

# EXPECTED LABOUR MARKET EFFECTS OF THE GREEN DEAL INDUSTRIAL PLAN

THE POTENTIAL OF LABOUR POLICY  
FOR JUST TRANSITION REGIONS

*Milan Petit, Mikhail Sirenko, Michael Obersteiner, Kevin le Merle*



Policy Study published in April 2024 by

**FEPS**  
FOUNDATION FOR EUROPEAN  
PROGRESSIVE STUDIES



## **THE FOUNDATION FOR EUROPEAN PROGRESSIVE STUDIES (FEPS)**

European Political Foundation - N° 4 BE 896.230.213  
Avenue des Arts 46 1000 Brussels (Belgium)  
[www.feps-europe.eu](http://www.feps-europe.eu)  
@FEPS\_Europe



## **FRIEDRICH-EBERT-STIFTUNG**

Rue du Taciturne 38, BE-1000 Brussels (Belgium)  
<https://brussels.fes.de/>  
@fes\_brussels

**Project SEER**

## **Estimating Socioeconomic Effects of implementing European green deal implementation and Reform (SEER)**

Project SEER is a consortium consisting of Systemiq, The Centre for System Solutions, the Center for Policy Exploration Analysis and Simulation, Oxford University's Environmental Change Institute, and the Club of Rome.  
[www.systemiq.earth/portfolio/seer](http://www.systemiq.earth/portfolio/seer)

Environmental Change Institute



## **Environmental Change Institute**

School of Geography and the Environment,  
University of Oxford, OUCE, South Parks Road, Oxford,  
OX1 3QY (United Kingdom)  
[www.eci.ox.ac.uk](http://www.eci.ox.ac.uk)  
@ecioxford



## **International Institute for Applied Systems Analysis (IIASA)**

Schlossplatz 1, A-2361 Laxenburg (Austria)  
[www.iiasa.ac.at](http://www.iiasa.ac.at)  
@IIASAVienna

Copyright 2024 by the Foundation for European Progressive Studies  
Front page photo: [shutterstock.com/Gorodenkoff](https://www.shutterstock.com/Gorodenkoff)  
Copy-editing: Rosalyne Cowie

**Legal deposit registration number: D/2024/15396./14**  
**ISBN: 978-2-931233-73-3 9782931233733**

## ACKNOWLEDGEMENTS

The authors of this report are especially grateful for financial support provided by the Foundation for European Progressive Studies and the Friedrich Ebert Stiftung for this report series, and Luis Saéz Jiménez for his organisational support. They would also like to extend special thanks to the whole SEER team for laying the foundations on which this report is written, especially to Erik Pruyt and Tushith Islam (Center for Policy Exploration Analysis and Simulation) for building the SEER model. Furthermore, they would like to thank their reviewers, Béla Galgóczi (European Trade Union Institute), Miłoslawa Stępień (CEE Bankwatch), Patricia Urban (Centre for European Policy Studies), Rafael Wildauer (Greenwich University) and Sanna Markannen (Cambridge Institute for Sustainable Leadership), and all the attendees of the FEPS workshop "Ensuring a Just Transition in times of industrial transformation" in Brussels on 6 December 2023 for their valuable input and time. Finally, they would like to express their gratitude to the local experts and policymakers for their contributions.



This Policy Study was produced with the financial support of the European Parliament. It does not represent the view of the European Parliament.

