understanding their needs and for implementing interventions effectively. As a result, in relation to the “partnership principle” and other aspects of MLG, EU Cohesion policy is designed to support local and regional stakeholders rather than to treat them as mere receivers of financial assistance (Bachtler and McMaster, 2008; Barca, 2009). However, such an approach to the governance of territorial issues has been found beneficial in multiple ways, including the mobilisation of local knowledge and the improvement of intervention effectiveness in weak regions (Pike, Rodríguez-Pose and Tomaney, 2006). That said, Hadjimichalis (2011) argues that Cohesion policy has

done little to reduce geographical inequality. Nonetheless, these policy frameworks explicitly acknowledge the problem of uneven geography and represent a sustained attempt to govern it through redistribution, place-based intervention, and multi-level coordination.

The effectiveness of MLG largely depends on institutional capacity. According to the European Parliament (2014, p. 31), poor administrative capacity, or lack of experience in implementing MLG at regional and local levels, hinders any meaningful efforts of cooperation and coordination among stakeholders. Apart from that, conflicts may easily emerge within different levels of governance, especially when central administrations do not want to share power and local actors find decisions too top-down (European Parliament, 2014, pp. 11–15). These aspects of the topic are extremely relevant for our discussion of transition governance, as they impact both the process of democratic participation and the actual implementation and effectiveness of funding.

To conclude, the EU Cohesion Policy and MLG serve as critical policy instruments in dealing with territorial issues in Europe. The EU Cohesion Policy outlines the principles of “solidarity”, “territorial cohesion”, and “place-based” approaches, whereas MLG ensures the proper application of these principles. In this regard, the relevance of these concepts for this thesis can be viewed through the idea that the effectiveness of regional policies does not only depend on the financial resources available but also on the quality of governance and institutional capabilities.

The principle of Territorial Cohesion in Greece

As a comparatively less developed Member State, Greece has for a long period received considerable EU cohesion funding. As a result, the development strategy of its regions has been highly integrated with the policy frameworks within Europe (Bazoti, 2024; European Commission, Eurostat, n.d.). In the end, this has led to investments in infrastructure, human capital, and modernization, as well as in the increasing Europeanization of policies concerning Greek regions (Andreou, 2006; Bazoti, 2024).

Within the context of the thesis, the case of Greece seems to provide evidence for both the usefulness and the fundamental limitations of territorial cohesion and MLG within a structurally fragmented national landscape. Despite the contribution of EU cohesion policy to broader convergence, developmental disparities have tended to persist at a national level (Petrakos and Psycharis, 2016; Bazoti, 2024). This underscores the

importance of the “place-based” approach: the existence of diverse territorial challenges means that solutions need to be context-specific rather than being imposed through a set of universal and generic “one-size-fits-all” policy models. However, it can also be seen that in the case of Greece, the success of such approaches is largely dependent upon the capacity of institutions, coordination across governance levels, and the ability of national and regional actors to implement EU principles in practice (Andreou, 2006; OECD, 2020a). Therefore, Greece can serve as an important setting in which territorial cohesion and MLG operate not just as policy ideas but also as policy realities.

Chapter 3: METHODOLOGY

In this chapter, the research design and data collection for examining the post-lignite transition in Western Macedonia and Megalopolis will be detailed. To conduct the analysis, a comparative case study research design is used in relation to the above-mentioned two coal-dependent regions. In particular, Western Macedonia (NUTS-2 region) and Megalopolis (LAU located in Peloponnese) were selected as the case studies, since they both represent lignite mining territories in Greece but are distinct in terms of their size and institutional capacity. Furthermore, the two regions are both governed by the same national decarbonization policy and the EU-funded program, which enables us to compare the impact of the same policy tool within varying territorial contexts.

3.1 Research design and case selection

In this paper, a comparative qualitative case study research method will be employed. Rather than testing a statistical hypothesis, it seeks to comprehend how European funding mechanisms work in practice and how they manifest themselves in policy formulation and outcome documentation. Western Macedonia and Megalopolis were selected deliberately because of their similarities and contrasts. Both regions are traditional lignite-dependent economies that are experiencing coal exit policies. However, Western Macedonia is considered to be a relatively bigger and mountainous

region that already possesses a MLG system, whereas Megalopolis is considered to be a small municipality within the wider region of Peloponnese (Arcadia).

Western Macedonia and Megalopolis can be compared because they are the dominant coal-producing regions and employ most of the country's coal labour force. While they experience different socio-economic developments (e.g., Western Macedonia is estimated to have a total population of approximately 254,000 people (Vrontisi *et al.*, 2024, p. 3)), while Megalopolis is only a town with approximately 5,300 people (Hellenic Statistical Authority, 2024), the common point between the two regions is that they have low diversification and fossil-energy employment, which is causing declining demographics. In other words, if EU funding mechanisms prove successful under different conditions, then that would demonstrate the generality of certain findings; if not, that highlights how local context matters

3.2 Data sources and analytical methods

The methodological approach is primarily qualitative content analysis of official documents and policy texts, complemented by relevant socio-economic statistics. Specifically, the data sources include:

- *EU and National Policy Documents:* Regulations and official guidelines for the JTM and cohesion policy (including the Just Transition Fund, European Regional Development Fund, etc.); Greece's National Energy and Climate Plan (NECP); the National Recovery and Resilience Plan; and other relevant legislative acts.
- *Territorial Just Transition Plans and Strategy Documents:* The official Just Transition Development Plan for Western Macedonia and any equivalent planning documents for Megalopolis/Arcadia; Regional Development Programmes and smart-specialization strategies.
- *Implementation Reports and News Releases:* Reports on progress made in the distribution of funds, news releases or articles concerning projects that have been financed by the JTM or other EU initiatives, and publicly available documents related to project implementation.
- *Socio-economic statistical data:* Statistical data from national and European statistical authorities (such as employment figures, population trends, and

regional economic indicators) were used to assess early socio-economic impacts. While acknowledging the delay involved between the implementation of policies and their effects, these indicators serve as an indication of the trends that may be developing.

- *Policy studies:* Secondary sources and policy documents (e.g. EU Commission reports, think tank policy briefs,) were used because they provided empirical evidence or summaries of official data on the regions.

The documents were analysed through systematic coding and thematic analysis. The themes identified in the process of the analysis were derived from the theoretical concepts discussed in Chapter 2; these include, inter alia, territorial justice, governance, local participation, economic diversification, and smart specialization. The documents were studied in terms of the goals and measures proposed in the plans, expected results and achievements, as well as the extent to which socio-economic challenges were addressed or overlooked.

In addition to the textual analysis, the research uses quantitative regional indicators. The key indicators (such as population size, Gross Domestic Product (GDP) and employment rate) and additional socio-demographic indicators (population age distribution and labour force participation) are presented as part of a descriptive analysis showing pre-existing conditions of each region. In the process of analyzing the case studies, the quantitative indicators are not subject to any econometric analysis or modelling, as this study is primarily interpretative and comparative in nature, rather than econometric. They are not analysed with statistical methods; instead, they inform the narrative and help confirm that the case descriptions are grounded in empirical evidence. All quantitative data used in this study comes from reliable sources such as Eurostat, Hellenic Statistical Authority and Organisation for Economic Co-operation and Development, among others.

Throughout the analysis, the comparative lens focuses on two dimensions: (1) substance – differences in substance and priorities outlined in transition plans between region and municipality level; (2) process – different governance arrangements and institutional capacity for implementation.

3.3 Methodology limitations

There are numerous limitations in the methodology that need to be considered. To begin with, there is no primary data collection involved in the research. Interviews, surveys, and field observations were not performed. Instead, the research is based on secondary data sources. This results in several limitations:

- *Availability and timeliness:* There might be limited accessibility to a number of sources that can help answer the research question, as well as outdated data. Information related to how a certain project was carried out (for instance, expenditures and employment effects) might have limited access or might be outdated.
- *Spatial Aggregation:* Given that a lot of data is collected only at the NUTS-2 or national level, it becomes difficult to capture the situation in a single municipality (Megalopolis). Data about Megalopolis in particular is scarce, so the conditions there are usually approximated by looking at data related to the broader Arcadia region.
- *Potential bias:* Policy documents and strategies are fundamentally normative because they are largely concerned with articulating what is to be done, as opposed to what has actually been done. As such, there may be discrepancies between institutional and political priorities than local outlooks. It is, however, assumed at the outset that these policy documents depict policy implementation fairly accurately.
- *Absence of participatory data:* Due to there being no interviews with stakeholders, their opinions have not been documented along with the existing governance systems. This means that issues like community opposition / backlash against certain projects and internal administrative challenges within the management authority might not have been taken into account.
- *Long-term comparability:* Western Macedonia and Megalopolis are examined simultaneously and yet the availability of data differs. As Western Macedonia is classified as a region, it is more extensively covered in Eurostat datasets than Megalopolis, which is examined at the municipal level. This affects the depth and consistency of the comparative analysis. Therefore, the two cases cannot always be traced through fully comparable time series.

To mitigate these limitations, the study approaches its results as tentative and qualitative. However, it should be recognised that the findings are based to a large extent on formal documents and statistics and thus do not fully capture the complexity of conditions on

the ground. A possible way to make future research more empirically robust could be conducting interviews with local officials, business representatives, and residents. Moreover, firm-level or individual-level data can be employed for further analysis — when available. The empirical chapters that follow will apply this framework to examine the effectiveness of Just Transition funding in promoting regional restructuring in the selected regions.

Chapter 4: EMPIRICAL ANALYSIS - ENERGY TRANSITION IMPACTS AND POLICY MEASURES

4.1 The context of the energy transition

The energy transition can be defined as the process where energy systems move from being based upon fossil fuels to lower carbon alternatives (European Union, n.d.). Within the EU, the concept of the energy transition became a primary strategic goal through various policy frameworks like the Energy Union framework, Clean Energy for All Europeans package, and the European Green Deal, all of which link decarbonisation to the broader objective of climate neutrality by 2050 (European Commission, 2015; European Commission, 2019). In this context, Member States are required to prepare integrated National Energy and Climate Plans, ensuring that decarbonisation efforts are carried out not simply as a matter of technical policy but rather as a coordinated transformation of energy systems.

In the case of Greece, on the other hand, the above process of energy transition seems to have gained a considerably more tangible territorial dimension. The fast de-commissioning of the lignite plants has turned the energy transition from a mere goal of energy policy to a pressing task for just regional development. Historically, both these territories have served as the basis of the country's lignite-based electricity system, and they now face the burden of adjustment that decarbonisation entails. Therefore, when considering the issue of the energy transition in Greece, it is necessary to understand it not just as a matter of national energy policy but also as a territorially uneven restructuring process.

The key element of EU energy governance is the combination of thorough planning and the establishment of Just Transition measures. The 2018 Governance Regulation requires that National Energy and Climate Plans include not only targets for greenhouse gas emissions and renewables but also considerations about social justice and regional balance (European Parliamentary Research Service, 2015). In parallel, the EU introduced the JTM to mobilize funding for regions and workers historically dependent on carbon-intensive industries (European Parliamentary Research Service, 2015). Coal-reliant areas must prepare Territorial Just Transition Plans outlining the difficulties and investment requirements of the concerned territories until 2030 to be eligible for the Just Transition Fund (JTF), among other resources (European Commission, n.d.). In practice, this has been especially significant for Greece, where the Territorial Just Transition Plans for Western Macedonia and Megalopolis translate high-level climate objectives into territorially targeted strategies. Together, the NECP, JTM, and TJP constitute an example of MLG, as they link carbon neutrality goals to regional-level actions, and at the same time, EU goals for climate action are accompanied by social and territorial justice. Nevertheless, the existence of instruments for planning, financing, and state aid is not a guarantee that labour markets will become better or social balance will be achieved regionally.

Unlike the traditional approach, the European approach considers the energy transition as a socio-economic transition, along with the technological one. International organizations have paid attention to this aspect as well, stressing that any climate and environmental policies should go hand in hand with policies on decent work, social protection, and distributive justice, so that no societal group was left aside during the process of the energy transition (ILO, 2023). In the case of Greece, this statement bears a special importance due to the fact that adjustment costs are mainly concentrated in the regions, which have historically been dependent on lignite mining and production of electricity through it. Hence, the challenge facing Greece is not only to manage to abandon using lignite, but also to do this without exacerbating regional inequalities, leaving aside those social groups that have been important for the country's energy industry.

Similarly, the European Green Deal is presented as a strategy of new growth that seeks to decouple economic prosperity from fossil fuel use (European Commission, 2019). It highlights that efforts to reach climate neutrality should go together with protecting livelihoods and promoting innovation. In its discourse, the EU often mentions the idea of "a just transition" suggesting that climate ambitions and environment policies should be complemented with protective measures regarding the welfare of workers, regions, and

other disadvantaged social groups. This position corresponds to the growing global understanding that any transitions towards a low-carbon economy require taking into account social justice considerations. As a result, EU policies have combined energy and climate policies with social priorities. Against this background, the present chapter studies how these dynamics are unfolding in the Greek case, and specifically in Western Macedonia and Megalopolis, where the promises and contradictions of the just transition are most visible.

To better understand the energy transition process in Europe, an analysis based on a political economic approach would be useful. As Karl Polanyi argued, “fictitious commodities” —meaning land and labour— must not be commodified because, they become disconnected from the institutions and practices within which their meaning is constructed and regulated (Polanyi, 2001). Enclosure of land in history, along with other forms of land appropriation, has been connected with labour exploitation and has characterized the era of colonial modernity (Hadjimichalis, 2011). From a Marxian eco-social perspective, these processes can be explained with the concept of the “metabolic rift”; a widening, structurally produced gap between society and nature that disrupts any “thermodynamic reciprocity” between the two (Salleh, 2010; Moore, 2016). Simply stated, capitalist industrialization has relied heavily on nature and labour exploitation, and does not consider the associated environmental and social consequences. Thus, the proposed framework implies that the process of the energy transition should take into account such considerations as limitations and embedding in social and ecological contexts, since an energy transition driven only by market mechanisms could potentially ignore these factors (Polanyi, 2001; Brechin & Fenner, 2017). Similarly, such a market-centred approach could result in perpetuating the status quo or creating new inequalities unless broader political governance and social aspects are considered in the decision-making process (Krommyda, 2024).

The concerns are relevant in terms of the green transition of the Greek energy sector. Although in Western Macedonia and Megalopolis, the end of the lignite era cannot be seen as automatically leading to a socially beneficial and territorial transition to sustainable development, there are several examples when renewable energy installations replace lignite mines in these areas. While large-scale solar parks, grid investments, and other green projects may contribute to the reduction of carbon emissions, their development may be associated with ownership issues and asymmetric spatial impacts. It is that the communities of those regions will have to deal with the economic changes whereas the benefits will be mostly enjoyed by national or foreign companies investing in the region’s economy.

Applying this lens to the “green” transition more broadly, technologies for low-emission energy generation, transport, and storage (renewables, electric vehicles, batteries, etc.) entail a shift towards new kinds of material extraction and processing. The use of wind turbines, solar panels, battery storage, and other technologies requires large amounts of certain minerals and metals (rare earths, lithium, cobalt, and others), whose extracting is often associated with environmental degradation and social conflicts (Valero *et al.*, 2018; Giurco *et al.*, 2019; Jaramillo *et al.*, 2022). This raises questions related to the possibility of the reproduction of extractive logic in decarbonization strategies under a “green” cover; particularly when material sourcing and environmental costs are displaced spatially or socially. As a result, some scholars argue about the risk of “green extractivism”; a scenario in which the clean energy economy will perpetuate exploitative resource extraction, often displacing burdens to vulnerable communities (Franquesa, 2022; Boateng *et al.*, 2023). Issues related to the financialization of climate policies should be mentioned in this regard as well: in such a view of the climate crisis, the environmental threat is mainly seen as a business opportunity (Kobayashi-Solomon, 2019; McDonald & Bailey, 2020; Holden, 2020). Thus, while the EU Green Deal calls for decoupling growth from carbon emissions, critical observers highlight the fact that the profits-driven logic might lead to investment solely in attractive projects and regions (Barca, 2009; ILO, 2015; OECD, 2021a). In this way, the concerns over green extractivism have implications for Greece’s post-lignite transition in Western Macedonia and Megalopolis. It is important not only to examine said transition only in terms of carbon reduction and project pipelines, but also in terms of power relations, market structures, and the territorial distribution of costs and benefits.

This kind of approach to the socio-ecological transitions implies focusing on actors who shape such processes, the distribution of power, property, and control, and whether social re-embedding is promoted by the emerging green economy (Christophers, 2022; Krommyda, 2024). This makes it especially useful for the analysis of the transition in Western Macedonia and Megalopolis since one can take into consideration such aspects as power relations and markets as well as costs and benefits distribution in space.

In normative terms, the concept of “just transition” is vital when evaluating the social consequences of decarbonization. According to Healy and Barry (2017), a transition can only be considered “just” when it ensures distributive, procedural, and recognitional justice —meaning, when the costs and benefits are equitably distributed, local communities have a meaningful role in decision-making, and the historical identities of fossil fuel-dependent regions are acknowledged. This tripartite definition establishes a benchmark: the goals of climate policy should go further than just reducing emissions to

include protection or improvement of the results associated with social justice (Healy & Barry, 2017). As a matter of fact, distributive justice requires that the gains from lignite phase-out, such as employment and better environmental conditions, should benefit the most impacted communities, while at the same time ensuring that any negative impacts on jobs and income are controlled and minimized (Healy & Barry, 2017). “Procedural justice” requires effective participatory mechanisms that allow workers and local communities to make an impact on the strategy of transition (Healy & Barry, 2017). Finally, “recognitional justice” involves the recognition of the particular culture and history of the areas under transition (Healy & Barry, 2017).

In the case of Greece, the aforementioned principles acquire a spatial dimension. Industrial restructuring goes beyond defining the local labour market by involving territories that have been more directly impacted by the consequences of Greece’s energy-based growth model. For decades, the aforementioned territories provided the basis for national electrification and industrial growth through lignite extraction and coal-fired electricity production. However, it is precisely the latter regions that face one of the most significant challenges due to the coal phase-out process. It is in this sense that Hadjimichalis’s (2021) notion of “territorial justice” becomes especially relevant. The question is not limited to the provision of financial compensation and professional retraining for the workforce, but also concerns the historical disparity between costs, benefits, and development opportunities among different geographical locations.

