

Managing Labour Market Transformation in a Coal Transition Region: Evidence from the Western Macedonia Living Lab

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Abstract

The accelerated phase-out of coal and lignite under the European Green Deal is generating significant labour market disruptions in coal-dependent regions. Western Macedonia in Greece—one of Europe’s fastest decarbonisation cases—offers a critical setting to examine how labour market restructuring can be managed under conditions of structural vulnerability and policy urgency. This paper presents empirical evidence from the Western Macedonia Living Lab, established within the Horizon Europe ISABEL project, as a platform for stakeholder engagement and place-based policy experimentation. Drawing on interviews, participatory workshops, and regional labour market analysis, the study explores employment dynamics, job displacement risks, emerging skill needs, governance capacity, and the effectiveness of transition measures. Particular attention is given to institutional coordination, social acceptance, and gender implications. Findings suggest that although strategic frameworks and funding instruments such as the Just Transition Fund provide essential support, uncertainties persist regarding job creation, skill alignment, and governance inclusiveness. The paper argues that effective labour market transformation requires place-based governance, sustained stakeholder engagement, and adaptive institutional capacity, demonstrating the value of Living Lab methodologies for evidence-based decision-making in just transition contexts.

Keywords: regional labour markets; twin transition; job creation and destruction; structural change; regional resilience; place-based policy.

1. Introduction

The European Green Deal and the broader commitment to climate neutrality by 2050 have accelerated structural transformations in coal-dependent regions across Europe. The phasing out of coal and lignite activities represents not merely an environmental reform, but a profound reconfiguration of regional production systems, labour markets, institutional structures, and socio-economic identities

(Trembaczowski, 2025). Regions historically specialised in fossil-fuel extraction and energy-intensive industries face the dual challenge of mitigating employment losses while simultaneously constructing alternative economic pathways (Kojola, 2025).

Western Macedonia in Greece constitutes one of the most rapid and ambitious lignite phase-out cases in Europe. The accelerated decommissioning of lignite-fired power plants has created acute employment risks and intensified pre-existing structural weaknesses, including high unemployment rates, limited diversification, demographic decline, and gender disparities in labour market participation. This context renders Western Macedonia a critical empirical case for examining how labour market transformation can be managed in practice under conditions of urgency and uncertainty (Pavloudakis et al, 2023).

This paper presents findings from the Western Macedonia Living Lab, established within the Horizon Europe ISABEL project. The Living Lab operates as a structured platform for stakeholder engagement, qualitative inquiry, and place-based policy experimentation. By integrating regional profiling, stakeholder consultations, and in-depth interviews with workers, employers, policymakers, and training providers, the study explores how labour market restructuring is unfolding, how risks are perceived, and how institutional capacities shape adaptive responses.

By focusing on a single coal transition region in depth, this paper contributes to the literature on just transition and regional transformation in three ways: First, it provides empirically grounded insights into labour market dynamics during accelerated decarbonisation. Second, it evaluates the governance capacity and institutional coordination mechanisms supporting (or constraining) adaptation. Third, it demonstrates how Living Lab methodologies can function as instruments for policy learning and evidence-based decision-making in structurally vulnerable regions.

2. Western Macedonia in Transition: Structural Conditions and Vulnerabilities

Western Macedonia's economy has historically been anchored in lignite extraction and electricity generation. The Public Power Corporation (PPC) constituted not only a dominant employer but also the backbone of regional value chains and local income generation. The energy sector's share in Gross Value Added significantly exceeded national averages, while manufacturing and knowledge-intensive services remained underdeveloped (Tranoulidis et al, 2022).

Even prior to the phase-out announcement, the region exhibited persistent structural weaknesses. Unemployment rates—both general and female—were consistently among the highest in the European Union. Female unemployment, in particular, reflected structural gender imbalances embedded in a male-dominated energy economy. Demographic decline and youth outmigration further constrained the region's adaptive capacity.

The accelerated lignite phase-out, while environmentally necessary, intensified these vulnerabilities. Job losses in direct mining and power generation were accompanied by indirect effects across subcontractors, local SMEs, and service providers. The region thus confronts a complex labour market shock characterised by:

- Sectoral contraction in fossil-related activities
- Uncertainty regarding the pace and scale of new job creation
- Skill mismatches between legacy occupations and emerging green sectors
- Social concerns regarding fairness, inclusion, and intergenerational equity

In this context, labour market transformation cannot be reduced to retraining programs alone. It requires coordinated governance, institutional alignment, and long-term economic diversification strategies.

3. The Living Lab Approach: Conceptual and Methodological Framework

Living Labs are collaborative innovation ecosystems operating in real-life settings, where public authorities, businesses, academia, and citizens jointly develop solutions to societal challenges. Grounded in the Quadruple Helix model, they are characterised by openness, stakeholder empowerment, iterative experimentation, and continuous learning (Kalinauskaite, 2021).

The Western Macedonia Living Lab was established as a structured yet flexible platform for systematic stakeholder engagement and qualitative research. It combined semi-structured interviews with workers, trade union representatives, employers, training providers, and regional authorities, alongside regional labour market profiling and participatory workshops focused on reskilling, diversification, and governance coordination.

Unlike conventional consultation processes, the Living Lab fostered sustained interaction and feedback loops between research findings and policy discussions. This approach enabled the identification of both measurable labour market trends and subjective perceptions—essential for understanding social acceptance, institutional gaps, and the region’s adaptive capacity during the transition.