# TABLE OF CONTENTS

<b>EXECUTIVE SUMMARY</b> .....	6
<b>1 INTRODUCTION</b> .....	9
1.1 STUDY OBJECTIVES, APPROACH AND METHODOLOGY .....	10
<b>2 POLICY CONTEXT</b> .....	13
2.1 GREEN DEAL INDUSTRIAL PLAN .....	14
2.2 THE EUROPEAN LABOUR MARKET AND THE GREEN TRANSITION.....	15
2.3 LABOUR MARKET MOBILITY CHALLENGES AND POTENTIAL POLICY SOLUTIONS .....	17
2.4 EXPECTED LABOUR MARKET IMPACTS OF THE GDIP.....	20
2.5 EXPLORING THE LABOUR MARKET IMPACTS OF THE GDIP ON THE SELECTED CASE REGIONS WITH THE SEER MODELLING TOOL.....	21
<b>3 CASE STUDIES</b> .....	24
3.1 CASE STUDY 1: HAINAUT (BELGIUM) .....	25
3.1.1 Model exploration .....	27
3.2 CASE STUDY 2: ASTURIAS AND CASTILLA Y LEÓN (SPAIN) .....	29
3.2.1 Model exploration .....	31
3.3 CASE STUDY 3: MORAVIA-SILESIA AND SILESIA (CZECHIA AND POLAND) .....	35
3.3.1 Model exploration .....	37
3.4 CASE STUDY 4: ÖVRE NORRLAND (SWEDEN) .....	41
3.4.1 Model exploration .....	43

<b>4 COMPARATIVE ANALYSIS</b> .....	44
4.1 CHALLENGES AND OPPORTUNITIES OF THE STUDIED JUST TRANSITION REGIONS .....	45
4.2 EXPLORING THE EFFECTS OF THE GDIP AND COMPLEMENTING LABOUR MARKET POLICIES .....	49
4.2.1 Baseline.....	49
4.2.2 GDIP.....	51
4.2.3 Complementing GDIP with labour market policies.....	53
4.3 LIMITATIONS OF MODELLING .....	55
<b>5 IMPLICATIONS OF THE OUTCOMES AND POLICY RECOMMENDATIONS</b> .....	58
5.1 REGION-SPECIFIC RECOMMENDATIONS.....	62
<b>6 CONCLUSION</b> .....	63
<b>ANNEX 1: MODEL DESCRIPTION</b> .....	67
SYSTEM DYNAMICS MODELLING .....	68
<b>ANNEX 2: THE SEER MODEL</b> .....	70
MODEL INTRODUCTION .....	71
THE CORE MODULE – LABOUR DYNAMICS .....	71
MODEL INPUTS AND OUTPUTS .....	73
MODELLING CRMA AND NZIA LABOUR MARKET IMPACTS .....	74
MODELLING NZIA LABOUR MARKET IMPACTS .....	74
<b>ANNEX 3: EXPERT INTERVIEW METHODOLOGY AND QUESTIONNAIRE</b> .....	76
EXPERT INTERVIEW METHODOLOGY .....	77
QUESTIONNAIRE .....	77
<b>ENDNOTES</b> .....	79
<b>AUTHORS, ABOUT FEPS &amp; PARTNERS</b> .....	83
8. ABOUT THE AUTHORS .....	84
9. ABOUT FEPS AND PARTNERS .....	86

---

# **EXECUTIVE SUMMARY**

---

# EXECUTIVE SUMMARY

**In the pursuit of ambitious climate goals, Europe finds itself juggling seemingly conflicting goals:** striking a balance between achieving its environmental objectives; ensuring the transition is fair; strengthening the single market; improving the competitiveness of European business; and doing this with limited resources in an environment marked by polycrisis. **The Green Deal Industrial Plan (GDIP)** unveiled at the start of 2023 **was designed** by the European Commission to complement the European Green Deal **to reconcile these goals.**

**The current European labour market is not functioning well, with labour shortages existing next to structural unemployment.** If the European Green Deal's targets are to be achieved, it is essential that the labour market challenges are overcome. If designed well, this could have the added benefit of addressing many social issues related to inequality, regional cohesion and well-being more generally.

The core of the GDIP consists of the Net-Zero Industry Act and the Critical Raw Materials Act, which aim to encourage Europe's green industrialisation and accelerate the transition to a clean energy system. To cushion the negative social and economic effects of the green transition in the hardest-hit regions, the European Commission has also separately implemented the Just Transition Mechanism. While these programmes address two sides of the same coin, **little is understood about if and how the GDIP could support a Just Transition.**

Therefore, **this policy study focuses on the labour market effects of the GDIP, as well as the potential for labour market policies to strengthen its successful implementation.** To ensure the recommendations are relevant to policymakers, it does so for four case studies combining six Just Transition regions, and it outlines the labour policy solutions that hold potential for building synergies between the GDIP and the Just Transition programmes. The cases

have been selected based on geographic spread, socio-economic diversity and proximity to regions with a similar profile, and they include Hainaut (BE), Asturias and Castilla y León (ES), Moravia-Silesia (CZ) and Silesia (PL), and Övre Norrland (SE).