That is precisely the reason why Western Macedonia and Megalopolis play such an important role as empirical case studies in the context of this research. They provide a possibility to test whether the implementation of just transition approaches addresses the problem of uneven geographical distribution of socio-environmental burden and whether they actually redress territorially concentrated disadvantage. In other words, justice in relation to transition is not only a social value, but also a spatial one, which requires a recognition of past patterns of dependence and sacrifice followed by an initiative for social and economic revitalization (Swilling, 2019). From a theoretical perspective, this implies the use of approaches based on “territorial justice”, which recognizes the geography of social inequalities (Hadjimichalis, 2021). Nevertheless, it is also crucial to differentiate between the concept of territorial justice and its actual implementation. Whether justice is achieved depends on how transition policies are translated into actual governance arrangements, investment decisions, and socio-economic outcomes in practice.

4.2 Drivers of regional inequalities in Greece

Greece displays marked spatial and economic inequalities across its regions. Notwithstanding its relatively limited territorial size, substantial divergences persist between the urban core concentrated around Athens and other parts of the country. The following recent statistics confirm the magnitude of the inequality gap. Western Macedonia records a per capita GDP equivalent to approximately 48% of the EU average in 2024 (provisional), placing it among the less prosperous regions of the EU. By contrast, the Attica region, which includes Athens, reaches 96% of the average GDP in the Union, reflecting the high level of convergence with European economic conditions (Eurostat, 2026). Within the national context, the level of output per capita in Attica is approximately double that of Greece's weakest-performing regions, underscoring pronounced internal asymmetries (OECD, 2020a).

These more general inequalities at a national level are relevant for the understanding of the transition taking place in Western Macedonia and Megalopolis. Rather than beginning the decarbonization process from a position of territorial robustness, the two case-study regions were already vulnerable peripheral areas shaped by structural dependence, weak diversification, and constrained resilience to external pressures. Therefore, the importance of the lignite transition in Greece goes well beyond the termination of lignite-based production and operations. This closure is unfolding within a national landscape already marked by uneven development and long-standing centre–periphery asymmetries.

Factors that determine the disparities in regions within Greece are multiple, covering elements of geography, economy, and institutions. The element of geography plays a key role because, according to the OECD (2020a), the unique geographical character of Greece results in fragmented markets and unequal accessibility. Remote rural regions and small islands struggle with limited connectivity (transport and digital) and face higher costs to integrate into larger economies (OECD, 2020a). It could be argued therefore that this physical fragmentation has historically impeded balanced development, as coastal and metropolitan areas benefited from trade and investment while interior and island areas remained less developed (OECD, 2020a) (Vouziou, 2022).

The structure of the economy and its evolution over time are also critical factors. According to Matsaganis and Manalis (2022), some parts of Greece have seen a trend toward deindustrialization in which there has been a reduction in industrial or mineral production without any corresponding new investments. The same pattern is recognized

by Karasmanaki *et al.* (2020), who note that this trend of industries moving out of the area has created very high levels of unemployment along with a lack of employment options in other sectors. For areas like Western Macedonia and Megalopolis, the historical prevalence of coal mining and energy production from lignite has led to an extremely pronounced level of sector dependency, where success in the economy was tied to a single industry.

The institutional and governance dimension is also an important component of the analysis. Traditionally, Greece was one of the most centralized countries in Europe, lacking both financial and administrative independence at the local or regional level (Karanikolas & Hatzipanteli, 2010). Although the territorial organisation of the state has evolved over time, with a gradual strengthening of regional and local governance structures, decentralisation has remained uneven. In practice, capacity constraints at subnational levels have continued to shape development outcomes. It is common for many local and regional government entities to face difficulties that arise due to the lack of administrative capacity, financial means, and expertise. This situation is of importance for the current thesis as it becomes apparent that the success of the transition process will not be determined solely by the presence of financial means but also by the capacity that is required in order to use these financial means effectively.

Greece therefore provides a particularly significant context in which to study “just transition”. In OECD’s “Regional Policy for Greece Post-2020” review, by 2020 Greece ranked among those with the highest levels of regional GDP per capita inequality within the OECD. The recent exogenous shocks have acted on these pre-existing disparities to varying degrees, and in some cases, they have amplified territorial differences. The sovereign debt crisis and the following era of austerity have had different consequences for the peripheral and industrial regions than for the central Athens metropolitan region, in terms of economic contraction, industrial closures, and reductions in state investments (OECD, 2020a). While unemployment increased nationwide, labour pressure remained for longer periods in certain regions like northern Greece and portions of the Peloponnese as the economy started recovering in Athens. Likewise, the COVID-19 pandemic generated uneven regional consequences in 2020 (OECD, 2020a). Against this backdrop, the shift of Western Macedonia and Megalopolis can be seen in the broader context of uneven territorial development.

4.3 National and EU policy framework

Greece has traditionally been one of the largest beneficiaries of EU Cohesion policy, leading to a development path that is closely tied to European policy and conditionality (Bazoti, 2024; European Commission, Eurostat, n.d.). In this regard, cohesion funding has led to economic modernization, including infrastructural developments and human capital investments, while also having an impact on economic development plans in Greece as well as other institutional arrangements (Bazoti, 2024). On the other hand, the country continues to experience substantial territorial inequalities internally. While assistance from the EU has helped to reduce territorial disparities at the European level, in some cases these internal disparities have not only continued but also increased as growth and investment remained disproportionately concentrated in metropolitan Athens (Petrakos & Psycharis, 2016; Bazoti, 2024). The above is crucial for the current study because it provides a background of uneven territorial development in the context of the Greek transition.

The institutional context of regional policy in Greece has been significantly shaped by the impact of Europeanization of governance structures. In line with the findings reported by Andreou (2006), it is necessary to highlight that the administration of Structural Funds contributed to the administrative modernization process, while according to Petrakos and Psycharis (2016), the need for absorption and coordination of EU funding led to the formalization of regional administration, involving Managing Authorities and various other planning and monitoring arrangements. Thus, the institutionalization of MLG processes took place in relation to the management of Structural Funds in Greece, despite the fact that their implementation has often been hindered by domestic political dynamics, centralisation, and uneven administrative capacity (OECD, 2020a). It is an important point to consider in terms of Western Macedonia and Megalopoli because apart from the availability of funds, it is crucial to think about whether existing governance structures will allow translating them into timely actions in the relevant areas.

Subsequent to the launch of the European Green Deal and the creation of the JTM, there occurred considerable change in the policymaking environment. The Green Deal put forward a vision of achieving climate neutrality and redefining the growth model for Europe as its core priorities, yet at the same time recognizing the potential uneven impact of the proposed decarbonization policies on different territories or communities (European Commission, 2021). The notion of a “just transition” became central, as it is underscored the efforts to ensure the burden of “green” transition was distributed equally

by helping communities impacted due to their dependency on fossil fuel production or other energy-intensive sectors (Pueyo and Leining, 2023; McCauley and Pettigrew, 2022). This goal is realized through the creation of JTF, the dedicated InvestEU scheme and the Public Sector Loan Facility (PSLF) merging direct support for affected regions with instruments designed to activate public and private investment (European Commission, 2020; European Parliament and Council of the European Union, 2021).

Greece is expected to receive around €755 million in EU JTF grants for 2021–2027, one of the largest national allocations, reflecting the severity of the transition challenge in its coal-dependent areas (OECD, 2021b). With national co-financing and the contribution of the other JTM pillars, the broader just transition package for Greece has been estimated at approximately €1.5–1.6 billion (International Energy Agency, 2023). These resources are programmed through Greece’s Territorial Just Transition Plans and the dedicated Just Transition Development Programme, making the Greek transition a salient example of how cohesion principles—solidarity, territorial sensitivity, place-based intervention, and MLG—are being applied in a new policy domain.

Alongside cohesion policy and the JTM, the Recovery and Resilience Facility (RRF) has become another major component of the national framework shaping territorial development. Greece’s National Recovery and Resilience Plan, “Greece 2.0”, amounts to approximately €35.9 billion, combining grants and loans to support reforms and investments in areas such as renewable energy, electricity grids, digital public administration, infrastructure, business support, skills, and healthcare (Lilyanova and Pari, 2025). Even if the RRF offers important opportunities for modernisation and investments, the governance structures that support the facility seem to display more centralisation and a more top-down approach compared to traditional cohesion policy. These characteristics raise issues concerning the coherence between the needs of the region, the compatibility of the funded projects with the existing initiatives supported by cohesion funding, and the necessary administrative capabilities in order to carry out the projects under tight deadlines (European Commission, 2021; Makris *et al.*, 2024; Lypiridi, 2021b, p. 80-82). All these mechanisms form part of the wider territorial and institutional setting in which post-lignite transition is unfolding in Greece.

4.4 The implementation of the Just Development Transition Programme in Greece: an overview

The Just Transition Fund is often referred to as a new instrument of the Cohesion Policy during the 2021 – 2027 programming period and serves as the first pillar of the Just Transition Mechanism. This instrument is designed to assist regions that have been hit the hardest during the transition process towards climate neutrality in order to avoid increasing regional inequalities (General Secretariat for NSRF, 2026). However, the relevance of the Fund to the current study is especially pertinent, as it is connected to the main research question regarding the proper targeting and use of European funding for the transition development of lignite-dependent regions. The JTF aims at turning the notion of “just transition” from a general political statement into a real development policy. Therefore, the JTF understands that decarbonization is not just a matter of energy or environment; it is more complicated and involves social and spatial aspects (General Secretariat for NSRF, 2026). For territories like Western Macedonia and Megalopolis, where economy, employment are centred on lignite mining, the availability of such a financing tool is a requirement for ensuring that there is no sudden economic disruption.

In the Greek case, the JTF being applied through the Just Development Transition Programme 2021-2027. The budget of this programme is estimated at €1.609 billion, with a contribution from EU funding amounting to €1.370 billion and national contribution amounting to €239 million (General Secretariat for NSRF, 2026). The declared purpose of the Programme is to assist the regions and populations that are impacted by the social, economic and environmental effects of the transition in relation to the Union's climate and energy goals for 2030 and its objective to achieve a climate-neutral economy by 2050.

Another point that makes the Greek JDTP relevant from an institutional perspective is that it is the first JDTP to receive approval in Europe (General Secretariat for NSRF, 2026). That approval ensured that the just transition became an important priority for national development, especially in view of the rapid phasing out of lignite and provision of timely assistance to the worst affected regions. The key intervention zones include the Region of Western Macedonia, Municipality of Megalopolis and surrounding areas, as well as the Regions of the North Aegean, South Aegean and Crete (General Secretariat for NSRF, 2026).

Territorial aspects of the Programme are illustrated in three Territorial Just Transition Plans that deal with Western Macedonia, Megalopolis, and the islands of North Aegean, South Aegean, and Crete. Based on the statistics of the 2nd revision of the JDTP, the budget of the Programme is estimated at €1.609 billion (General Secretariat for NSRF, 2026). Of this amount, Western Macedonia gets the most of the funding, accounting for

€1.006 billion, which is equal to 62.5% of the entire budget (General Secretariat for NSRF, 2026). The funding that Megalopolis will get will be €385.916.646 which is equal to 24% of the programme, whereas the islands of the North and South Aegean and Crete will get €217.262.572 (General Secretariat for NSRF, 2026).

This distribution of funds confirms that Western Macedonia constitutes a central territorial core of Greece's just transition. This high share of funding reflects both its structural dependence on lignite and the scale of the productive and employment-related restructuring required. The region is called upon to move from a strongly mono-sectoral energy model towards a diversified and sustainable development pattern, which justifies the concentration of the largest share of resources. At the same time, the share directed to Megalopolis is also particularly significant. Although the area has a smaller population, administrative and productive scale compared with Western Macedonia, the allocation of 24% of the resources of the JDTP indicates that it is recognised as a distinct and critical transition core (General Secretariat for NSRF, 2026).

In such a context, the Just Development Transition Program clearly acquires a territorial and development dimension. Funds are not allocated through horizontal distribution, but rather follow a differential allocation according to the level of dependency on lignite, the economic and social impact, and the potential for development in each area. Nevertheless, the quantity of resources made available does not constitute enough to ensure the success of the transition process. The challenge that these regions must overcome is precisely whether they have what it takes to turn funding into successful projects which can produce economic benefits, provide good employment, and improve regional resilience.

Priority 1: Strengthening and Promoting Entrepreneurship

There is a variety of activities within the scope of the Program priorities. The focus area under Priority 1, entitled "Strengthening and Promoting Entrepreneurship" entails a particular attention by the JDTP to diversification of the production base of transition territories. This Priority encompasses actions related to improving business competitiveness, entrepreneurship and innovation, startup entrepreneurship, and digitalization (General Secretariat for NSRF, 2026). It is imperative that this strategy be implemented because of the reliance upon lignite, whereby the end of lignite-related activities necessitates the creation of other economic activities, more entrepreneurship opportunities, and a decline in dependency upon a mono-sectoral approach to development.

On the programme level, Strengthening and Promoting Entrepreneurship forms the highest Priority within the Just Transition Programme with an allocated budget of €734.07 million or 45.6% of the total Programme budget (General Secretariat for NSRF, 2026). This distribution indicates that the concept of entrepreneurship is regarded as the chief tool for diversifying production in the transitional regions. Of great significance is the consideration accorded to Western Macedonia, where approximately €517.44 million will be allocated, compared to Megalopolis, which will receive approximately €180.62 million (General Secretariat for NSRF, 2026).

There are indications that this priority is set to be quite extensive in terms of administration and finances. In the category of calls related to the Priority, there are 33 calls listed, which include calls, amendments, and extensions. On the other hand, the list of approved project inclusions indicates 53 administrative entries in relation to this Priority (EYDAM, n.d.). Nevertheless, it would be incorrect to regard these numbers as equivalent to the number of approved projects because each involves different kinds of decisions. This is why the List of Operations_Article 49 is a more accurate representation (General Secretariat for NSRF, 2025).

As per the List of Operations_Article 49, there are a total of 860 operations covered by Priority 1 with a total budget of €850.15 million out of which EU will contribute approximately €517.22 million (General Secretariat for NSRF, 2025). This chart demonstrates that the empowerment of entrepreneurship has become a key pillar of just transition in Greece, and not some additional tool. It is especially important in relation to the financial aspect, since the financial magnitude of such operations has quite a high percentage of the entire financial portfolio of the JDTP.

In addition, the structure of operations inside reflects the double nature of their realization. On the one hand, there are many operations related to relatively small grants for entrepreneurs. For instance, 736 operations are estimated at up to €100,000, which means €62.7 million altogether. On the other hand, fewer operations represent an overwhelmingly high portion of finances – 7 operations above €20 million make €271.9 million (General Secretariat for NSRF, 2025). From the above image, it can be observed that the combination of the logic of intervention is reflected in two ways – the support of SMEs on the one hand and the support of bigger or more strategic investments on the other hand, taking into consideration the requirement of state aids rules.

As far as contents are concerned, a vast majority of projects relate to the development of business and the internationalization of SMEs including investments in production. In this regard, 854 out of 860 operations valued at about €780.8 million are classified as

such. Other areas include IT infrastructure, data centers, business incubation, support for spin-off and start-up, and research infrastructures (General Secretariat for NSRF, 2025). In that sense, then, Priority 1 is not confined to a conventional logic of economic incentives, but aims to connect entrepreneurship to innovation, digitalization, and the creation of new possibilities for development in the transition zones.

At the same time, however, it should be noted that the mere presence of a large number of projects and a considerable budget is insufficient for proving the effectiveness of the transition process itself. Here, one should focus on whether such means of support can contribute to productive diversification, sustainable job creation, and the consolidation of the local economy. As far as regions dependent on the lignite industry is concerned, Priority 1 becomes of particular importance due to the need to fill the void created by the decline in this area. Still, the success of this priority will largely depend on the quality of investments, local firms' ability to take advantage of them, as well as the implementation of activities based on actual needs in the local economic reality.

Priority 2: Energy Transition – Climate Neutrality

The second point is that there is Priority 2 entitled “Energy Transition – Climate Neutrality”, which consists of activities related to the energy part of the transformation process. Such activities may be described as including energy efficiency renovations of public buildings and key infrastructures, installation of heat pumps, financing energy communities, along with assistance for investments by businesses in renewables, renewable hydrogen, and efficient cogeneration systems (General Secretariat for NSRF, 2026). In terms of programming, Energy Transition – Climate Neutrality will have an overall budget of €243.20 million, which corresponds to 15.1% of the total Programme budget. This indicates the significance of the energy component within the energy transition programme as one of the essential components of the JDTP, although not the only one. Of note here is the allocation towards Western Macedonia (about €128.49 million) and Megalopolis (about €89.06 million) (General Secretariat for NSRF, 2026).

According to the calls page of the Managing Authority for Just Development Transition, 9 distinct calls have been issued for Priority 2 (EYDAM, n.d.). The significance of Priority 2 can be discussed from two perspectives. Firstly, activities associated with energy efficiency measures and clean energy help reduce costs associated with energy and improve public infrastructure, as well as assist in switching lignite-based regions to an alternative energy system. Secondly, attention paid to the development of renewable energy projects, energy self-production, and renewable hydrogen shows that not only

does the process relate to the alleviation of the consequences of phase-out; at the same time, it is aimed at moving towards a completely new energy model of functioning.

As per the operations under Priority 2 described in the List of Operations_Article 49 (dated 16/12/2025), there are 6 approved projects with a cost of about €36.21 million and EU funding amounting to €28.28 million. All of the operations relate to Western Macedonia and include the installation of heat pumps, energy upgrading of the Kastoria General Hospital and Florina General Hospital, energy production through photovoltaic systems for energy communities, and energy upgrading of University of Western Macedonia facilities. This illustrates that at the first stage of implementing the priority, the focus is made on socially beneficial energy activities associated with energy cost reduction and improved energy infrastructure (General Secretariat for NSRF, 2025).

From the approved project list on the webpage of Managing Authority of Just Development Transition, one can see that the area of Priority 2 has now started expanding into State aid for investments. Particularly, the recent approvals from the year 2026 relate to three operations for existing SMEs, where the total cost is €29.94 million and total public expenditure is €19.03 million, while also there are two operations for newly established large firms with total costs €56.33 million and total public expenditures €25.35 million (EYDAM, n.d.). This finding illustrates the process of reorienting Priority 2 from focusing only on energy savings and public works to paying more attention to renewable energy resources and renewable hydrogen.

Despite the importance of such measures, the findings require an element of caution. Though investment into energy is vital both in the pursuit of climate neutrality and in creating a new identity of the regions that used lignite coal, they cannot guarantee a complete transformation of the region on their own. The effect these investments would have on employment, value chains development, and diversification of the productive capacity will depend on how well they can be combined with the capacities of local business entities, technical competences, scientific organizations, and additional policies concerning education. As such, Priority 2 becomes an important, yet insufficient tool of a just transition. However, under certain conditions, it can play an important role in modernizing the energy sector and developing the green orientation of production in these areas.