4. Governance and Strategic Frameworks

The transition in Western Macedonia is framed by a comprehensive roadmap supported by the World Bank and embedded within Greece’s Just Transition Development Plan (2021–2027). The strategic architecture is structured around three pillars: First, *Government Systems*: Strengthening governance structures, clarifying institutional responsibilities, and enhancing coordination between central and regional authorities. Second, *People and Communities*: Assessing affected labour force characteristics, designing reskilling pathways, and establishing social protection mechanisms. Third, *Repurposing Former Mining Lands and Assets*: Developing reclamation plans, regulatory reforms, and financing mechanisms to facilitate land reuse and new investments.

While the framework provides clear strategic direction, evidence from the Living Lab highlights several implementation challenges. Stakeholders pointed to delays in the materialisation of announced investments, which have created uncertainty regarding the actual pace of economic restructuring. Concerns

were also raised about the limited clarity surrounding the timelines of new industrial projects, making it difficult for workers, businesses, and training providers to plan accordingly. In addition, participants emphasised a fragmentation between national-level planning and local realities, noting that centrally designed policies do not always reflect the specific socio-economic conditions of the region. Finally, there is a widespread perception of centralised decision-making processes, with local actors feeling insufficiently involved in shaping key transition strategies.

Governance capacity emerges as a critical variable. Regions undergoing structural transformation require not only financial resources but also institutional alignment, transparency, and trust-building mechanisms.

5. Labour Market Dynamics and Skill Transformation

Interviews conducted within the Living Lab reveal several patterns shaping labour market restructuring:

5.1 Perceived Job Displacement

Workers directly employed in lignite activities expressed high levels of uncertainty regarding long-term employment prospects. Although early retirement schemes and compensation measures exist, younger workers face limited clarity about alternative career pathways.

Indirectly affected workers—particularly those in subcontracting firms—reported greater vulnerability due to weaker social protection coverage.

5.2 Emerging Skill Needs

Stakeholders identified potential growth sectors including renewable energy, hydrogen technologies, environmental restoration, agri-food innovation, logistics, and digital services. However, concerns persist regarding: First, mismatch between training programs and industry needs. Second, limited absorption capacity of emerging sectors and third, insufficient alignment between vocational education providers and private investors.

Training providers acknowledged the need to redesign curricula, yet emphasised the importance of predictable investment pipelines to ensure that reskilling efforts correspond to actual labour demand.

5.3 Gender Implications

Given historically male-dominated energy employment, the transition poses differentiated impacts. Female unemployment rates remain higher than national averages. Without targeted gender-sensitive policies, new green sectors risk reproducing existing inequalities. Stakeholders emphasised the importance of inclusive entrepreneurship support, care infrastructure, and targeted training pathways.

6. Social Acceptance and Narrative Contestation

Living Lab discussions revealed contested narratives surrounding the pace and governance of the transition. While environmental imperatives are broadly acknowledged, concerns persist regarding fairness and procedural justice.

Key themes include:

- Perception of abrupt decision-making at national level
- Limited early-stage consultation with local communities
- Uncertainty about the sequencing of plant closures and investment activation

Social acceptance is not solely determined by compensation measures but by perceived inclusiveness and transparency. Participatory procedures, stakeholder inclusion, and communication strategies are therefore central to maintaining trust.

7. Comparative Insights from Other Coal Regions

Comparative evidence highlights that Western Macedonia's transition is significantly faster than historical transitions in regions such as Germany's Rhenish coal region. While governance frameworks share similarities, leadership structures differ. In Western Macedonia, transition coordination is more centrally driven, whereas in other regions regional development agencies played stronger roles.

Lessons from international experiences demonstrate that insufficient active labour market policies and weak public intervention can result in long-term socio-economic scarring. Western Macedonia thus stands at a critical juncture: proactive, coordinated intervention may mitigate negative effects, whereas fragmented implementation risks entrenched decline.

8. Policy Recommendations

Based on Living Lab findings, several strategic recommendations emerge:

Strengthening Place-Based Governance. Enhance regional institutional capacity, clarify stakeholder roles, and establish permanent coordination platforms linking central government, regional authorities, and social partners.

Aligning Training with Industrial Strategy. Ensure that reskilling programs are directly linked to confirmed investment pipelines and sectoral roadmaps.

Gender-Sensitive Transition Policies. Develop targeted measures addressing female unemployment and ensuring equitable access to emerging sectors.

Monitoring and Adaptive Learning. Institutionalise monitoring tools capable of tracking employment effects, training outcomes, and social impacts in real time.

Leveraging European Funding Strategically. Maximise the catalytic role of the Just Transition Fund and related instruments to build innovation ecosystems rather than isolated projects.

9. Conclusion

Western Macedonia represents a paradigmatic case of accelerated coal phase-out under European climate policy. The region's experience illustrates that labour market transformation in coal-dependent territories is not solely a technical or financial challenge but fundamentally a governance and coordination issue.

The Western Macedonia Living Lab demonstrates how structured stakeholder engagement can generate context-sensitive knowledge, foster trust, and support adaptive policymaking. By integrating qualitative insights with regional analysis, the Living Lab provides an evidence base for managing structural transformation in socially sustainable ways.

While significant uncertainties remain regarding job creation pace, skill alignment, and long-term diversification, the findings underscore the central importance of place-based governance, continuous stakeholder engagement, and adaptive institutional frameworks. As Europe advances toward climate neutrality, the lessons from Western Macedonia highlight that just transition is not achieved through funding alone, but through inclusive processes, coordinated strategies, and sustained regional capacity-building.

10. References

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