The study applies a mixed-method approach, combining literature review, expert interviews and an innovative modelling approach using the SEER labour market model. This model is able to explore the policy impacts of the GDIP and selected labour market policies on key labour market indicators.

Based on this approach, **the study finds that Europe does not lack workers; it has a structural mismatch between demand and supply. A lack of labour mobility is the key challenge to be overcome by policymakers for the labour market.** This mobility not only involves re- and upskilling or moving location, but also refers to moving jobs within or between organisations or between sectors. While **skills and labour shortages are considered to be the most serious problem** by businesses of all sizes across the EU, especially for the manufacturing sector, **this urgency is not reflected** in the solutions offered **by the proposed GDIP policies.**

A detailed analysis of the Just Transition regions shows that **some challenges are common, such as ageing, the cost-of-living crisis and a lack of public resources** to deal with socio-economic challenges; other challenges are more context specific. **No region regarded the green transition as a socio-economic challenge in and of itself; rather, it was seen as something that could amplify or alleviate existing challenges.** Interregional cooperation was seen as having the most potential to help overcome these, and European support was warmly welcomed.

From the specific challenges, four distinct archetypes were identified, each represented by a case study. Hainaut presents the first type of

region, which combines skills shortages in growing green industries with concentrated structural unemployment in specific communities. The next type is north-western Spain, where there is a lack of quality jobs, especially for the young. The third are Moravia-Silesia and Silesia, where youth and brain drain is the main challenge, despite strong economic growth and low unemployment rates. Relatively low perceived quality of life was identified as the main driver of this process. The last type is Övre Norrland, where public services and housing are lacking to accommodate the workers that are needed for the expansion of green industries. It should be noted that **even within regions, there was a high local variance of challenges.**

**The policy analysis has found that complementing the GDIP with labour market policies is a no-regret option for all regions.** Although the effects of the combined policies are, by themselves, likely to be insufficient to reduce unemployment and workforce shortages to desirable levels. Furthermore, it has shown that the **GDIP will likely increase workforce shortages if no additional measures are taken.** Of the two studied labour market policies – improving within-region labour mobility and supporting relocation to different regions – the former was more effective at reducing workforce shortages, while the latter outperformed with regard to reducing unemployment. This indicates a trade-off that policymakers should consider.

Based on the findings of the research, this policy study concludes that **the labour market effects of the green transition are likely to be highly localised and regionally small.** This would however change if industries such as the chemical, steel and automotive sectors were impacted. Furthermore, it shows that **green policies can modify but not resolve socio-economic issues; social policies are essential for a successful transition.** And lastly, **a systems approach** to labour market policy that addresses all root causes of the labour mobility barriers in an integrated and holistic manner **is needed to reconcile the Commission's social, climate and economic goals.**

*“A Just Transition to a thriving and green Europe is possible, even for the hardest-hit regions.”*

**A Just Transition to a thriving and green Europe is possible, even for the hardest-hit regions.** Significant progress has been made over the past years, but to achieve the desired targets, **a bolder and more integrated approach is needed for a socially just and well-functioning European labour market.**



---

# 1. INTRODUCTION

---

# 1. INTRODUCTION

In the pursuit of ambitious climate goals, Europe finds itself walking a tightrope: striking a balance between achieving its environmental objectives and retaining the backing of the public in an environment marked by polycrisis.<sup>1</sup> Despite strong public support for the European Green Deal (EGD),<sup>2</sup> climate measures are under political pressure when it comes to the distributive consequences of their implementation. Some are blaming them for increasing the cost-of-living crisis,<sup>3</sup> while others have argued the multiple interrelated crises Europe faces can only be solved by transforming energy systems and ambitious climate action.<sup>4</sup>