Priority 3: Land-Use Readjustment – Circular Economy

Thirdly, Priority 3 entails land-use readjustment and circular economy, which involves initiatives linked to regeneration and reuse of contaminated lignite lands, initiatives in relation to green infrastructure, measures for land use realignment, as well as circular economy initiatives (General Secretariat for NSRF, 2026). In view of this fact, it is important to mention that this aspect becomes especially relevant in relation to the just transition, since it is evident that the redevelopment and transformation of lignite lands play an absolutely critical role in the process of diversifying the production of the regions after the closure of the lignite industry. In other words, not only does the economic transformation depend on the implementation of economic measures, but also the extent to which lignite lands could be made ready for use in new ways. From the perspective of funding, the “Land-Use Readjustment and the Circular Economy” enjoys the total budget of €62.00 million, which equals 3.9% of the total Program funds (General Secretariat for NSRF, 2026). The total amount is, in this context, rather low compared to funding for other priorities, although it should be noted that restoration and reconversion of the lignite mining area is crucial for sustainable development of the transitional regions. From the total amount, €46 million will be spent on Western Macedonia, while Megalopolis will receive around €16 million. No money is supposed to be spent on the islands (General Secretariat for NSRF, 2026). This is because the priority under consideration is related primarily to areas dependent on lignite, where problems regarding land rehabilitation and repurposing abandoned mine sites are more pressing than elsewhere.

However, its implementation thus far remains largely insufficient. In relation to these, the most important request is considered to be “3.1.1: Restoration and Regeneration Works of the Vegora Mine”, amounting to €30.4 million to be allocated to the Municipality of Amyntaio as the recipient (EYDAM, 2024). This study is concerned with the restoration/regeneration works done at the old Vegora Mine site, and the intervention falls under 3.1, which means it relates to the developmental use of restored lands/facilities from the lignite area (EYDAM, 2024).

The crucial thing here, however, is that, during the current stage of the mapping, there are no approved operations within Priority 3 at all. This fact is proven by the List of Operations_Article_49 document where one can find no operations under Priority 3. It does not mean, however, that the priority has been dropped or will not be activated in the future, because the call might have still been at its initial evaluation stage. What can be concluded is that land-readjustment has not turned into any approved operations with an established budget for implementation yet, despite being extremely important in terms of developmental transition.

It is crucial for the analysis of the JDTP because the restoration of the lands used for lignite mining is the prerequisite for many other kinds of transformations. Thus, it means that Priority 3 reveals an important aspect of implementing just transition, namely its possible time-consuming nature due to the lack of approved operations. It implies that the just transition framework takes into account the importance of using the former lignite lands in some way, but the activation process has not reached its final stage yet.

Priority 4: Just Labour Transition

Fourth, significant attention is directed towards Priority 4 of the Programme, entitled “Just Labour Transition”. This priority focuses on the social component of the lignite phase out process as it addresses the issue of people affected by the phase out process rather than providing finance for the investments. Under the framework of the JDTP, the actions include skills development, reskilling, investments in educational facilities, and support in the integration into the labour market (General Secretariat for NSRF, 2026). In this way, the fourth priority seeks to address a key challenge facing the post-lignite era by enabling workers and the unemployed to make a smooth transition from the lignite-based production system to new job opportunities.

From a programming perspective, the Just Labour Transition is one of the key elements of the JDTP, featuring an allocation of €280.26 million, equivalent to 17.4% of the entire programme (General Secretariat for NSRF, 2026). This shows that the labour component of the process is considered to be something more than an issue that is secondary; rather, it becomes a core pillar of development for the region as a whole. It should be emphasized that Western Macedonia receives considerable funding from the EU, around €187.30 million, while €53.48 million is allocated for Megalopolis (General Secretariat for NSRF, 2026).

As far as the achievement of Priority 4 is concerned, there have been significant strides made compared to other priorities, including land use adjustments and the circular economy. In particular, the Managing Authority for Just Development Transition has on their website a total of twelve calls that relate to the Just Labour Transition, which include programs involving job creation, counselling, training, certifications, skill development, social structures, among others, especially aimed at people affected by the lignite closure (EYDAM, n.d.). The approvals in the Managing Authority Just Development Transition are numerous in number and must be read with care, because they involve not just the issuance of approvals but also possible rejection of any such proposal (EYDAM, n.d.).

As follows from the file of List of Operations_Article 49, there are twenty-two operations that have been approved for Priority 4. As a result, the amount of funds allocated for those operations equals €173.62 million, while the contribution of the EU will make up €147.47 million. It is necessary to emphasize, however, that such numbers do not reflect the degree of absorption of funds and their ultimate impact on the job market, as they mostly refer to the commitment of resources to the approved operations.

In general, the Priority 4 operations can be characterized as falling into three major categories: (i) education and counseling services offered to the unemployed and employed; (ii) establishment of skills and employment frameworks; and (iii) assistance to transitioning regions. The presence of these operations proves that the process of transition has not only involved the creation of new opportunities through investments but also the adaptation of human capital.

Nevertheless, despite the positive representation of the activation of resources, the priority contains certain crucial elements in the area of evaluation. On the one hand, there is no doubt that attention should be paid to training and counselling services. At the same time, such measures cannot ensure reintegration by themselves as their success depends primarily on the compatibility between newly acquired skills and employment possibilities within the regional markets.

The problem is especially acute for areas such as Western Macedonia and Megalopolis, where lignite production has resulted in the long-term existence of well-paying jobs during more than five decades. Thus, the transition process cannot be limited only to training programs but involves the connection of skills policies with the provision of investments, establishment of value chains, and employment opportunities. The main challenge of working with this priority is connected with the need for coordination with other priorities and investments' advancement.

Priority 5: Structured Small-Scale Interventions

Apart from the aforementioned interventions, the Programme also includes small-scale intervention strategies aimed at improving the quality of life and broadening economic activities in the area (General Secretariat for NSRF, 2026). From the point of view of Program Implementation, the total budget under Priority 5 amounts to €71.17 million, which constitutes 4.4% of the overall Program budget. Out of this amount, around €22.67 million is earmarked for Western Macedonia, €8.64 million for Megalopolis, while €39.86 million is set aside for the islands (General Secretariat for NSRF, 2026). This distribution

clearly shows that this priority is much more complementary than others listed in Programme's main priorities such as entrepreneurship, energy transition, and labour market transition.

Regarding the current implementation of Priority 5, there are three calls that are listed on the official list of calls. The first call is related to the "Energy Upgrading of Buildings under the Responsibility of First-Level Local Authorities in the Greco Islands" for a budget of €10 million (EYDAM, 2026). The second call concerns "sustainable mobility on islands of the Region of Crete within the framework of Integrated Territorial Investments", and has an assigned budget of €3.7 million (EYDAM, 2026). The third concerns the "Protection, Enhancement and Promotion of Cultural Heritage in the Integrated Territorial Investments areas of Western Macedonia and Megalopolis", with a budget of €16.95 million (EYDAM, 2026). Overall, the total amount for all three calls comes up to roughly €30.65 million.

This means that approximately 43% of the budget dedicated to Priority 5 is already used at the call level. At the same time, the status differs when project approval is analyzed. According to the Priority 5 official website, there are currently no approved operations. Hence, there are no operations included in the List of Operations_Article 49, as the latter includes only approved, not just published, operations. The lack of approved operations should not be viewed as an inherent issue with this priority, since the calls were published relatively recently and might still be undergoing the process of evaluation and project formation. However, analytically speaking, the delay cannot be ignored, and it shows that despite the potential of small-scale intervention in terms of creating a visible effect in the area, projects have yet to materialize.

This means that Priority 5 is more of a supplemental tool for upgrading space and society, but not the main driver of the productive restructuring of the territories in question. The importance of this priority is defined by its efforts to tie just transition to the implementation of specific local projects, such as developing cultural infrastructure, introducing sustainable mobility and energy systems, and employing territorial strategies. On the other hand, there have been no approved operations yet, which means that the priority can be regarded as a very nascent one.

Priority 6: Technical Assistance

As for the programmatic dimension, Technical Assistance is considered a horizontal priority for the JDTP 2021-2027 since this priority is not related to productive investments

in the particular economic sectors. It is aimed at ensuring administrative and organizational conditions for the realization of the Programme. As is stated in the 2nd Revision of the JDTP, Priority 6 involves financing in the amount of €57.23 million, which makes up about 3.6% of the total budget of the Programme equaling €1.609 billion (General Secretariat for NSRF, 2026). Indeed, technical assistance is directly linked to issues of administration, monitoring and evaluation, public communications, development of projects, and beneficiary assistance (General Secretariat for NSRF, 2026). This is especially important when considering regions that have embarked on just transitions, since the effectiveness of financial mechanisms will depend on how fast the projects are developed and the assistance to the beneficiaries.

At the official site of EYDAM, there are 6 calls which fall under Priority 6 concerning different aspects of technical and administrative support for the Programme. These include support for the proper functioning of the Managing Authority for the JDTP under the NSRF, public relations and information campaign of the Programme, support to organizations/beneficiaries in the growth and proper implementation of operations, assessment of the Programme, and, finally, support for proper functioning of EYDAM Directorate for Strategic Planning and Funding Coordination (EYDAM, n.d.). This last call is called TA 6.1, published in 2025, and it comes at the cost of €3.5 million. The main aim of this call is the strengthening of the work done by the Directorate for Strategic Planning and Funding Coordination, specifically concerning monitoring, program definition, beneficiary support, and calls' development (EYDAM, 2025). As per the List of Operations_Article 49, there are seven independent operations, totalling €43.4 million, that have been identified and approved within the scope of Priority 6, and the associated Union contribution comes to around €36.88 million.

From a qualitative standpoint, Priority 6 offers an insight into one of the aspects of just transition, namely, the need to strengthen capacity building. It can be stated that while the resources of Priority 6 are not directly used to support any particular firms, workers, or infrastructure, it is about the processes that will influence the Programme in its entirety. However, caution needs to be exercised when assessing the value of this priority. While the high-level mobilisation of Technical Assistance proves to be a positive trend regarding the development of administrative structures required to implement the programme, this alone cannot serve as proof of any substantial transition to a more developed state in the lignite-dependent regions. The real value of this priority depends on how well these supplementary activities will accelerate project development, increase beneficiary assistance, improve absorption and allow for better-targeted projects within Western Macedonia and Megalopolis. In essence, technical assistance becomes a

necessary institutional infrastructure to initiate the transition process, but its value is purely auxiliary and conditional to its implementation as such within the scope of other priorities.

Priority 7: Support for Critical Technologies in Strategic Sectors — STEP

The seventh priority in the JDTP concerns “Support for Critical Technologies in Strategic Sectors” in line with the STEP platform of Europe. The priority encompasses the inclusion of a technology-related aspect in the just development transition through linking the just transition with critical technology development or production. Following the new JDTP, Priority 7 is centered on three major areas, which include digital technology and deep-tech innovation, clean/resource efficient technologies, and biotechnology (General Secretariat for NSRF, 2026).

In terms of the programmatically-related aspects, Priority 7 entails an aggregate budget of €90.43 million, corresponding to 5.6% of the overall budget of the JDTP, which stands at €1.609 billion. More specifically, from the aforementioned budget, about €66.70 million will be allocated to Western Macedonia and about €23.73 million to Megalopolis. Still, when it comes to implementation, the stage reached is rather preliminary. According to the EYDAM's web page concerning Priority 7 calls, there are currently no ongoing or concluded calls of Priority 7. In addition, according to the webpage containing approvals for Priority 7, there are currently no approved operations, hence the exclusion of Priority 7 from the List of Operations_Article 49. The approvals webpage only contains the name of the priority, without any operations underneath.

Nevertheless, it seems that plans for upcoming calls imply preparation for Priority 7. Indeed, the list of calls scheduled for April 2026 includes two interventions associated with Priority 7. The first one refers to the implementation of "State Aid Actions for the Support of Critical Technologies in Strategic Sectors — STEP," having a budget of €60 million (EYDAM, 2026). The second project is focused on “Development of Skills and Innovation to Support the Green and Digital Transition in the Strategic STEP Sectors” and has been budgeted at €40 million, while its activation is expected between the third and fourth quarters of 2026 (EYDAM, 2026). On the whole, the schedule of programming envisages an expenditure figure of €100 million for projects related to Priority 7.

Undoubtedly, the non-availability of the approved operations must not be taken as a drawback in this priority. The inclusion of STEP can be said to be fairly recent in the context of the Programme, and it is still at a planning stage. On the other hand, it does

serve certain broader management requirements as well, as it ensures flexibility in the utilization of funds not used up yet and which are vulnerable to decommitment according to the n+3 policy (European Commission, n.d.). Analytically speaking, this result is noteworthy to the extent that it shows the priority has yet to find expression in terms of concrete projects or funded initiatives in the regions experiencing transition. As such, its impact on the process of regional reconfiguration cannot be quantified at present.

The implementation process of the Programme is evidence of resource mobilization, but still, the transition process from the planning stage to action remains crucial. According to the presentation provided by EYDAM, based on figures obtained from the Integrated Information System of the NSRF up to 30 March 2026, the resources dedicated to the JDTP, after the 2nd Revision, add up to €1.609 billion, while programme specifications stand at €1.887 billion, which corresponds to 117% of the budget (Ministry of National Economy and Finance, 2026). The calls total about €1,497 million, accounting for 93 percent of the budget, whereas operations that have been approved total about €1,110 million, accounting for 69% (Ministry of National Economy and Finance, 2026). However, the financial commitment is quite small, accounting for 43% of the budget, roughly €692.01 million. It can be observed that, while there is great activation concerning calls and operations that have been approved, complete maturity regarding the operations has not been reached yet (Ministry of National Economy and Finance, 2026). At the same time, data regarding expenditure or absorption, are absent. The presence of this type of data will be able to show the conclusion of the intervention activities and allow one to assess its results by measuring output and result indicators.

This aspect is relevant in assessing the contribution of the JTF to regional development transitions. The activation of programs is important, since it proves the workability of the financial mechanism and the creation of conditions for intervention activities. At the same time, the effectiveness of the resources depends on their implementation period, the level of quality of the projects implemented, and the abilities of the local stakeholders and business entities to make funding requests, develop the business plan, and manage funds. Additionally, it depends on whether there are productive activities that can be supported by the investment, not just the mobilization of investments itself.

In the context of discussing the role and effectiveness of the JTF, one needs to also consider the relationship with other instruments of the JTM, including the PSLF. In the case of Greece, according to the information presented in the EYDAM presentation, loan agreements for projects of the public sector were made according to the third pillar of the

JTM. Thus, 15 approved projects worth €80.7 million have been approved in Western Macedonia. Moreover, a second loan agreement was signed that covered 33 projects worth €233.8 million. They are related to Western Macedonia, the Peloponnese, Crete, North Aegean, and South Aegean (Ministry of National Economy and Finance, 2026).

Overall, the JTF and the JDTP can be regarded as the core institutional and financial instruments through which the Greek government aims to tackle the territorial discrepancies in the impacts of lignite exit. Firstly, their very existence proves that the energy transition cannot rely only on market forces and generic incentives. Secondly, it shows that the transition involves territorial dimensions and thus necessitates targeted and coordinated actions. Lastly, it shows that the energy transition has to rely on multiple institutional levels of action. As for Western Macedonia, the JTF can be considered a tool for restructuration of the whole production pattern of the region that needs to transition from the mono-sectoral economy focused on lignite activities. The same fund becomes particularly important for Megalopolis because the region undergoes the transition in less institutional and productive density.

As can be seen from the analysis of the individual priorities of the JDTP, this programme demonstrates different degrees of activation. Priority 1, which concerns entrepreneurship, appears to be the most active and financially intensive part of the programme at the programming and operations level. It is important to note that the emphasis made on supporting local enterprises can be regarded as the key precondition for further successful transition. At the same time, it is uncertain whether the entrepreneurship support will lead to the establishment of new sustainable activities and/or will serve as a compensatory mechanism in the first place.

Similarly, Priority 2 concerning the energy transition and climate neutrality can be regarded as the part of the programme reflecting the energy-related nature of the problem. Various actions dedicated to energy efficiency, energy sources, self-production, and innovative technologies including renewable hydrogen demonstrate the necessity to change the energy model in the transition regions. Nevertheless, according to the performed analysis, energy transition cannot become sufficient to secure complete regional restructuring. The contribution of the related actions to employment, value chains, and sustainability will depend on the linkage to local enterprises' demands.

It becomes particularly difficult in regards to Priorities 3 and 5 because they reveal low operational maturity. Priority 3 associated with the repurposing of lignite land and the circular economy appears strategically important because its realization is a precondition

for further utilization of the mining territories. However, its lack of operational approval indicates that the dimension is not yet translated into actionable measures. It can be said about Priority 5 as well. The actions aimed at enhancing quality of life, local attractiveness, and social cohesion are crucial. Yet the non-existence of any approved actions means that for now, the potential benefit is not empirically proven.

On the contrary, Priority 4 appears to be activated quite successfully and demonstrates the importance of the social and labour market aspects of the transition process. Actions related to training, counselling, certification, employment promotion, and social support appear to be especially relevant for those regions where historical lignite activities have been linked with stable employment and strong identity. It is vital to emphasize that labour market transition cannot be achieved via training alone. Instead, its success will depend on whether the acquired skills match the current employment opportunities, investments, and potential in each particular territory.

Lastly, Priority 6 associated with Technical Assistance seems to be rather activated and is important in terms of the Programme's institutional capacity. While it does not contribute directly to development results, it provides the support for various activities, such as monitoring, evaluation, publicity, project maturation, and beneficiary support. From this perspective, Technical Assistance is to be regarded as a piece of necessary institutional framework. Its value is indirect, and its efficiency will be judged by the extent to which it contributes to the faster implementation of other priorities.

Furthermore, Priority 7 concerning critical technologies for strategic sectors through STEP shows another dimension of the JDTP, namely, its technologically oriented aspect. Linking just transition with the use of digital technology, clean and resource-efficient technologies, and biotechnologies can contribute to a shift from lignite towards higher added-value activities. At the moment, the priority in question remains “inactivated” since there is no active call or approved operation. Therefore, the contribution of technological innovations to productivity can be considered programmatic for now.

Consequently, the current portrait of the JDTP appears to be rather complex. On the one hand, some parts of it are quite activated and show promising trends. On the other hand, some priorities, which can ensure the achievement of long-term goals, still require further maturation. Thus, the assessment of the programme progress cannot be limited by only comparing budgetary allocations. At the same time, their balance and quality have to be evaluated as well. To sum up, the JTF can be regarded as the embodiment of territorial justice, which is reflected throughout the paper. The concept includes not only financial support of projects but also the possibility of participation in the development of the new

model by the regions that provided support for the previous one for decades. Overall, the programme in question appears to be created and already established. Still, its successfulness will depend on its implementation.

4.5 Social Impacts

The transition from fossil fuels is bound to have enormous social repercussions, particularly in places where energy production has been dependent on coal and hydrocarbon resources. This is especially evident in Greece where these implications will become obvious in regions such as Western Macedonia and Megalopolis that relied on lignite mining for power generation. In line with the Just Transition framework, it is crucial to assess how decarbonization is affecting community demographics, cohesion, identity, and well-being in these territories, and whether emerging policies are adequately addressing these human dimensions. These social impacts are examined not as isolated side effects, but as structurally produced outcomes of a rapid and uneven transition process unfolding in two already vulnerable regions.

One immediate social impact of decarbonization is the demographic change observed in coal dependent areas. The decline or closure of a dominant industry often triggers out-migration, population loss, and aging of the remaining population. In Western Macedonia the population has indeed contracted sharply in the past decade. Between 2011 and 2021, there was a drop in the population by more than 10%, which was the most significant reduction of the population rate in the whole of Greece (Hellenic Statistical Authority, 2023, p. 18). An even greater decrease of approximately 17.8% occurred in Megalopolis between 2011 and 2021, decreasing from 10,687 to 8,784 people (Hellenic Statistical Authority, 2023, p. 37). Such trends show that there was a substantial outmigration from these areas, as the local economies worsened, that was necessary for people in order to seek better employment opportunities. Thus, the demographic structure of these towns changed dramatically and became characterized by people of higher ages. About 10.8% of the population of Megalopolis is under 20 years old, while nearly 39% is over 60 (Marinakos *et al.*, 2020, p. 15). It is a rather fast process that affects not only local economy but also other social aspects since schools face closure due to lack of students or smaller demand for goods and services is exhibited by the wider population. From an analytical point of view, it is clear that these situations represent more than just temporary adaptation shocks; they also reveal longer-term

trends of selective migration, segmented labour markets, and regional disadvantage. From a “just transition” perspective, these dynamics risk locking coal regions into a downward spiral as far as demographic change undermines both the labour base, as well as limit opportunities stemmed from transition-related investments.

These demographic issues have complications beyond their social context, affecting development issues as well. Population loss, ageing, and youth migration reduce the size of the labour pool, lower domestic consumption, and hinder the long-term capacity of Western Macedonia and Megalopolis to benefit of new investments opportunities. In this sense, demographic loss is more than just a consequence of transition; it is also a tool used to prolong territorial vulnerability.

Beyond statistics, the process of energy transition has intangible yet serious impacts on social cohesion in the territories affected. The mining and power generation activities did not simply provided employment for people in these regions but also formed elements of social structure and collective memory. For many years, the state-run Public Power Corporation (PPC) not only employed locals but was also a key social player by providing the funding to build district heating networks, schools, and housing in the region. People felt pride in themselves being miners or operators in power plants due to their participation in Greece’s industrialization and electrification after the World War II (Krommyda, 2024). A specific “lignite culture” appeared, and subsequent generations continued mining while holding traditional views about its significance. All this resulted in strong local support for continued lignite production despite growing environmental concerns (Krommyda, 2024). Local surveys conducted as late as the 2010s indicated that some residents (including younger ones) preferred renewed investment in lignite activities over a total phase-out (Karasmanaki *et al.*, 2020).

These processes create substantial psychosocial stress within the affected communities. At a crucial stage of the region’s transformation, when advocates of “green” transition confront supporters of preservation of lignite activities, the process poses a risk of undermining social cohesion. Furthermore, should the transition be seen as centrally-imposed from Athens and/or Brussels without adequate involvement of local communities, this would create mistrust and resentment towards local authorities (Makris, Apostolopoulos & Anastasopoulou, 2024). As noted above, many residents in Western Macedonia and Megalopolis feel marginalized by the state. This sense of marginalization —regardless if it’s real or imagined— could fuel social conflict and foster an idea of the region being underdeveloped and struggling (Makris, Apostolopoulos & Anastasopoulou, 2024; Karasmanaki *et al.* 2020).

However, it should be noted that apart from its impacts on economic arrangements and collective identity, the transition will also affect the well-being of its participants and influence their psychosocial state as well. Within the highly interconnected mono-industrial territories, unemployment does not solely mean a financial difficulty. It also signifies a significant disruption at both personal and family level (Krommyda, 2024). As a matter of fact, it is becoming evident that the process of lignite phase-out has triggered an increase in mental disorders among the locals as evidenced by social workers and local psychologists (Krommyda, 2024). The rapid phase-out schedule has provided them with minimal time to psychologically prepare for the transition. In addition, the lack of employment opportunities in the local economy leaves many said residents to choose either being unemployed for an extended period of time or relocating. All of these factors create additional stress that affects both workers and their families (Krommyda, 2024).

Another source of stress is the fear of having to live with health problems such as respiratory diseases and hearing damage —typical for retired miners working in lignite mines (Drivas *et al.*, 2007). Moreover, the issue of the possibility land restoration also contributes to a broader climate of insecurity within transitioning communities (Drivas *et al.*, 2007). Thus, the psychological side of the transition process highlights the need for Just Transition policies that incorporate mental health support and community renewal initiatives (Krommyda, 2024).

4.6 Economic Impacts

The energy transition entails a plethora of economic consequences, especially for areas where the productive system was based on the extraction of fossil fuels and the production of energy through thermal power plants. The same applies for Western Macedonia and Megalopolis, where lignite has played the crucial role in determining the economic model of the region. For such transitional regions, the shift away from lignite entails not just the change from one form of energy to another, but the deconstruction of the existing productive model, thus necessitating economic reorientation. This section deals with the economic implications of the transition away from lignite for the case studies of Greece, while taking into account selected experiences from other European regions utilizing coal.

The main economic impact expected after the shutdown of mines and power stations will be the disappearance of the most important productive factor driving the local economy.

In the case of Western Macedonia, the energy industry (including lignite extraction and electricity production) had been dominating the local economy for decades. Industrial manufacturing, which is inherently linked to the energy industry operations, accounts for nearly 50% of Gross Value Added (GVA) in the region, whereas its average share in the Greek economy totals around 13% (Christiaensen & Ferré, 2020a, p. 11). Therefore, the employment effects appear to be especially notable since, as Christiaensen and Ferré (2020a, p. 15) estimate, as many as 5,500 people had worked directly in mines and power stations within the four lignite-mining municipalities in 2018, accounting for more than 22% of all employment positions available locally. Estimates gained through extensive research indicate that before the transition began, the number of workers engaged in coal extraction had reached approximately 8,000 individuals or about 30% of all employees in the region (Christiaensen & Ferré, 2020a, p. 15). Hence, the closure of lignite units removes the cornerstone of the local economy, which will negatively affect the regional GDP and business activity. Additionally, the government revenue is expected to decrease due to the reduced amount of royalties, taxes levied on PPC, and special fees associated with coal mining. An exemplary illustration of such a decrease is the redistribution of earnings from the European Union Emissions Trading System (EU ETS). Following the adoption of the national legislative act in 2018, when continuous lobbying from the region took place, 6% of Greece's total ETS auction revenue was supposed to be distributed to Western Macedonia; however, by 2024, the actual share was around 1.65%, emphasizing the growing gap between the constitutional right and fiscal reality (Ioannidis, 2025). Ioannidis (2025) also claims that, upholding the original 6% earmarking of EU ETS auction revenues could have generated roughly €800 million for lignite-dependent regions by 2030, based on projected auction revenues and carbon price trajectories. The moderated share, however, has already cost Western Macedonia approximately €224 million by 2024, with cumulative costs forecast to surpass €500 million by the end of the decade (Ioannidis, 2025). In other words, the national budgetary allocations combined with the design of the energy transition policies are actually depriving the local administrations of funds, thus making the economic challenge for coal-dependent municipalities even more severe. Collectively, territories in transition are faced with economic recession because their main driver of production is lost, unless new activities can be developed to fill the void left behind. Therefore, the decline in productive capacity is part of a wider trend of economic disruption, in which the disappearance of a key industry leads to a torrent of secondary effects within the region. The immediate effect of deindustrialization is a major investment gap. Insofar as coal-dependent economic activity decreases, there seems to will be no incentive for private

investment to step in, leaving behind a void that cannot be filled automatically by market forces. Regarding Western Macedonia and Megalopolis, apart from the reduction of the existing economic activities, the challenge is also that of developing new productive potential in renewable energy sources, energy storage systems, sustainable manufacturing, agritech, tourism, and other industries that can generate sustainable employment and value addition. But as Christiaensen and Ferré (2020a, p. 27) observe, the main challenge after the lignite industry decline is to create jobs and attract firms into the coal-mining regions. Without adequate investment in time, such regions will remain stagnant and witness high unemployment levels coupled with professional brain drain.

The rearrangement course includes the exploitation of current assets and infrastructure, while also addressing weaknesses. On the positive side, these regions have several significant comparative advantages, such as an e substantial expertise in the energy sector, an established power transmission system with substations that can accommodate further energy projects, and extensive land areas available for redevelopment. As such, policymakers have sought to direct targeted investments to these areas. A key illustration of this strategy is the strong emphasis placed on the expansion of renewables: in Western Macedonia, a consortium of PPC Renewables and RWE AG has begun constructing a series of utility-scale solar photovoltaic parks on a former lignite mine site in Amyntaio, totalling around 730 Megawatt (MW) of capacity (Alpha Bank, Eurobank & National Bank of Greece, 2024). This project—one of the biggest solar projects in Southeast Europe—is partly funded by RRF, thereby showcasing how public funds are used to foster private investment projects. Similar solar energy projects on a massive scale, together with plans for producing “green” hydrogen and batteries, are also being implemented under the scheme of the newly formulated development strategy in the region (Ministry of Labour and Social Affairs, 2022). This will be achieved by turning Western Macedonia into an energy region based on renewables rather than lignite energy, exploiting the area’s abundant solar resources and large amount of land. Another area that will get massive investment in solar energy is Megalopolis, where there will be a deployment of up to 0.5 GW of PV energy projects (Government Committee for Just Development Transition, 2020, p. 17).

Conversely, despite being a crucial aspect of Greece’s efforts towards decarbonizing its economy, there seems to be an inherent limit to the extent of employment generated through renewable projects that could compensate for the unemployment due to the cessation of mining. Research suggests that jobs related to renewable energy, such as solar or wind energy projects, are typically short-lived and concentrated only on the construction stage (Fabra *et al.*, 2024, pp. 4-10). Once operational, the workforce

engagement is relatively small, and the maintenance can be provided by a specialized team working with several locations. This employment feature is the core of the just transition debate; renewable energy investment is crucial in order to achieve the decarbonization goals but does not guarantee employment justice.

Unlike in the case of the lignite economy, when mining operations and thermal plants provided plenty of stable jobs for residents of the region, international research by the International Energy Agency, the ILO, and the OECD shows that the employment intensity of renewable energy is lower than that of fossil fuel energy, which makes it hard to absorb the full workforce displaced by coal closure (International Energy Agency, 2022; ILO, 2015; ILO, 2022; OECD, 2021a). Therefore, for the purpose of transition, in addition to renewable energy production, it is essential to create new sources of income and industries in transitional areas like Western Macedonia and Megalopolis.

Structural Challenges in Coal Regions

Other than the loss of the mines and industrial facilities, territories in transition face structural challenges when to rebuilt their economies. The main one is lack of diversification within the economies in focus because they were single-industry centres or “monocultures” that had few Small and Medium Enterprises (SMEs) in unrelated sectors. Some historical cases can be used to illustrate the situation. Germany’s Ruhr area is a indicative example. As late as 1980, heavy industry still contributed about 50% of the Ruhr’s regional GDP with most of it controlled by a few large corporations (Wong, Röser & Maxwell, 2022, p. 8). Likewise, the Lusatia region in eastern Germany relied on its lignite mining up until 2016 when it still accounted for about 30% of the regional GDP, showing insufficient diversity (Wong, Röser, & Maxwell, 2022, p. 14). Western Macedonia and Megalopolis reflect this pattern closely; for decades, economic activity in both areas was centred on PPC, with little manufacturing beyond energy-related activities and no significant technology base. As a result, the entire productive base will have to be restructured almost completely, a process that will undoubtedly be time-consuming and difficult. The challenges are best understood not just as separate problems, but rather as an interconnected set of structural factors affecting regional transformation.

All these considerations imply that the process of reconstruction of the economic base is a time-consuming endeavour, even if political commitment is strong. In general, lignite phase-out seems to be a complex and costly process. Western Macedonia and Megalopolis risk similar prolonged adjustments if structural challenges are not addressed head-on. The next part of this section will discuss how European funding is in fact being deployed to tackle precisely these needs, effectively acknowledging that without external help, these structural barriers could lead to failure of the transition.

The role of European funding in reversing deindustrialization

Given the scale of the challenges described, the role of European funding is pivotal in helping coal regions avoid permanent decline. The EU has explicitly acknowledged that the “green” transition, if driven solely by market forces, may deepen regional inequalities and produce areas of acute deindustrialisation. In response, it set up the JTM as part of the European Green Deal, one component of which is the JTF. About €17.5 billion (in 2018 prices) was allocated to the JTF at EU level (Council of the European Union, 2021). These funds are concentrated on the “most affected” regions, meaning those with high employment or GDP dependence on fossil fuel industries. Importantly, access to the JTF required each Member State to produce Territorial Just Transition Plans, which ensures that the funding is linked to a coherent regional strategy (European Commission, n.d.). Although European funding instruments constitute a central pillar of the Just Transition strategy, their effectiveness depends less on their nominal scale than on how they interact with regional governance capacity, project maturity, and the ability to anchor investments in territorially embedded production systems.

In theory though, European support has been substantial for the case of Greece. Greece was actually the first EU country to have its Just Transition Plan approved by the European Commission. The approved program (late 2021/early 2022) allocated approximately €1.63 billion in total funding to support the transition of its lignite regions (Western Macedonia, plus Megalopolis and a few smaller areas) (European Commission, 2022). The JTF is complemented by other funds: the RRF —the EU’s pandemic recovery instrument— has also earmarked significant investments for climate-related projects in Greece, some of which directly benefit coal regions (such as renewable energy and grid projects on former mine lands, and job training programs) (European Commission, n.d.). Traditional Structural Funds are likewise being aligned: for instance, Greece’s mainstream regional development programs for 2021–27 include

climate transition and just transition as horizontal priorities, dedicating a share of funds to these aims (European Regional Development Fund, n.d.). Furthermore, Greece has tapped the other two pillars besides the JTF (InvestEU scheme and EIB); in October/November 2023 the European Commission and EIB approved a PSLF package of €80.7 million for the region (comprising a €14.5 million grant and a €58 million loan), aimed at kick-starting 15 priority infrastructure, social-service and diversification projects in six municipalities (European Commission, 2023). While these instruments set out ambitious goals, their actual impact depends on how they are implemented, the criteria used to select projects, and the ability of local and regional stakeholders to convert funding into meaningful and productive investments.

NUTS-2 Western Macedonia (population ~250,000) and Peloponnese (population ~530,000) are slated to receive on the order of €1.6 billion in just transition funds in targeted funding over the decade (European Commission, n.d.). By 2023, as the first wave of projects commenced, the Peloponnese's unemployment rate had fallen to 9.6%, below the national average, pointing to a degree of resilience, while Western Macedonia still recorded a much higher rate of 16.7% (European Commission, n.d.). This is indicative of stabilization and not the sharp rise that was anticipated at the start of the closures of lignite mines. These statistics bring out the result that the European Union intends to prevent: a further rise in unemployment beyond 20% in Western Macedonia without strategic investments for the creation of other employment opportunities (European Commission, n.d.).

Qualitatively, the funding is aiding projects that would not have occurred otherwise. For example, as noted earlier, a 2 GW solar PV programme in Western Macedonia, developed by PPC Renewables and its partners, is being implemented on former mining sites, supported by RRF financing as well as JTF assistance for the related grid upgrades (Western Macedonia S.A., 2020, p. 15). The "Innovation Zone of Western Macedonia" is another example of institutional assistance for economic diversification. Designed as an "umbrella structure", the zone is promoting innovation infrastructure, incubators, and research partnerships aimed at supporting start-ups and other high value-added sectors in the region (European Commission, 2022). In the Peloponnese, the Just Transition funds have similarly shown flagship initiatives. One is the creation of a "Bioeconomy 360° Hub" in the municipalities around Megalopoli, aiming to transform the local agri-food industry (European Commission, 2022). Another venture is the establishment of a pharmaceutical production unit on a repurposed industrial site in Megalopoli, with an investment of about €90 million that is expected to create up to 400 skilled jobs (Western Macedonia S.A., 2020, p. 17). At the same time, 0.5 GW of solar parks are being

developed in the Megalopoli area (50 MW already under construction by PPC) to replace lignite power with clean energy generation (Western Macedonia S.A., 2020, p. 17). Plans have been made for other sectors of activity beyond energy, with suggestions for a tech park and a theme park to boost tourism, which will add to the expansion of the services sector. This clearly shows an effort by the government to broaden its economic base (Western Macedonia S.A., 2020, p. 17). Nevertheless, there are some considerations that should be kept in mind. Plans for building new correctional facilities in the vicinity of Megalopolis and in Western Macedonia raise some doubts about the overall strategy for economic development (ERT News, 2026). Such projects, although promising in terms of creating short-term employment, do not necessarily align with the innovation model of growth.

An analysis of *counterfactual scenario* proves informative as well: how would the future trajectories look like in case of the lack of EU funding and just-transition policy here? It seems quite likely that without any kind of assistance from the EU, Western Macedonia and Megalopolis would suffer significant economic downturn. Without any means of improvement, unemployment rates in these territories could either remain at high levels or get even worse. Additionally, issues such as accelerated migration of young and qualified workforce and population aging would emerge and exacerbate further. Market forces themselves probably would not lead to a quick investment in solar projects and appearance of new industries since the regions were considered to be structurally declining, which makes them unfavourable for businesses. Funding from the EU has had a considerable effect on the future development of these territories; through grants and concessional loans, the Union has made it financially feasible for firms in these regions to survive and also helped finance necessary improvements in infrastructure and human capital—all those achievements would not be possible without government intervention (European Commission, 2020).

On the other hand, an analysis should also cover the sustainability of this model of development financed by the government. Public spending can play an important role in stabilizing declining transition regions and helping them get back on track and develop further. At the same time, the problem that arises when using the model described above is the risk of too high dependence of regions' economic development on financial assistance coming from the government. What is crucial here is whether it would be possible for these regions to become independent of financial support in the long run. For example, it is questionable whether the newly-created businesses would remain economically sustainable without subsidies—in the end, they would cease receiving them once the current funding cycle concludes (after 2027).