In response to fragile supply chains, threats to national security, and the energy and cost-of-living crises, countries around the world are engaging in so-called “homeland economics”, supporting their national champions and raising barriers to international competitors.<sup>5</sup> This, combined with challenges such as rising interest rates and energy prices, shortages of skilled labour, digitalisation and increasing regulatory pressures, has led European businesses to raise the alarm.<sup>6</sup>

*“Public surveys suggest the fairness of the transition will be key to its success.”*

In response to these concerns, the EU Commission unveiled the Green Deal Industrial Plan (GDIP).<sup>7</sup> This is composed of various policies that aim to encourage Europe’s green industrialisation and accelerate the green transition.<sup>8</sup> At the same time, public surveys suggest the fairness of the transition will be key to its success,<sup>9</sup> further highlighting the importance of making full use of the Just Transition Mechanism (JTM) and related programmes.<sup>10</sup> While these programmes address two sides of the same coin, little is understood about if and how the GDIP could support a Just Transition.

This policy study aims to explore multiple possible futures and clarify the links between industrial and labour policy interventions for a Just Transition. Specifically, the study focuses on the labour market effects of the GDIP, as well as the potential for labour market policies to strengthen its successful implementation. Given the green transition is expected to impact some territories more than others, the policy study explores the possible labour market impacts of the GDIP in four Just Transition regions and assesses various labour policies that hold potential for building synergies between the two programmes.

The structure of the study is laid out as follows: firstly, we detail our methodological approach, setting the foundation for the subsequent analysis. This is followed by a comprehensive overview of the context surrounding the green transition and its related policies. We then delve into a series of case studies, each providing a regional analysis enriched with modelling results. These results are subsequently compared across regions. Lastly, the study provides an overview of the findings’ implications for policymakers, followed by concluding remarks.

## 1.1 Study objectives, approach and methodology

This policy study’s overarching aim is to understand how labour market policies can strengthen the Just Transition process in Just Transition regions under the proposed GDIP at sector-specific levels.

To do this, the study investigates the effects of two GDIP policies on the European labour market and additionally aims to evaluate potential labour market policies that could ensure a Just Transition. These policies are the Net-Zero Industry Act (NZIA) and the Critical Raw Materials Act (CRMA). Acknowledging the relevance of regional context for labour market policies, four case studies are selected, consisting

of six NUTS2 regions that receive Just Transition funding. These are geographically spread, in close proximity to similar regions, and face diverse socio-economic challenges, thereby providing a comprehensive basis for suggesting a set of regionally nuanced recommendations.