4.7 Labour Impacts

As noted by the ILO, moving towards a low carbon economy is not only a process of technological or ecological transformation but is also an important process of structural change with implications for the functioning of the labour market (ILO, 2015). In the case of Greece, the issue is particularly visible through the examination of the labour-market impact of the transition. It is expected that the effects will be most pronounced in Western Macedonia and Megalopolis, where the lignite economy supported relative stable employment for decades and formed social classes, and labour-market behavior. This section examines the effects in the two selected regions with a special focus on unemployment, retraining, social dialogue, and heterogeneous results from transition among employees.

Industrial restructuring as a consequence of climate change, without any precautionary actions taken beforehand, may cause considerable turmoil in the labour market. Although international projections suggest that this transition will bring about an overall growth in employment levels, the share of gains from this phenomenon does not seem to be equally distributed among industries, skill groups, and regions (International Energy Agency, 2021). This imbalance becomes even more pronounced in areas such as Western Macedonia and Megalopolis, in which case the problem emerges because coal-dependent employment tends to become less accessible over time, whereas alternative sources of employment are develop slowly. This implies a significant probability for long-term unemployment for workers laid off from the lignite industry.

Retraining programs do not guarantee effectiveness. One significant problem is low participation in training sessions, including that of older workers who do not want to go back to the training process or are afraid to undertake retraining after working all their life in one job. For labourers in their mid-50s with many years of experience in mining, the prospect of acquiring a completely new, set of skills may be unrealistic, particularly given the limited time remaining in their working lives. In such cases, transition strategies should include targeted, age-appropriate support measures. Thus, Just Transition programs often include both reskilling and early retirement programs for people approaching retirement age (ILO, 2022).

Another limitation to be considered relates to the fit between training and market demands for labour. Training efforts are successful only when carried out in cooperation

with businesses, and where the qualifications acquired lead to genuine job opportunities (ILO, 2022). In the absence of effective cooperation, reskilling and upskilling efforts are prone to becoming supply-led activities, where the goal becomes providing training as such without paying attention to the real market needs. This leads to the creation of workers whose skills do not match the existing labour market conditions, thus resulting in poor employability prospects (International Energy Agency, 2021). This problem can be partially addressed through active labour-market activation policies, such as wage and social-insurance subsidies including wage and social-insurance subsidies to incentivise firms to recruit and train unemployed residents from said transition areas, as well as entrepreneurship and self-employment grants for lignite-mining employees aspiring to launch their own businesses (Just Transition Coordination Committee, 2021).

To put it simply, handling unemployment issues arising in the course of decarbonisation involves creating links to compensate for a certain time-related deficit between increasing unemployment and generating employment. The extent to which this bridging succeeds will certainly differ across worker groups. While some employees will have no trouble adapting to the new environment, others will face major obstacles. As was already mentioned above, transition regions of Western Macedonia and Megalopolis are likely to experience a transitional employment deficit.

An overlooked component in transitions is the importance of social dialogue and worker organizations. In Europe's traditional heavy industries, trade unions had significant influence, and they played an active role in negotiating the terms of change related to layoff packages, severance pay, re-training rights, etc. (European Commission, 2011). In the context of a "just transition", both the ILO and EU policies emphasize the significance of multilateral dialogue between unions, employers, and the state, because it plays a crucial role in planning and implementing the transition (Krommyda, 2024). The rationale is that the inclusion of the worker organizations leads to more equitable outcomes and increases the legitimacy of the process, while unions can push for ensuring safety standards and decent working conditions in new "green" industries. Many of the renewable energy sectors that have grown in recent years have emerged during a period marked by declining trade union density across advanced economies (Visser, 2019). Contrary to historical high rates of collective organization in coal, steel and other traditional industries (European Commission, 2011), many renewables, including PV, feature smaller companies, subcontracting and more dispersed value chains (International Renewable Energy Agency, 2022). As a result, trade union density and collective bargaining coverage in growing renewables tend to be much lower than in the corresponding traditional sectors (ILO, 2018; Stevis & Felli, 2015). This structural shift

raises concerns that workers may be underheard. This is especially true for in Greece's lignite-dependent territories, where the lignite-based PPC traditionally maintained high trade union coverage. With the downsizing of PPC, many jobs in Greece that used to enjoy the strongest trade union protection are lost (Balkan Green Energy News, 2023).

In response to that situation, inclusive governance mechanisms were adopted. According to the EU Just Transition Governance Regulation (EU) 2021/1056 Article 18, TJTPs should be developed through inclusive consultation of the regional stakeholders, which includes consultations with social partners, especially trade unions and employers' organizations (European Parliament & Council of the European Union, 2021). In practice, as was mentioned above, several trade unionists in Western Macedonia saw consultation in the TJTP process primarily as a formality since the consultation was conducted after the key decision on shutting down lignite production was made in 2028 (Makris, Apostolopoulos & Anastasopoulou, 2024).

Therefore, true social dialogue is an essential aspect of a democratic and just transition. Effective mechanisms of dialogue allow workers and their unions to act as co-creators of the transition process. In turn, it helps to shift the priorities of the trade unions away from defending existing industries, such as mines, toward influencing the emerging economy and shaping green jobs in terms of quality and conditions.

Gendered and age-related impacts on labour from energy transitions also arise. The traditional dominance of heavy industries, especially mining and electricity production, has meant that the closure of lignite plants in Western Macedonia will cause significant job losses among young and middle-aged men, destabilising long-standing domestic and community roles (Coal Transitions, 2022; Christiaensen & Ferré, 2020a). At the same time, women—who traditionally were not employed in mining but had higher representation in care, retail, and other service sectors—may find new employment possibilities in an expanding service economy (Coal Transitions, 2022). Nevertheless, these employment scenarios are often associated with low pay, insecurity, and limited unionization (Coal Transitions, 2022). Additionally, women typically face more domestic and caregiving responsibilities than men, making it harder for them to benefit from labour market prospects in the absence of dedicated childcare and/or eldercare support facilities (Christiaensen & Ferré, 2020b). In this respect, it is essential to ensure that any transition plans address any existing disparities in the employment of women and men within a Just Transition process (Regulation (EU) 2021/1056, Arts. 14–15).

For older workers in the coal and industrial sector (especially those aged over 50), there is an obvious lack of potential opportunities for re-skilling along with a shorter period in

which the cost of acquiring these skills will be recovered. Without proper support, these individuals will drop out of the labour force by way of early retirement and long-term unemployment, putting a burden on pension programs and losing valuable human capital that can be used in other sectors (Coal Transitions, 2022; Christiaensen & Ferré, 2020a). Meanwhile, the youth population in the formerly coal-dependent areas runs risk exclusion due to the emergence of new “green” jobs which require certain skills not still possessed by the residents of these areas. Without proper action being taken, this can accelerate brain drain. The data shows Western Macedonia’s youth unemployment near 60% (Christiaensen & Ferré, 2020a, p. 13). Essentially, in both Western Macedonia and Megalopolis, demographic aging is a big constraint. If large portions of the population are older, the workforce available for new industries shrinks, and at the same time the social care burden increases (Christiaensen & Ferré, 2020a; City Population, 2024).

In aggregate, an equitable “just transition” requires systematic consideration of gender and age-based inequalities. This implies labour-market policies that respond to differentiated capacities and constraints—for instance, retraining schemes adapted to older workers through shorter, practice-oriented programmes that enable quicker reintegration, rather than prolonged and costly re-education pathways. At the same time, strengthening women’s access to the emerging green economy necessitates targeted measures such as flexible training arrangements, childcare provision, and active efforts to challenge persistent gender segregation in technical and renewable-energy fields. These priorities align with the European Pillar of Social Rights and with Regulation (EU) 2021/1056 establishing the JTF, both of which emphasise gender equality and the protection of vulnerable groups in transition territories (European Parliament & Council of the European Union, 2021). Following this approach, Greece’s TJTPs have defined the following groups as priorities for projects under selection criteria: long-term unemployed, women, and young people (Ministry of Labour and Social Affairs, 2022). Yet, the crucial question remains in its successful implementation. Without a focus on inclusive delivery of the programme, any gains from transition could be highly skewed. In this regard, labour market outcomes serve as an essential indicator of the success of the just transition, where decarbonization occurs inclusively.

On the whole, a genuinely just transition requires a systematic focus on differences in labour market vulnerability across gender and age groups. In relation to Western Macedonia and Megalopolis, it is important not only to judge the performance of the labour market on the basis of employment creation but also according to whom these jobs are being made available, under what terms, and with how much inclusivity.

Chapter 5: CASE STUDY I - WESTERN MACEDONIA

Western Macedonia is a mountainous region in Northern Greece, which includes the prefectures of Kozani, Florina, Kastoria and Grevena. Historically, the region served as the focal point of lignite production. Over many decades, it has housed most of Greece's coal mines and thermal power plants, which played a significant role in Greece's electricity generation process. This historical role contributed to the formation of a relative concentrated development model, with the regional economy, the labor market and the social structures depending significantly on the lignite sector. Therefore, in the context of the theoretical framework, Western Macedonia reflects a path-dependent pattern of development, where long-term specialization in one sector limited opportunities for economic diversification (mono-specialised regional development).

In the region, local communities prospered around PPC mines and power stations; the appearance of many modern settlements can be attributed to the lignite boom of the 1950s. In particular, at the peak of lignite production (~1997), up to 9,000 PPC workers operated in mines and plants (The Transition of Work, 2025). In the core mining prefectures Kozani and Florina, the regional economies have totally been shaped by energy-related industries. So, as Christiaensen & Ferré (2020a) point out, in 2018 the industrial sector (which includes mining, manufacturing and electricity production) accounted for about 60% of the total GVA in Kozani and 49% in Florina. Moreover, the economic vulnerability of Western Macedonia is exacerbated by the fact that, in some cases, 71% of large employers (>50 employees) get up to 80% of their revenues through PPC subcontracting (Christiaensen & Ferré, 2020a, p. 22). Overall, such mono-sectoral dominance formed a classic case of "economic monoculture". From the standpoint of regional development theory, economic monocultures are often vulnerable to external shocks, are characterized by structural rigidity, a lack of innovation and lock-in effects.

In September 2019, it was announced at the UN Climate Action Summit that all lignite power stations in Greece would be phased out by 2028; an unprecedented step, given the fact that among European coal-using countries, Greece stands out as having the most ambitious timeline (Lypiridi, 2021a). Indeed, since 2019, large lignite-fired power

stations began their shutdown process; by the end of 2023, over 80% of lignite capacity was retired, and the remaining major plant is scheduled to run until 2028 (Makris, Apostolopoulos & Anastasopoulou, 2024). As can be seen, the phasing out process in Western Macedonia became a turning point in the socioeconomic development of the region, which now needs to transform itself into another development model relatively quickly.

In the following sections, the transition process experienced by Western Macedonia will be analysed. At the same time, this first case study will serve as a kind of basis for analyzing the case of Megalopolis, which will be considered later. To begin with, the pre-transition context will be outlined. Next, the process of the transitional strategy and its implementation will be discussed. In particular, the transitional strategy and governance architecture will be examined. Then, the projects that were implemented during the transition, or are intended to be implemented, will be outlined. Finally, the challenges, as well as the difficulties of Western Macedonia's development in the course of transition, will be discussed.

5.1 Pre-transition development model

Before the transition, Western Macedonia's development model was largely defined by lignite extraction and coal-based electricity generation. The PPC was the main source of employment, income, and tax revenues in the region. According to Ziouzos *et al.* (2021), even at the moment when the sector began experiencing a decline towards the end of the 2010s, coal-related activities still comprised more than 10% of overall employment in the region and approximately 34% of GVA in the core mining prefectures of Kozani and Florina. It should be noted that according to the findings reported by Christiaensen & Ferré (2020a), energy production was predominant among economic activities in these prefectures and contributed heavily to Western Macedonia's dependency on lignite production.

The mono-industrial structure produced short-term socioeconomic benefits. Employment within PPC and its contractor network was relatively well-paid, stable and unionized. In addition, PPC took up functions related to welfare financing district-heating systems, local infrastructure, and community facilities. As established before, these arrangements filled in for for diversified regional development, underpinning dependence on a single corporate actor (Karasmanaki *et al.*, 2020).

This growth pattern was also plagued with structural flaws that gradually became apparent towards late 2010s. As both international and domestic circumstances shifted, —most notable of which is the increase in CO₂ allowances which made lignite power uncompetitive, along with stricter EU air-quality standards— the coal industry began to experience an era of consistent decline. From a theoretical perspective, this process represents the vulnerabilities of path-dependent economies that result to asymmetric shocks. Evidence from Eurostat regional accounts data (2023) suggest that Western Macedonia's GDP per capita in Purchasing Power Standards declined by approximately 8.4% between 2014 and 2015, marking one of the most abrupt single-year contractions in Greece during this period. Using Eurostat LFS data for 2018, the region recorded an unemployment rate of 27%, significantly higher than the national average of 19% for the same period (Christiaensen & Ferré, 2020a, p. 7). These figures mask even more severe disparities among specific groups. Youth unemployment (ages 15–24) exceeds 60% (Christiaensen & Ferré, 2020a, p. 34). Female unemployment also remains persistently elevated, at 34%, well above the national average (Christiaensen & Ferré, 2020a, p. 34). Long-term unemployment is also a persistent feature with two-thirds of the unemployed having been out of work for over a year (Christiaensen & Ferré, 2020a, p. 34).

As discussed in the “Social Impacts of the Transition” section, Western Macedonia entered the transition with severe demographic vulnerabilities, including sustained out-migration of working-age population, rapid population decline (-10.3% between 2011 and 2021), and accelerated ageing, according to the 2021 census (Hellenic Statistical Authority, 2023; 18). This ongoing exodus of labour further weakened the local economy. At the same time, the region's population is aging rapidly, with residents aged 65 and over accounting for 23.6% of the total—above the national average of 21.8% (Christiaensen & Ferré, 2020a, p. 8). This aging population and the concurrent decline in the working-age people (with one-third of the total population currently employed, as Christiaensen & Ferré highlight in their World Bank report) created an alarming dependency ratio. An older, shrinking population is linked to lower levels of entrepreneurship, decreased dynamism in the labour force, and greater strain on healthcare and social services. In terms of overall structure, Western Macedonia entered the transition fixed in a self-reinforcing cycle of mono-sectoral dependence, labour-market decline, and demographic erosion. Such structural deficiencies seem to make this region particularly vulnerable to the sudden withdrawal of its industrial backbone as well as reinforce a cumulative causation process, thus further constraining the region's development prospects.

Additionally, Western Macedonia has accumulated serious environmental risks as a consequence of the extraction and burning coal. Local interviews document high rates of chronic illnesses: according to the locals, pollution of air and water has caused numerous cases of cancer, heart problems, bronchitis, and other diseases related to respiratory disorders (Gkeka, 2022). Therefore, despite the expected decline in the production of lignite, the demand for healthcare services will continue growing due to the need to address the long-term consequences of previous environmental disasters. Local water sources have been contaminated too from said mining activities, which resulted in serious environmental degradation. Thus, Western Macedonia faces a dual challenge: the necessity of reorganizing the local economy and implementing measures aimed at restoring the environment damaged. Consequently, the legacy of the lignite era does not end after the last piece of coal is extracted, as there remain long-term healthcare issues to be resolved and land to be rehabilitated. Such an example can be regarded as the manifestation of “disproportionate local burdens”, meaning that Western Macedonia not only has to cope with the socio-economic problems caused by deindustrialization but also has to restore the environment degraded due to previous practices.

It would appear that, on the threshold of the transition, Western Macedonia found itself caught up in a reinforcing spiral of industrial decline, unemployment and poverty, outmigration of young people, and increasing environmental risks; symptoms of the ongoing dissolution of the region’s development paradigm based on lignite production. From a theoretical perspective, Western Macedonia could be considered a formerly growing energy region, whose dominant basic-sector industry played an important role in creating employment opportunities, generating multiplier effects throughout the region (Filenta, 2025; Anselin, 2001; Kaldor, 1970). However, the weakening of that dominant sector triggered adverse dynamics characteristic of the cumulative causation and path-dependence models —specifically self-reinforcing trends of job losses, declining local demand, and outmigration (Myrdal, 1957; Martin and Sunley, 2006; Krugman, 1991). In comparative analysis, it could be concluded that Western Macedonia possessed a wider industrial structure and a larger territory than Megalopolis, yet it was even more dependent on lignite.

5.2 The Transitional Strategy and flagship interventions

Considering the structural difficulties faced by Western Macedonia, it was crucial for the Greek authorities to speed up the development of an extensive Just Transition framework in 2020-2021, focusing mainly on the specified territory. The political decision to close down lignite operations until 2028 created urgency and direction, leading to a specific time frame within which policies needed to be implemented. In fact, the government decided to set up a Coordination Committee of the JTDP under the Ministry of Development and Investments (Makris, Apostolopoulos & Anastasopoulou, 2024). Furthermore, it founded METAVASI S.A., responsible for the redevelopment of former mines and promoting investments (Makris, Apostolopoulos & Anastasopoulou, 2024).

As it was noted earlier, the consistent with EU targets NECP was approved back in 2019 (European Commission, 2025), and in parallel the Greek government developed a dedicated JDTP which became the basis for the country to become eligible for the resources of the EU JTF (Coordination Committee of the Just Development Transition Plan, 2020). Analyzing the specified plan from an academic point of view, it can be argued that the JDTP represents a case of place-based policy approach since it builds on the ideas stated in the Barca Report (2009) and corresponds to the EU's cohesion policy principles, because it seeks to provide territorially specific interventions rather than implementing uniform development measures (Coordination Committee of the Just Development Transition Plan, 2020). At the same time, it can be noted that the orientation of the plan towards particular priorities also highlights the tension between central and decentralized development models since it recognizes that Western Macedonia should compensate for the loss of coal activities and overcome its structural problems associated with remoteness and lack of economic diversity (Coordination Committee of the Just Development Transition Plan, 2020).

The JDTP includes three strategic priorities (Enterprise Greece, n.d.):

- 1) Safeguarding and generation of employment in the regions;
- 2) Mitigation of social effects of the transition in terms of health, education, and welfare;
- 3) Maintenance of energy security and diversification of the economy.

In order to achieve these goals, the JDTP plan for Western Macedonia includes five development pillars, which coincide with the five development pillars discussed earlier for all transition regions. Each development pillar includes a series of programs and flagship projects (Coordination Committee of the Just Development Transition Plan, 2020):

1. *Clean Energy*: Establishment of a renewable energy hub through the large-scale deployment of solar, wind, and energy storage projects.
2. *Industry and Commerce*: Developing the regions where there used to be mining, into areas for setting up industries and logistics operations.
3. *Smart Agricultural Production*: Improvement of agricultural methods using sustainable agriculture and advancements in agricultural technology.
4. *Sustainable Tourism*: Creating eco-friendly and cultural tourism opportunities based on the region's natural parks and lakes and other heritage sites.
5. *Technology and Education*: Improving the human resource base by investing in education and R&D efforts.

Similarly, governance and policies were used to implement the plans discussed above. One of such measures included special urban plans for lignite areas (ελλ. *Ειδικά Πολεοδομικά Σχέδια*) through law 4759/2020 (Region of Western Macedonia, 2021). Such rapid spatial plans describe zoning of former mine areas and facilitation of permits for projects on this area (Region of Western Macedonia, 2021). However, the Green Tank (2024) notes that by mid-2024 the special urban planning studies for the “Greek Decarbonization Zones” located in Ptolemaida, Amyntaio, and Megalopolis were still undergoing consultation stage, highlighting temporal delays in spatial planning connected of the transition. Another measure was Law 4872/2021 (“Just Development Transition”) that outlined certain measures for the lignite phase-out including the transfer of mine lands to the public fund METAVASI S.A. for redevelopment (Region of Central Greece, n.d.). Law 4872/2021 also provided several other just transition measures like raising state aid limits for Western Macedonia as well as tax incentives to companies operating in transition zones (Region of Central Greece, n.d.).

The related MLG structure consists of central, regional, and local bodies. The Government Committee for Just Development Transition (formed under Cabinet Act no. 52/23.12.2019) is responsible for strategic planning and coordination within ministries (Kaminiaris and Mantzaris, 2021). Parallel Steering Committee comprised of regional authorities and technical advisors oversees regular program implementation, assisted by a Technical Secretariat (Politis, 2020, p. 2). Politis (2020) suggests that, on regional level, Western Macedonia (NUTS-2) updated its regional development plans, and each municipality is meant to have a local just transition committee or coordinator to propose projects for the transition process. Several public consultations were conducted in 2020-2021 to collect comments on the plan. However, as previously mentioned, in many cases these consultations have been perceived by local community members as too late and allowing little opportunity to influence the decision (Ministry of Environment and Energy,

2020; Makris, Apostolopoulos & Anastasopoulou, 2024). Nonetheless, compared to past “top-down” models, there has been at least a formal attempt to involve locals: e.g., a Technical Advisory Committee was set up by involving the University of Western Macedonia for assessment of proposals for regional development needs (Government Committee for Just Development Transition, 2020).

By 2022, the Just Transition Operational Programme for 2021–2027 had already been approved. With a total allocation amounting to about €1.63 billion, various funding channels have been suggested, such as, for example, the support of SMEs and the upgrading of district heating systems, among others (Government Committee for Just Development Transition, 2020). In December 2023, the EIB and the European Commission agreed on the first package amounting to €80.7 million to be allocated to Western Macedonia (European Commission, 2023). It is anticipated that it will fund 15 different projects, such as, for instance, the creation of a waste management plant, infrastructure improvement, and the creation of a vocational training centre, among others (European Commission, 2023).

By 2023, the path towards transition from lignite in Western Macedonia has been outlined. As compared with Megalopolis, Western Macedonia offers a relatively clearer strategy of development after the closure of the mines; due to its smaller scale of NUTS-2 and greater administrative visibility, various means for policy formulation and implementation can be employed in Western Macedonia, such as the use of JTF resources, the implementation of spatial planning initiatives, the initiation of projects backed up by the PSLF, and private renewable energy investments (Makris, Apostolopoulos & Anastasopoulou, 2024; European Commission, 2023). Still, despite the presence of a well-elaborated transition strategy, its successful realization cannot be guaranteed. Thus, by 2024, many projects still remained only at the stage of design.

Despite some apparent advantages in terms of institutional density and transition strategy coherence offered by the Western Macedonia case, it still cannot entirely overcome the issue of implementation and faces the problem of democratic legitimation, similar to the Megalopolis case. Traditionally, Greece follows a centralized approach to regional policy, characterized by a low degree of delegation to local entities. Following this historical pattern, the just transition was largely implemented and financed by the central authorities in close cooperation with the EC; regional stakeholders played merely advisory and secondary roles (Kaminiaris & Mantzaris, 2021). Thus, this situation creates the impression of “tokenistic participation” when decisions are taken in Athens and Brussels, but only post hoc consultations with local stakeholders take place (Kaminiaris

& Mantzaris, 2021). Nevertheless, contrary to the situation with the Megalopolis region, Western Macedonia can boast a more transparent coordinating committee and denser administrative structure.

5.3 Projects and investments: building the “new economy”

The implementation of the “just transition” policy in Western Macedonia occurs via a variety of projects and interventions spread across different sectors.

Expanding utilities-scale energy infrastructure is central to Western Macedonia’s “post-lignite transition” strategy, leveraging on the region’s high solar potential and available land after mine closures. Central to that effort is the planned installation of up to 2 GW of PV capacity on former lignite areas (PPC Group, 2025). PPC Renewables, along with RWE AG, is implementing several related projects. An early milestone in 2022 is a 204 MW solar park that was installed near Kozani by Hellenic Petroleum’s renewable energy subsidiary ELPE RES, with a forecasted yearly production of 350 GWh (HELLENiQ ENERGY, 2022). Moreover, PPC Renewables and RWE AG are developing a total of four PV parks in the Amyntaio mine area, which are planned at around 490 MW with EU RRF and commercial funding (Public Power Corporation S.A. 2024). The critical question regarding the “just transition” is whether these large renewable energy projects will reinforce externally-controlled energy production or whether they could be embedded in local value chains generating sustainable employment, fiscal revenues, and endogenous development. Furthermore, Greece’s first pilot green-hydrogen initiative (a small electrolyser intended to test renewable hydrogen production under the EU’s Hydrogen Valleys framework (Hellenic Hydrogen S.A., n.d.)) is located in Western Macedonia (Hellenic Hydrogen S.A., n.d.). In terms of energy transformation, while clean-energy investments sustain the region’s role as an energy-producing territory, it is not yet clear if its new identity will help compensate for the socioeconomic functions lost due to the lignite phase-out. While Western Macedonia features a more extensive clean-energy pipeline than Megalopolis, increased investment alone does not guarantee higher yields in local employment.

Other attempts to stimulate additional industrial and economic activity in addition to energy development include the development of new industrial parks and business areas envisioned on land released through PPC’s downsizing. An indicative proposal is the establishment of a Western Macedonia Innovation Zone (with a start-up ecosystem

linked to the University of Western Macedonia) that is supposed to create an institutionalized innovation ecosystem combining research, entrepreneurship, and manufacturing processes, making this region attractive as a hub for technologies, renewable energy, and higher value activities (Tagka, 2026). Such development should provide institutional support, clustering, and special incentives for attracting domestic and foreign investments based on the principles of the Just Transition strategy, helping the region to transform from its dependency on lignite into an industrial powerhouse with increased competitiveness and diversification potential (Tagka, 2026). But the real success of such efforts can hardly be guaranteed because simply having available industrial land might not be enough to attract investors to an area undergoing significant socioeconomic transformation and depopulation. Other early-stage efforts involve development of a data centre facility that was approved for JTF whose employment footprint is expected to be modest (Machtsiras, 2025), cautious investor interest in establishing a lithium-ion battery manufacturing facility in Kozani which has not advanced beyond exploratory discussions still (Ministry of Labour and Social Affairs, 2022), and a small number of local SMEs dealing with waste management, receiving funding through circular economy-related Just Transition Programme calls (Ministry of Labour and Social Affairs, 2022).

Finally, mine land rehabilitation and environmental recovery initiatives within Western Macedonia have been recognized as one of the top priorities that are eligible for funding under the national Just Transition and Recovery Fund framework (Vrontisi *et al.*, 2024). Yet the extent and speed of such interventions are unknown, especially when considering the magnitude of environmental damage resulting from years of lignite mining operations. The regional district heating systems, which were almost completely reliant on waste heat from the lignite power plants, need immediate reconfiguration due to the shutdowns (Municipal District Heating Company of the Wider Amyntaio Area, 2023). Although the JTF and, for larger components, the PSLF of the JTM provide financial backing, it remains uncertain whether these mechanisms will be sufficient to secure the full operational and financial viability of the new heating systems over time (Coordination Committee of the Just Development Transition Plan, 2020; Municipal District Heating Company of the Wider Amyntaio Area, 2023).

Western Macedonia has begun to see investments in social and human-capital infrastructure through EU and national just-transition instruments, although their scale and long-term effectiveness remain uncertain. Skill development has been a prominent focus: the region now hosts the Just Transition Centre of Vocational Excellence, a consortium coordinated by the University of Western Macedonia and local training

bodies, which offers programmes in renewable-energy maintenance, energy-efficient construction, circular-economy applications, ICT, and entrepreneurship (COVESEED, 2024). While these initiatives align with the skills agenda set out in the JDTP and the regional RIS3 strategy, it is too early to assess whether they can reverse the long-standing challenges of labour-market mismatch, outward migration, and low innovation capacity.

5.4 Governance, absorption capacity, and implementation issues

Notwithstanding the efforts put into targeted actions as well as certain positive developments achieved, the transition in Western Macedonia seems to be hampered by a number of structural and procedural barriers that stand in the way of an effectively “just” transition. As such, the aforementioned factors help to demonstrate the extent to which the disproportionate burdens placed on the region and indicate how there remains a persistent disconnection between strategic and practical considerations within the transition process. It should be noted that, from a comparative perspective, Western Macedonia’s challenges do not essentially differ from Megalopolis, although they operate under conditions of greater institutional thickness and a wider funding portfolio.

Economic and Employment Gap

As previously mentioned, the speed of the lignite phase-out is supposed to lead to the loss of almost 5,600 jobs related directly to mining and energy production until 2028, while its effects on the regional economy will cause a much higher level of job losses, up to 10,600 (Coordination Committee of the Just Development Transition Plan, 2020). Meanwhile, diversification strategies within the framework of the JDTP are expected to create around 6,000 new jobs by 2028 (Christiaensen & Ferré, 2020a). This mismatch means that the unemployment problem is likely to remain acute despite all the efforts made, which can contribute to income compression over the transition period. In particular, one possible scenario involves a decrease in the region’s GDP by approximately 26% and annual income reduction to €1.2 billion as a consequence of a poor level of mitigation measures (Ziouzios, Karlopoulos & Fragkos, 2021).

While in terms of the employment gap there is a quantitative deficiency, which makes it hard to balance the economic situation and create a positive atmosphere, qualitative differences between funded projects and local needs can serve as another serious threat. In this case, the mismatch refers to the gap between invested money and actual needs because a great part of the EU-funded initiatives is focused on “soft” actions including feasibility studies, trainings, and networking activities which, even though necessary for capacity building, cannot replace employment loss associated with the lignite phase-out (Christiaensen & Ferré, 2020b). Furthermore, local authorities are critical of the process due to its primarily preparatory character that requires job-creation investments (McCarthy, 2025). At the same time, there are no large-scale projects that could demonstrate their functionality. For example, in Megalopolis, there is a plan to create gas infrastructure and launch other projects; however, it remained unfulfilled, thus giving birth to a notion of contraction instead of regeneration. This tendency can be explained using the theory of “cumulative causation” suggested by Myrdal operating in an adverse direction.

Moreover, it is important to point out the existing imbalances in labour force supply and demand. As described in “Labour Impacts” section, labour market diagnostics suggest that the major part of the region’s lignite workforce is represented by people aged 35 to 54 with low-to-medium formal education. This matter creates additional problems with fast reskilling and upskilling (Christiaensen & Ferré, 2020b; Vrontisi *et al.*, 2024). At the same time, although the JDTP assumes wide-scale reskilling and retraining projects, their effectiveness is questionable due to the lack of alignment between their scope and actual needs of the labour market (Vrontisi *et al.*, 2024). Simultaneously, the continuous brain drain out of Western Macedonia could limit the emergence of an innovative environment.

Social Equity Concerns

The success of the energy / just transition will also depend on the manner in which the emerging gains are distributed among various social groups. Even if new investments stimulate growth, the risk of unequal benefit distribution among different social categories persists. As highlighted earlier, younger age groups and women are more likely to be exposed to increased risks of unemployment unless effective inclusion strategies are put in place.

Moreover, it needs to be pointed out that the transition effects are spatially uneven as well. While the prefectures of Kozani and Florina are those most actively involved in lignite mining and power generation, Kastoria and Grevena regions are more marginal. The economy of the first two prefectures traditionally revolved around heavy industry and energy, as evidenced by the share of lignite mining and power generation in regional GDP and employment that accounted for approximately 34% and 10%, respectively (Ziouzios, Karlopoulos, Fragkos & Vrontisi, 2023). By contrast, in the latter prefectures, the share of the industrial sector in local GDP was estimated to be only about 17% and 6% in Kastoria and Grevena, respectively (Christiaensen & Ferré, 2020a, p. 39). Therefore, whereas the first two regions lose the majority of their industrial sectors as the result of the coal phase-out, the other two regions are less economically affected by the transition.

Governance and Administrative Capacity

The fact is that such a drastic change in the conditions of social and economic life requires time. At the same time, the accelerated deadline of 2028 for stopping lignite mining, associated with national climate commitments, is quite challenging in this regard. As noted, local actors consider that this period does not allow all actors to adjust to the situation (Makris, Apostolopoulos, & Anastasopoulou, 2024). According to Makris et al. (2024), there is a significant concern about participation problems in this process. Even though there were consultations on the topic, many key issues, including the timing of the transition and the distribution of funds for it, were decided without the necessary discussions (Makris, Apostolopoulos, & Anastasopoulou, 2024). Besides, some uncertainty surrounds the selection of investments for the implementation of the program, given the unclear selection criteria.

In addition, there are implementation problems associated with low absorptive capacity and other limitations. Up to late 2025, no more than 5% of the allocated just transition funds were actually distributed among recipients. However, even then, only around 50% of the allocated budget was approved for project purposes (McCarthy, 2025). It would seem that the problem of low absorptive capacity and administrative inefficiency, typical of regional policy measures in Greece, continues to affect the implementation of this plan. In particular, bureaucratic barriers, procedural delays, and the lack of experience in managing projects at local levels sometimes reduce the effectiveness of EU financial assistance, creating real disputes that undermine the entire transition process.

In general, actions aimed at achieving transformation goals should be consistent. Another important problem lies in the idea of building new correctional facilities in Western Macedonia, which is contrary to the principles of regional development (ERT News, 2026). Despite the fact that this initiative can provide short-term employment, it does not fit into the broader strategy for developing an innovative and diversified regional economy.

Environmental and Fiscal Burdens

As highlighted in the assessment of legacy burdens, Western Macedonia inherits substantial environmental liabilities. The total cost of the ecological regeneration of the former mining areas and associated sites is expected to be considerable, and its implementation will take an extended period of time. The state's commitment to spend €162 million on this cause may be considered a first step towards a solution; despite that, according to assessments, the full-scale rehabilitation requires several multiples of that amount (PPC, 2024).

From a fiscal perspective, the transition process also places strain on the local authorities. As municipalities suffer from losing two key revenue streams (such as the lignite levy and a reduced share of ETS proceeds) while simultaneously facing a growing list of responsibilities (such as maintenance of infrastructure in ex-PPC territories), the situation is likely to lead to increased tensions at the local level (Ioannidis, 2025). Undoubtedly, the reduction in ETS-related revenues is even more aggravating in light of the increased financial burden placed upon the municipalities due to the ongoing transition. By allocating only 1.65% instead of the initially estimated 6% of ETS revenues to the municipalities of Western Macedonia, it appears that they missed out on approximately €224 million worth of revenues by 2024 (Ioannidis, 2025).

5.5 Intermediate Conclusions (Western Macedonia)

The history of the region up until now provides evidence that illustrates the opportunities and complexities associated with Just Transition in a coal-dependent regional economy. The reliance on lignite generated short-term advantages combined with vulnerabilities.

The aforementioned reliance on the lignite industry constituted the core of the socio-economic development of Western Macedonia, providing employment, infrastructure and industrial expertise. At the same time, such reliance resulted in over-specialization, restricted diversification, and increased vulnerability due to demographic factors. Thus, the accelerated commitment to complete lignite phase-out by 2028 can be characterized as both an environmental and territorial challenge.

Specifically, the region seems to enjoy a number of comparative advantages over other regions in Greece facing similar transitions. As opposed to the case of Megalopolis, the governance framework in Western Macedonia is more developed; there are more capable institutions. This means that the region has the chance of devising a better package for the upcoming transition process that will entail investments into renewable energy mega-projects, trainings, public infrastructure improvement, and spatial planning reform. Still, it cannot be overlooked that most of the above-mentioned strategies still need to be developed and piloted on a local level to be proven efficient. Thus, despite the apparent advantages regarding the existing institutional capacity and resources, path dependencies, labor-market mismatches, and the long development of initiatives are among the constraints.

In light of the issues identified, it becomes clear that Western Macedonia faces significant challenges in implementing its transition strategy. However, it can be argued that it would be impossible without governance quality and participatory depth. Financial investments alone cannot provide the necessary success, as other factors should be considered too.

Chapter 6: CASE STUDY II - MEGALOPOLIS

The Municipality of Megalopolis (NUTS-3 / LAU 1) is located in Arcadia in the central Peloponnese. For decades, it was characterised by a mono-sectorial development model revolving around lignite coal mining and electricity generation. Ever since the late 1960s, Megalopolis has served as an important role as an electricity producter. Its lignite-based economic model proved resilient for decades, bringing jobs and revenue, but nowadays it has become unsustainable due to the challenges related to climate change and energy transitions. Accordingly, in line with Greece's national decarbonization strategy, the lignite mines in Megalopolis have closed down completely. Namely, PPC's

last lignite units (Megalopolis III and IV) ceased their work (Aposporis, 2025), while the mining operations had been decreased to residual levels (Global Energy Monitor, n.d.). Overall, the case of Megalopolis offers a useful analytical counterpoint to Western Macedonia; it can serve as an example to explore how energy transition plays out in a thin, mono-industrial local economy as opposed to a larger and more densely structured one such as Western Macedonia.

The transition of this territory is managed through the framework provided by JDTP as well as its local counterpart, the TJTP for Arcadia. These plans classify Megalopolis as a priority area due to the fact that it is highly vulnerable to the coal phase-out, stemming from the town's high reliance on the lignite sector, limited alternative economic base, and demographic fragility. Specifically, the total population of Arcadia fell from approximately 86,700 in 2011 to 77,592 people in 2021, with Megalopolis accounting for 8,784 residents—a decline of about 17.8% over the same period. Moreover, 28.4% of Arcadia's residents are aged 65 years or older compared to the national average of 22.8%, thus highlighting the fact that the region's socio-economic problems also stem from aging of the local population (City Population, 2024; World Bank, 2025).