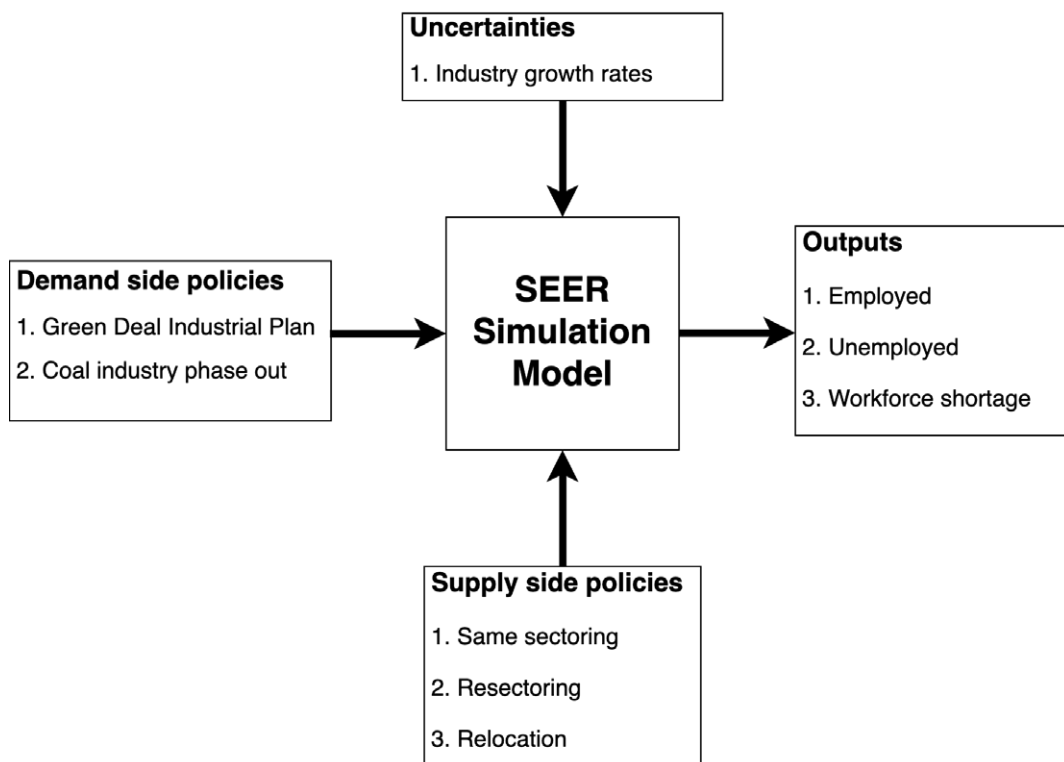
The central research question being tackled can be read as follows: *What is the expected impact of labour-mobility-enhancing policies on employment, unemployment and workforce shortages on a future scenario of the implementation of the proposed NZIA and CRMA on the regions of Hainaut, Asturias, Castilla y León, Moravia-Silesia, Silesia and Övre Norrland for the period 2025-2035?*

To tackle this question, the study uses a mixed-method approach. An economic and grey literature review of the current political and economic context provides an overview of the CRMA and NZIA policies and their expected labour market effects. Secondly, the link to the four selected Just Transition regions

is made through semi-structured interviews with local policymakers and experts, as well as data from Eurostat and national statistical agencies. Thirdly, for each of the cases, the results of the SEER labour market model, which models labour mobility in Europe to explore the labour market effects of the EGD, are presented. The model is run under a baseline scenario, a GDIP scenario where the CRMA and NZIA are implemented, and two scenarios where the GDIP is complemented with two types of labour policies. Finally, the regions and the respective policy effects are compared. In this way, the policy study can provide a set of policy recommendations regarding labour policies that can serve Just Transition objectives in the context of the GDIP.

This study is the first in a series of publications that will build on the SEER labour market model. The systems dynamics model, shown simplified in Figure 1.1, is based on Eurostat<sup>11</sup> and European Jobs Monitor<sup>12</sup> data at the regional level (NUTS2<sup>13</sup>),