Despite the municipality's small size, the economic consequences of the energy / just transition of Megalopolis can be extremely significant. Based on the estimates of the Hellenic Statistical Authority's Regional Accounts (Gross Value Added by Industry – Classification A10, 2019 data), it can be noted that the Regional Unit of Arcadia had the largest concentration of GVA in mining, electricity, gas and related utilities within the Peloponnese Region, with this industry accounting for almost a third of its total GVA generated by these sectors (Hellenic Statistical Authority, 2022). This mono-industrial development of the area created an explicit form of “carbon lock-in” and, more broadly, “path dependency”, as local institutions, workforce and fiscal arrangements became closely interconnected to the lignite sector. At the same time, the municipality's narrow economic base and insufficient entrepreneurship did not allow for any additional areas for potential absorption of labour force due to lignite decline.

Generally, the case of Megalopolis highlights the question of whether it is possible for a carbon-dependent local economy to delignify without losing socio-economic stability. In this respect, it could be viewed through the lens of “core–periphery” interpretations of uneven development where Megalopolis represents a specialised peripheral locality that is strongly integrated into the national energy system with its main decisions made outside the local level. Thus, in this context, the case raises the question of whether cohesion-oriented funding is sufficient enough to mitigate the structural disadvantages

usually found in peripheral mono-specialised localities. It could be especially interesting to consider the differences with Western Macedonia precisely because the former is much smaller in terms of territory and industry and has a less developed institutional structure.

6.1 Pre-transition development model

Before the implementation of the transition program, Megalopolis evolved into a monocentric economy relying mainly on lignite mining and thermal energy production. Thus, the fields of the lignite mines as well as the Megalopolis power station (including Unit IV following corporate restructuring by PPC) formed the major element of economic activity and employment in Megalopolis (Public Power Corporation, 2021). In particular, according to the study conducted by the Megalopolis TJTP with base year 2019, the “energy, extractives and water supply” sector contributed approximately 33% to the GVA of the Arcadia (Greek Government, 2021, p. 9). Moreover, the same document specifies that the Arcadia Region contributed approximately 64% of the Peloponnese region’s GVA in this sector (Greek Government, 2021, p. 10). Concerning employment data, according to the data presented in the Greek Government (2021), the “energy-water” sector directly employed roughly 1.6 thousand workers in Arcadia (2019). Additionally, the total impact of the lignite value chain (direct, indirect, and induced effects) was estimated to generate around 3,600 jobs locally (Greek Government, 2020). The labour market data also show that several hundred contractor and temporary workers are associated with the lignite sector (Greek Government, 2020). All that imply that the major factor responsible for employment, productivity, and human resource development in Megalopolis was it’s the lignite sector, which in turn creates on the one hand vulnerability in terms of diversification and on the other susceptibility to structural transformation.

As far as the first vulnerability factor is concerned, it is worth pointing out that certain demographic characteristics of Megalopolis make the labour market extremely vulnerable. As it has been discussed in the “Social Impacts” section, Megalopolis faced a number of demographic challenges (demographic decline and aging) prior to the start of the transition program that negatively affected the local labour market and increased dependency ratios. Between 2011 and 2021, the municipality’s population decreased by 17.8% (Hellenic Statistical Authority, 2023, p. 37). Emigration of the youth for educational

and professional purposes, coupled with an aging population, reduces the number of potential employees and increases dependency ratios, which puts additional pressure on social services and healthcare facilities. This issue is especially important for the planned structural transformation in the region since the industries to be developed (renewable energy technologies, smart agriculture, digital economy) demand skills that are currently infrequent in the local workforce.

Moreover, certain quality of life metrics before the implementation of the transition program revealed fragility in the region. Evidence from Eurostat indicates that the percentage of the population of Greece at risk of poverty or social exclusion was 28.3% in 2021. The corresponding metric is even higher in the Peloponnese region (EL65) (the NUTS 2 region where Arcadia and Megalopolis are located), standing at 38.1% in 2021 (Hellenic Statistical Authority, 2026). Additionally, the segregation from other industries makes it hard for Megalopolis to connect to the tourism and trade networks, thus making diversification impossible without the involvement of PPC. From a theoretical perspective, this can be seen through the prism of the growth pole theory and export-based model since lignite formed the core industry in the local economy (Filenta, 2025; Anselin, 2001; Kaldor, 1970). Nevertheless, in comparison with Western Macedonia, the case of Megalopolis demonstrates a narrower pattern of development that is geographically limited, making it prone to mono-specialization. In this context, theories of cumulative causation and path dependence become most relevant (Myrdal, 1957; Martin & Sunley, 2006; Krugman, 1991).

6.2 The Transitional Strategy and flagship interventions

With the imminent end of its lignite period, Megalopolis has formulated a diverse and multi-layered approach to transition under national and EU Just Transition approaches. One of the first steps was the development of an 811 MW combined-cycle gas turbine (CCGT) plant, aiming to compensate for energy production losses and maintain a marginal industrial position within the energy sector with the help of a public-private consortium (METLEN Energy & Metals, n.d.). As discussed in the “Labour impacts” section, this natural gas project cannot compensate for losses of jobs since the new plant is less labour-intensive than previous facilities.

In accordance with the outlined national framework for energy transition, Arcadia's TJTP serves as a strategic and financial foundation for the city's transition plan, as the region

is exposed to lignite phase-out and, hence, needs significant assistance from the government to manage transition effectively. As discussed above, Arcadia's plan shares most similarities with Western Macedonia's Just Transition Program, with some modifications related to local conditions and assets of the region. Overall, Arcadia is backed by approximately €391 million in transition funds from the EU JTF (for Arcadia including Megalopolis and a few neighbouring municipalities), plus national co-funding and mobilization of additional private investments (European Commission, 2023). Thus, considering its population size, Megalopolis faces a major state intervention in its energy transformation, reflecting the gravity of the situation and the high expectations placed on policy-led restructuring. However, the problem of the municipality's transition strategy is not the quantity of funding but rather the context in which it should be applied, as the lack of diversified institutional support and projects implies greater challenges.

The Arcadia's TJTP largely mirrors the national Just Transition strategy but also prioritizes agrifood activities, bio-economy projects, and sustainable tourism development. At the same time, the goals of this plan are similar to Western Macedonia's — (1) *Job creation and protection*; (2) *Social support and inclusion*; (3) *Infrastructure for diversification* and (4) *Environmental restoration*. Nevertheless, local authorities are concerned about the distribution of transition financing and argue that a considerable share of it has been channelled to neighbouring non-coal areas. Such issues contribute to local discontent, thus making people sensitive to such problems as geographic discrimination (Presidents of the Municipal Communities of Megalopolis, 2024). Unlike Western Macedonia, which has benefitted from dense MLG provisions (Topaloglou, 2022), specific administrative bodies, and constant monitoring at national and international levels (being a NUTS-2 region), Megalopolis features weaker institutional foundations (being NUTS-3 / LAU1). As a result, the difference between the institutions' thicknesses translates into disparities in the absorption and effectiveness of funding (Marinakis *et al.*, 2020).

One of the crucial issues in Megalopolis is related to the management of human impacts. Like Western Macedonia, Arcadia employs such labour market policies as training, wage subsidies, entrepreneurship support, etc. Thus, according to the government's plan, certain targeted training programs are launched to assist workers who lose their jobs after the closure of energy production facilities. Although little research exists on their effectiveness, preliminary results indicate that it is limited, as evidenced by incomplete information about the training completion and outcomes by 2024-2025 (Greek

Government, 2022). Besides, certain structural factors complicate the process of workers' reemployment and skill upgrading. For example, the demographic profile of the PPC workforce is mainly middle-aged men (with some close to retirement), who have been working for many years in the same organization/employer, so their expertise is one dimensional (Baker *et al.*, 2022).

6.3 Projects and investments: building the “new economy”

There have been several flagship projects and initiatives that have been planned for Megalopolis to support the transition away from the coal sector. From the “growth pole” theory point of view, many of these initiatives have been designed as anchor projects, although their spill-over capacity is still unknown. These include:

- *Large-Scale Renewable Energy Investments:* Similarly to Western Macedonia, the solar potential of Megalopolis is being capitalized upon, along with its electricity transmission network, to establish it as an energy hub. There are several PV parks being constructed in abandoned mines, some by PPC Renewables and others by private firms, totalling hundreds of megawatts of capacity. For instance, there are two projects each for PV power stations of 125 MW in Megalopolis by PPC Renewables, which have been given approval for just transition funds (Aposporis, 2025). In total, 0.5 GW of solar parks are being set up in the Megalopolis area, including 50 MW already in progress at PPC as of 2023 (PPC Group 2025).
- *Industrial Park and Business Zone Development:* For the stimulation of diverse industries and commerce, an industrial estate is planned in the reclaimed space resulting from the reduction in the scale of operations at PPC (Just Transition Special Authority, n.d.). The purpose of the project is to provide an ample amount of developed land space where potential companies could set up their businesses. (Just Transition Special Authority, n.d.) The huge area of level ground that was formed by mining activities in the past, which is highlighted in the transition strategy as one of the local strengths, will enable such industrial developments (Just Transition Special Authority, n.d.). If successful, this intervention would create diversified employment opportunities and help replace some of the value chain lost with the coal industry. Local authorities and Enterprise Greece have been marketing the Megalopolis area for such

development, emphasizing improved road connectivity and the skilled labour legacy of PPC's workforce (Baker *et al.*, 2022). Moreover, while some of the related initiatives tied up with the wider restructuring effort —such as building new correctional facilities outside Megalopolis— raise issues about the consistency of the emerging development policy (ERT News, 2026). While the creation of these facilities may generate some immediate, short-term employment, this doesn't mean that they relate to an innovative, territorial form of development.

- *Bioeconomy 360° Hub*: One of the flagship proposals within the Arcadia's TJTP is the establishment of a “Bioeconomy 360° Hub” in Megalopolis (Just Transition Special Authority, n.d.). It is claimed that the project represents an innovation and entrepreneurship centre related to the entire bioeconomy value chain, ranging from primary agricultural production, to food processing, forest-based operations, and resource circularity. It is intended to enable a transformation of the economy towards sustainable agriculture and agrifood sectors, (European Commission, 2023).

In addition, the development of the hub is planned to entail the provision of common space (research laboratories, processing and storage facilities) along with the services associated with R&D and training. Networking between farmers, cooperative organizations, and agri-tech start-ups is another crucial aspect of its activity. Finally, the objectives of the project include higher-value agri-food production (such as essential oils, medicinal plants, special dairy products) and agro-innovations (such as precision farming, greenhouses, advanced digital technologies), as well as circular initiatives (such as bioenergy from agricultural residues, fertilization, etc.) (Just Transition Special Authority, n.d.). By focusing on several layers of the bioeconomy, the project is supposed to create employment not only in agriculture but also in product processing, technology, and distribution, as well as leverage the growing demands in the sustainable market (Greek Government, 2022). However, despite the fact that some planning efforts have already been made and cooperation with universities is underway, the initiative is still at the early stage of implementation, facing many uncertainties and questions related to the possibility of implementation, market demands, institutional capacity, and capabilities of the local players in engaging in technologically and organizationally demanding initiatives. Megalopolis (NUTS-3 / LAU 1) does not have much prior experience in the high-value production or entrepreneurship driven by innovations. At the same time, the contrast between the Bioeconomy Hub project and that of Western Macedonia is obvious: while the

former focuses on only a few initiatives, which makes it vulnerable to potential difficulties and delays, the latter pursues a wider range of activities aimed at transformation.

- *Modernization of District Heating and Energy Infrastructure:* Megalopolis is one of the small municipalities (LAU 1) of Greece that has been benefiting from district heating provided by low-cost thermal energy from PPC lignite power plants. However, now that the PPC facilities are being shut down, the continuation of this essential service becomes questionable. Thus, in order to guarantee that the heating is ensured in future, it has been suggested to upgrade the existing heating systems and convert the district heating network into something else. According to the current plans, the replacement of heat will be made using high-efficiency natural gas boilers; however, there might also be some biomass boilers involved in the future (Greek Government, 2022). The attempts to attract money for this purpose via the funds of JTF and the EIB's Project for Sustainable Local Financing demonstrate the costs involved as well as the importance of this social issue since vulnerable people will need to be taken care of. However, aside from the conversion of the heating system, other energy-related improvements are also under consideration. For example, the electricity distribution network is supposed to be modernized to cope with bidirectional flows because of PV projects that are being implemented in the area (Greek Government, 2022). Moreover, even more advanced measures have been proposed by the government, including, for instance, smart cities technologies such as meters and LED street lighting (Greek Government, 2022). All these improvements can contribute to quality of life and savings while decreasing greenhouse gas emissions; however, most of them have not yet been realized, and much depends on whether the municipality would be able to afford this or not. Finally, the area's historical heritage and nearby archaeological sites are also being included in the tourism strategy and may serve as a basis for creating hiking routes and a mining museum for tourists

Compared to Western Macedonia's overall portfolio, Megalopolis depends much more on a narrow range of anchor projects, hence making it more susceptible to the risk of licensing, financing, and implementation delays as well as to any risks arising from the possible poor performance of projects during the transitional period (Marinakos *et al.*, 2020).

6.4 Governance, absorption capacity, and implementation issues

In the course of the development of Megalopolis's "just transition," there exist several of the problems identified in the case of Western Macedonia, but adjusted according to their scale (NUTS-3 / LAU 1). They are related to uncertainties on both the policy side and the market side, social legitimacy, implementation capabilities, equitable results, and demographics. It is clear that despite the intentions behind the concept of Just Transition, these problems continue to persist.

A smooth transition from fossil fuels to clean energy in Megalopolis depends on a constant commitment to transition programs. Changes in government policies, delays in the process, or mismatching timeframes regarding the end of lignite use may damage investor confidence (International Energy Agency, 2024). Additionally, broader market dynamics impact decisions because fluctuations in energy prices, changes in the cost of finance (increased interest rates), and global changes in the demand for technologies involved in renewable energy production might have an effect on current investments and future projects in Megalopolis (International Energy Agency, 2024).

The justification for a "just" transition hinges also on the acceptance by the local population. Research into global transitions away from coal reveals that delays and lack of early benefits can result in "transition fatigue", demonstrated in the form of out-migration among young people, lack of trust, and even political repercussions (Vrontisi *et al.*, 2024). In the case of Megalopolis, high levels of unemployment or the perception that opportunities are unfairly unavailable would likely undermine social trust in the transition itself.

Ensuring equitable outcomes is another key to the integrity of the transition. In case economic growth does not provide equal benefits to larger municipalities, foreign investors, and highly qualified migrants, while locals have minimal advantages, such a change can perpetuate disparities (Marinakis *et al.*, 2020). Moreover, the demographic contraction, aging of the population, and departure of young people constitute considerable obstacles for Megalopolis, based on information provided by the Hellenic Statistical Authority and confirmed by OECD studies of industrial transition zones. On the one hand, these tendencies may limit the availability of the workforce to support new industries. On the other hand, they may create additional pressure on the provision of social services. The capacity of governance and the quality of participatory initiatives are vital concerns (Vrontisi *et al.*, 2024). Studies conducted in Greek coal regions reveal the lack of administrative assets, overlapping responsibilities, and insufficient procedures for

involving stakeholders and tracking developments through participatory monitoring (Vrontisi *et al.*, 2024). In case local populations, including PPC employees, do not contribute to the elaboration of reskilling programs, the results of the intervention may be less productive.

As emphasised in comparative transition literature, the sustainability of Megalopolis's transformation will not only rely on investments but also be defined by equitable benefit-sharing, competent administration, and the empowerment of local communities. Otherwise, Megalopolis risks repeating the negative experience of previous coal transitions.

6.5 Intermediate Conclusions (Megalopolis)

In light of the current transitional stage of implementation, the case of Megalopolis provides valuable lessons concerning the complexity of turning a lignite-centric mono-sectoral economy into a diversified and sustainable regional economy. Due to its smaller scale and less dense institutional architecture compared to Western Macedonia, Megalopolis better showcases how the same Just Transition strategy can yield a more fragile process of restructuring in case the local absorptive capacity is limited.

Notably, the Megalopolis has devised an extremely ambitious and multifaceted approach to transforming itself in line with its TJTP, which is based on heavy financial investments through the JTF, additional financing by the state, and potential future private investments. This transformation approach is aimed at restructuring the economic framework of the town by promoting development in several sectors, among others renewable energy, industry, entrepreneurship, agriculture/bio-economy, human capital, and social infrastructure. Overall, the goal is to create a new economic paradigm by replacing the existing one of monoculture. As a result, the town can become an interesting area in terms of renewable energy production and generation, as well as provide innovative jobs with high employment rates.

At the same time, it can be stated that the approach developed in Megalopolis entails significant risks due to the fact that many aspects remain undeveloped, and issues related to the market, investors' expectations, absorptive capacity of the institution and local demographic peculiarities are far from being clear. However, initial results of implementing this strategy include successful development in renewables, a biorefinery,

and education. Nevertheless, these achievements still only represent the first steps towards restructuring and are unlikely to bring about permanent changes. All things considered, the presented case proves that mono-industrial small towns are exposed to greater risks of transition than larger towns because of their size, demographics, and absorptive capacity.

Similarly to Western Macedonia, the key takeaway in the case of Megalopolis is the importance of human capital. In order to achieve success in restructuring, it is necessary to ensure adequate education and training of the local workforce. Thus, such interventions should become a key element of the transitional strategy, together with addressing specific issues related to the retraining of older residents and involvement of young people and human capital attraction. At the same time, the social justice perspective cannot be neglected. Indeed, in order for a transition to be called “just”, it needs to ensure equal access to emerging opportunities for former coal miners, local SMEs, farmers, women, and young people. Thus far, the experience of both case studies demonstrates that mere financial assistance does not suffice; instead, the need for special mechanisms of achieving greater social justice should not be underestimated.

Finally, another important cross-cutting aspect that has an effect on the transition process is governance. Much like in the case of Western Macedonia, it is necessary to establish adequate MLG arrangements on the regional level to ensure effective coordination of the stakeholders. However, unlike Western Macedonia, where such processes were discussed in detail, the experience of Megalopolis suggests that participatory governance arrangements are not yet fully developed.

Overall, the case of Megalopolis confirms lessons previously identified with regard to Western Macedonia. A consistent strategy is needed, socio-economic implications should be addressed promptly and sustained assistance and funding should be provided, in order for the transition to be “just” in practice. Thus, through the analysis of both cases, the ways to successfully combine environmental protection and local socio-economic stability have been shown, along with identifying the tensions inherent to Just Transition.

Having completed the empirical section, the discussion continues in two parts —a comparative discussion with an analysis of a counterfactual scenario followed by conclusions concerning energy transition and unequal regional development.

Chapter 7: COMPARATIVE DISCUSSION AND COUNTERFACTUAL PERSPECTIVE

In order to understand the decarbonisation of Greece's lignite-dependent regions, one must take into account regional inequalities and binding EU climate commitments. While the counterfactual perspective chosen for this chapter cannot provide any definitive predictions about alternative trajectories of development, it allows a limited comparison grounded in the existing literature on coal region transitions as well as observed pre-transition trends. The comparative analysis should also be viewed from the standpoint of the conceptual tools discussed in the earlier parts of this paper, especially those regarding uneven regional development, path dependency, MLG, place-based development, and territorial justice.

Both Western Macedonia and Megalopolis developed around state-owned lignite mining and power generation and had little economic diversification. Being the heartlands of PPC's coal operations, these regions were considered to be the most vulnerable in terms of transition and decarbonisation. Historical development of both regions can also be explained with growth poles and path dependency, since lignite-related activities constituted the central economic core. In response, Greek authorities and EU institutions prepared appropriate governance mechanisms and formulated TJTPs to ensure smooth economic restructuring. Specifically, Western Macedonia's TJTP concerns leveraging its considerable solar potential and manufacturing sector to become a clean-energy centre, while Megalopolis's is looking to diversify its activities through agri-food processing, circular economy, and niche manufacturing (European Economic and Social Committee, 2024).

Based on these premises, a wide range of EU funding instruments was mobilised to make the just transition possible. Namely, Greece's Just Transition Fund programme for 2021–2027 allocates approximately €1.63 billion for investments in territories in transition, with the focus on Western Macedonia and the municipality of Megalopolis (European Commission, 2022). Additionally, traditional Cohesion Policy instruments also play a key role. According to Greece's 2021–2027 Partnership Agreement, 30% of ERDF and 55% of the Cohesion Fund resources will be invested in climate-related projects, such as green industrial parks, improved transport connections, and rehabilitation of lignite sites (European Commission, 2022). Other pillars of the JTM, including InvestEU and PSLF, will provide additional means of financing, with InvestEU attracting private

finance through guarantees for projects such as renewable manufacturing or SME funding, while PSLF providing subsidised loans for public investment projects like district heating upgrades and training facilities (European Commission, 2022). Overall, it looks like the combination of these instruments aims to support the economic renovation of Western Macedonia and Megalopolis' economies in the post-lignite period. Their interaction is indicative of a MLG approach in which various territorial scales are coordinated through overlapping financial and institutional mechanisms.

It becomes clear from the discussion in previous chapters that the process of transitioning and funded interventions start to change developmental patterns of both regions. Firstly, as mentioned above, Western Macedonia witnesses growing renewables-related investments, with up to 2 GW of solar panels installed or planned to be built in Kozani and Ptolemaida (Western Macedonia S.A., 2020). Projects, mainly led by PPC and private investors, constitute quite a significant amount of "green" investment that not only creates direct employment but also contributes to the emergence of secondary activities related to it; from production of photovoltaic panels to hydrogen research (Western Macedonia S.A., 2020). Moreover, institutional initiatives such as the Innovation Zone of Western Macedonia encourages innovation and creation of start-ups in the region (European Commission, 2022). Overall, Western Macedonia exemplifies an effort to restructure a former carbon-intensive growth pole around a new energy specialization. As for Megalopolis, Just Transition funding has enabled implementation of major diversification projects, such as the "Bioeconomy 360° Hub", focused on agri-food innovations through circular economy technologies (European Commission, 2022). Other initiatives, such as the construction of technology park or tourism-related projects, will further contribute to economic diversification. In addition, Skills Development Centres in Kozani, Florina, and Megalopolis are providing training in renewable energy and IT, helping local communities to actively participate in emerging "green" economic activities (ejust4skills, 2024). In comparison to Western Macedonia, the diversification model of Megalopolis seems to be more local and place-based, but also more fragile due to lack of administrative capacity.

By comparing actual developments in Western Macedonia and Megalopolis with a hypothetical scenario absent EU support, one can conclude that alternative developmental trajectories would be significantly different. The deployment of various European funding instruments provides a realistic possibility to restructure economic systems. Without the presence of JTF, RRF, and Cohesion Policy funds, the lignite phase-out would cause serious economic shocks, including mass unemployment with limited immediate alternatives. A certain portion of jobs connected directly and indirectly

with mining and power generation would vanish, leaving the displaced workers marginalised. Such a scenario is consistent with theoretical accounts of cumulative decline in peripheral regions.

Taking into consideration pre-transition conditions makes it easier to evaluate possible social implications. For example, unemployment in Western Macedonia was constantly elevated before the start of the energy transition, and probably the absence of funding from EU sources would mean that this trend would continue. Furthermore, without European intervention, major projects currently underway would not have materialised. Under such circumstances, these territories would have followed a familiar “rust belt” trajectory characterised by continuous out-migration of skilled workers, loss of local tax bases, and the steady deterioration of physical and social infrastructure.

Among possible social effects of such a developmental trend would be increasing poverty rates, intensifying population drain of young skilled professionals, and possible political or social tensions driven by perceptions of government neglect. It can be concluded that economic diversification in such regions without European intervention would hardly occur due to high levels of perceived risk and limited short-term returns for investors. The role of EU funding instruments in the transition process can be summarised as transforming this risk-reward balance by offering grants, guarantees, and concessional finance. Absence of such interventions would practically imply that neither the central government nor local regional / municipal budgets would have the ability to invest into large projects.

Furthermore, the EU involvement in the restructuring process provided it with some level of strategic vision. Preparation of TJTPs compelled Greek authorities to think long-term, coordinate various interventions and interact with local communities to achieve consensus. The lack of the said framework would mean a much more fragmented approach to lignite shutdown, with a tendency towards short-term political decision making. With regard to the concept of MLG, EU presence provided better coordination among European, national, regional, and local actors. It could be argued that the absence of external intervention and financial resources would increase risks of poor transparency of projects, inadequate project evaluation, and difficulty sustaining momentum beyond electoral cycles.

At the same time, a more critical assessment reveals several important aspects. First of all, there is uncertainty as regards the duration of the effect of interventions in question, since it is not clear whether new economic structures will be able to sustain themselves or require constant influxes of external support. Furthermore, funds for the energy

transition will still be insufficient to address all economic, social, and environmental issues. As a result, difficult trade-offs are to be made in terms of project prioritisation and mobilising additional resources. From the perspective of endogenous and place-based development theory, this illustrates that although external finance plays a crucial role in the restructuring process, it is not enough to bring about adequate durable transformation.

Another limitation is associated with absorption of funds in regions where local administration is not always capable of managing large-scale project portfolios effectively. The implementation of projects related to development of infrastructure, industry, skills, and public services requires significant administrative skills and experience, and their deficiency could lead to under-absorption or misuse of funds. Besides, some projects were postponed or complicated due to bureaucratic delays and coordination challenges associated with using several funding instruments, such as JTF, ERDF, and RRF, that have different requirements and procedures. This issue highlights the territorially uneven institutional capacities of Western Macedonia and Megalopolis.

Finally, the social legitimacy of transition is not guaranteed because of effective community engagement. While large-scale investments financed from the EU budget will certainly benefit local communities economically, doubts arise about employment, value creation, and public revenues. From the perspective of territorial and procedural justice, it is crucial to address these questions to achieve socially legitimate transition. However, participation components, built into the process of preparing TJTPs, together with establishing local committees responsible for just transition, cannot eliminate broader uncertainties because of uncertainties related to global markets, energy prices, and future regulations.

Overall, it can be concluded that EU funding instruments have drastically influenced the trajectories of two largest lignite-producing territories in Greece, alleviating economic pressure caused by decarbonisation and laying foundations for greener and diversified economies. Comparison of this scenario to one when no financial assistance would be provided reveals that European solidarity played a key role in the mitigation of regional inequality and implementation of climate policy goals. However, there is no reason to claim that all effects of interventions in question are purely positive. The role of external finance is significant in initiating change, but not sufficient to bring about sustained outcomes. On the contrary, local administration and capacity, as well as endogenous development, should also play an important role.

Chapter 8: CONCLUSION AND RECOMMENDATIONS

This research paper explores the role of European financial assistance in the post-lignite transition of Greek territories dependent on the lignite industry through the examples of Western Macedonia and Megalopolis as structurally comparable yet geographically differentiated transition regions. Specifically, this study examines three interrelated topics: (i) the necessity of European funds in initiating the post-lignite transition; (ii) the effectiveness of the Just Transition Mechanism and other European interventions in reducing structural inequalities within Western Macedonia and Megalopolis; and (iii) barriers to implementing an efficient and socially inclusive transition.

As shown above, while the European funds proved crucial in launching a transition, they were not yet enough to ensure sustainable, economically balanced, and socially inclusive development of transition regions. The Just Transition Fund, the JDTM and Cohesion policy instruments, and other European measures created an effective framework for intervention; however, the results showed that the availability of funds, calls, and approved projects did not equal the emergence of positive socio-economic effects. The transition was at an intermediary level when considerable financial and administrative mobilization had already occurred but long-term socio-economic implications were yet uncertain.

8.1 Conclusions by research question

With respect to the *first* research question, this thesis proves the importance of European funding in allowing a transition process. Without the EU financial support, the withdrawal of lignite would likely result in an even more drastic economic shock, especially in regions historically connected to mining and electricity generation and their socio-economic implications. In other words, the involvement of European resources, calls, and approved operations enabled to recast decarbonization not just as an environmental initiative but also a targeted development policy in specific regions.

Recent insights into the JDTP implementation confirmed this statement. On the one hand, this instrument has effectively mobilized necessary resources. Furthermore,

territorial allocations of the JDTP showed that Western Macedonia and Megalopolis had been recognized as the major transition cores in Greece, with different territorial capacity and economic diversity. Thus, Western Macedonia received the lion's share of allocated resources since it exhibited higher economic and administrative capacities and deeper structural dependencies on lignite extraction and electricity generation.

At the same time, this research indicated that European funding was not sufficient to ensure sustainable development of transition regions. The evidence presented showed a noticeable advance in planning, calls, and approved projects; however, fewer completed projects, expenditures, jobs, and socio-economic effects had been achieved. That is, the difference between resource mobilization and transition effects was important in determining whether a transition could be considered effective. Simply put, the crucial issue was not anymore whether the funds were available but whether they had been successfully used.

For instance, one can see this problem in the priorities of the Just Development Transition Programme. Thus, the priority 1, focusing on entrepreneurship development and supporting start-up companies, constituted the largest and the most expensive part of the JDTP. The priority 4, dealing with just labour transition, remained quite relevant in view of training, coaching, certification, and employment of people. Finally, the priority 6, targeting technical assistance and capacity building, confirmed that the implementation of JDTP was not restricted to energy infrastructure but also aimed to increase economic dynamism and administrative capacity.

However, the JDTP revealed some priorities that seemed less mature than others. For example, Priority 3, related to land-use adjustment and circular economy, appeared as a promising instrument since any further development initiatives presupposed land rehabilitation. However, this priority still lacked maturity in the implementation. Similarly, the Priority 5, targeting small-scale territorial interventions, appeared immature in spite of having potential to contribute to the quality of local life and the increase of local social cohesion. Priority 7, connected to the STEP measure and critical technologies, appeared somewhat futuristic but also quite relevant for the future.

Thus, the implementation of JDTP showed a mixed picture of priorities. Some of them were relatively active; however, some others remained quite immobile although they played an important role in the long-term territorial restructuring. It meant that while the financial framework existed, the necessary administrative mobilization was lacking in the areas concerned. As a result, it became difficult to predict whether the implemented transition would lead to the desired results or create new problems.

With regard to the *second* research question, one should admit that EU funds partially addressed structural inequalities of Western Macedonia and Megalopolis. They reduced the risk of uncontrolled decline and offered an opportunity to develop economically disadvantaged regions. In addition, they involved elements of territorial justice since the European funds intervened precisely in those regions where the burden of the post-lignite transition was greatest in view of Greece's lignite-based energy sector.

Still, the mitigation of inequalities had been partial. Firstly, Western Macedonia and Megalopolis were characterized by a number of pre-existing structural problems, including weak diversification, demographic decline, lack of alternatives in their economic development, job instability, and weak administrative capacity compared to the metropolitan regions. Secondly, although the EU resources might help solve some issues, they could hardly reverse pre-existing structures. The JDTP analysis confirmed this fact since the prioritization of entrepreneurship and energy transition could create new economic activities but would not guarantee their integration.

Such an outcome was particularly evident with regard to investments in renewable energy sources. While these initiatives were important for decarbonization and creating new identities in the transition regions, they would hardly compensate for job intensity of mining activities and power plants. The reason was that renewable energy was less job-intensive than coal mines and conventional power stations. As a result, there appeared an "employment paradox": although energy transition would be environmentally successful, it would not bring sufficient employment.

The analysis of Priority 4 showed a similar picture: while training, coaching, and certification were necessary steps in achieving just labour transition, they were not enough. Only a combination with investments and job offers made skills policies relevant and effective. In particular, Western Macedonia and Megalopolis had been accustomed to mining activities, which provided relatively well-paid and stable jobs. Hence, in order to mitigate inequalities, it was essential not only to create new activities but also to ensure high-quality employment.

Finally, the partial mitigation of structural inequalities resulted from the differences in territorial capacities of Western Macedonia and Megalopolis. Thus, the first region had better visibility in national plans, more projects, and more administrative capacity; however, Megalopolis was significantly smaller and less capable. The JDTP territorial plan acknowledged its special transition role; however, in practice, it was difficult for local authorities to absorb resources, implement mature projects, and attract new

investments. It meant that the same policy instruments could work differently in regions with different capacities.

With regard to the *third* research question, it became clear that the key to the successful implementation was in the capacity of multi-level governance and territorial administration. The just transition framework of Greece had several strengths, such as the development of dedicated programmes, territorial plans, coordination procedures, and a multilevel governance structure, involving European, national, regional, and local actors. These characteristics were particularly important since in other cases, the lignite phase-out could be unorganized and chaotic.

At the same time, the implementation of this framework was still far from success. One of the main difficulties concerned the mismatch between programme implementation and practical transformation. While the JDTP implementation revealed high activation of the programme in the form of programming, calls, and approved projects, the mobilization was lower in the case of legal commitments, expenditure, project completion, and effects. Such a situation was important since the socio-economic implications of the lignite phase-out were direct and imminent, whereas transition activities took time to be completed.

Hence, the major implication of this finding was that timely implementation of transition was crucial for its effectiveness. Otherwise, the absence of activities and effects would exacerbate the negative trends since job losses and outmigration could weaken the local demand, human capital, and administrative and productive capacity. Such a feedback loop was one of the most important conclusions of the research paper: a transition process required not just funding but also timely actions to prevent job loss and demographic decline in transition regions.

The implementation of the JDTP priorities also confirmed this idea. Thus, while the Priority 1 had been active enough and financially intensive, its socio-economic impact was conditioned by the quality of supported activities and enterprises. Similarly, the Priority 4, dealing with labour transition, would be effective insofar as training and reskilling led to job offer; otherwise, they could become mere compensations for job loss. Priority 6 was necessary for administering transition but remained auxiliary unless other priorities were advanced. Priorities 3 and 5 were important but immature, while Priority 7 was mostly futuristic.

Consequently, in order to implement just transition successfully, it was important to coordinate all priorities rather than focus solely on their budgets. While entrepreneurship and energy transition were crucial for creating new activities, circular economy and

quality-of-life improvements were equally important, since otherwise, new jobs might not be sustainable and local socio-economic dynamics remained uncertain.

Thus, one could draw two main conclusions about just transition in Greece. Firstly, European financial assistance was crucial to enable transition in the country. Secondly, it was not sufficient to achieve territorial justice, unless it was translated into mature projects, productive diversification, employment creation, social legitimacy, and capacity building. In other words, a transition needed not just financial mobilization but a development of regional economic potential.

8.2 Recommendations and future research

Based on these conclusions, one could suggest several policy recommendations for increasing the effectiveness of the transition.

Firstly, it was necessary to improve the criteria for evaluating transition implementation. While the JDTP was evaluated in terms of budgeting, calls, and approved projects, the real implementation of the programme had to be judged in terms of project completion, expenditure, jobs, business survival, local development, and quality of employment. Otherwise, the potential effects of transition remained uncertain despite its financial mobilization.

Secondly, it was vital to achieve a balance between JDTP priorities. In spite of the fact that entrepreneurship and energy transition were crucial priorities, it was necessary to pay attention to land rehabilitation, circular economy activities, quality-of-life improvements, and development of new technologies. Priority 3 had to be intensified since the reuse of lignite lands appeared to be the basis for the future development. Priority 5 had to be expanded so that the positive effect of small-scale territorial interventions was felt. Finally, Priority 7 had to be connected to local firms and universities.

Thirdly, the linkage between labour transition priorities and investment projects had to be improved. Since job opportunities were crucial, reskilling and coaching had to target the economic sectors that required skilled labour. In particular, energy transition would require employment in the maintenance of equipment and construction, while advanced manufacturing, circular economy, sustainable agriculture, and environmental rehabilitation would require additional skilled labour.

Fourthly, the implementation of technical assistance had to become more strategic than passive. Priority 6, devoted to technical assistance, could not only serve as an administrative tool but also prepare mature projects and projects ready for funding. Such an approach was especially important for Megalopolis, which was less capable to benefit from JDTP compared to Western Macedonia.

Fifthly, it was important to involve local actors in the transition process. The participation of local authorities, organizations, and entrepreneurs was crucial in prioritizing projects, their selection, and implementation and not only in consultations. Increased transparency of project prioritization, benefits expected from them, and implementation could facilitate social legitimization of transition process.

Sixthly, renewable energy transition had to become one of the ways of developing the economy rather than its entire replacement. Since renewable energy projects were less job-intensive than mining, it was crucial to diversify regional economies so that other industries emerged, such as manufacturing, agricultural processing, tourism, services, research and innovation, and digitization.

Finally, further research was also necessary to determine the real effects of just transition. Currently, there was uncertainty regarding durable employment, job creation, business survival, local demographic stability, the effectiveness of reskilling programmes, social acceptance, and reuse of former lignite lands. In particular, the comparison of Western Macedonia and Megalopolis with other European coal regions would help understand the specifics of Greece's transition process.

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