**Figure 1.1. SEER model diagram.**

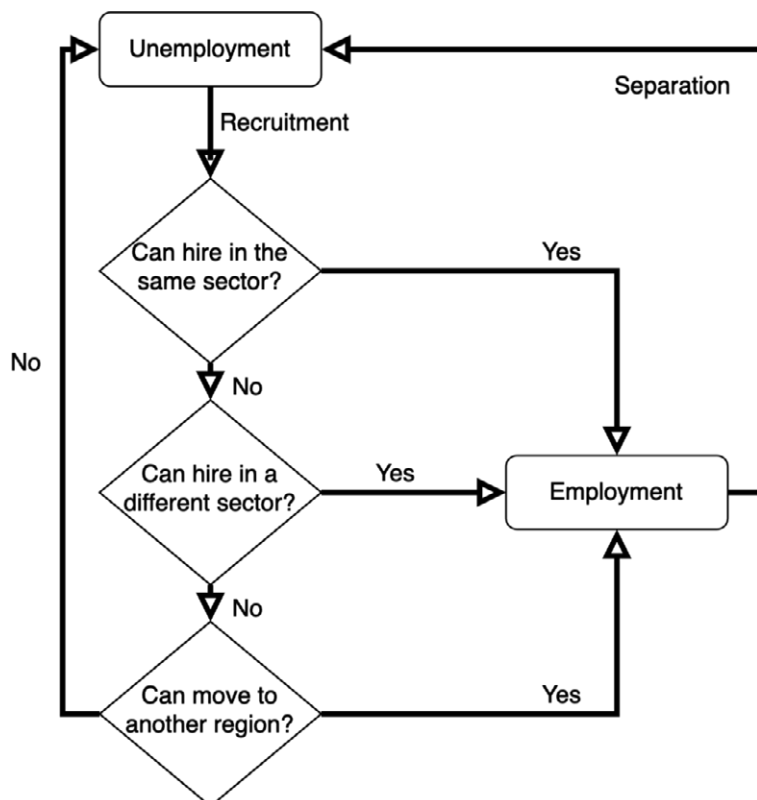


sectoral level (NACE2<sup>14</sup>), job category (ISCO2<sup>15</sup>) and skill level (ISCED<sup>16</sup>). The inputs are, on one hand, demand-side policies such as the GDIP and the coal phase out, which are generally implemented at EU or national levels, and, on the other hand, supply-side policies, which are mostly implemented at regional or national levels. In the current version of the model, these include same sectoring, meaning moving jobs within a sector within a region; resectoring, which includes switching jobs to a different sector within a region; and relocation, involving moving to a different region. All policies are based on matching workers to jobs with similar skill levels, as defined by ISCED (low, medium and high). The model also uses industry growth rates as an exogenous variable to simulate uncertainty. The outputs of the model are explorations of the effects of the selected supply- and demand-side policies under the various industry growth rates based on three indicators: the number of employed; the number of unemployed; and workforce shortages at regional (NUTS2) and sectoral (NACE1) levels.<sup>17</sup>

The model functions along a prioritisation scheme, as depicted in Figure 1.2, meaning that certain options are only considered if others are unsuccessful or impossible. In this case, being hired in the same sector and region is the first choice, after which an agent in the model will consider switching to a different sector within the same region. Relocating to another region comes last. This priority order was based on the transaction costs of moving jobs, with the least disruption experienced as the highest priority and vice versa.

Each step has a chance of success, with 0% meaning no unemployed will find a match through this intervention, and 100% meaning that all unemployed meeting the conditions described (i.e., matching the skill level and region) will find a matching job. Labour market policies can be assessed by changing the values of these percentages.

**Figure 1.2. Priority scheme for the model**



---

## **2. POLICY CONTEXT**

---

## 2. POLICY CONTEXT

### 2.1 Green Deal Industrial Plan

The European Commission unveiled the GDIP in response to various crises that hit European manufacturing in the past three years, such as COVID-19 and the war in Ukraine, and in light of big industrial support packages in the USA and China.<sup>18</sup> Two of the main components of this plan are the NZIA and the CRMA.<sup>19</sup> Taken together, these proposals should provide an impetus to the green industrialisation of Europe, which in turn holds the potential for improving the EU's competitiveness, reducing its carbon footprint and providing quality jobs.<sup>20</sup> Despite showing promise, its ability to achieve these goals is questioned by many stakeholders.<sup>21</sup>

At the time of writing, the CRMA has just been adopted, while the NZIA is still being discussed in trilogues. The CRMA aims to pursue four objectives to secure a sustainable supply of critical raw materials (CRMs): strengthen the EU's capacity at various value chain stages to achieve specific targets by 2030; diversify the EU's raw material imports to reduce dependency on any single third country; enhance monitoring and risk mitigation capacities; and ensure a robust single market, whilst augmenting the sustainability and circularity of CRMs.<sup>22</sup> The NZIA aims to scale net-zero technology manufacturing in Europe, simplify its regulatory framework, and foster a competitive and resilient net-zero industry. It aims to do so by setting enabling conditions, facilitating access to the market, accelerating CO<sub>2</sub> capture, supporting re- and upskilling programmes, fostering innovation, and setting up a coordinating platform between member states and the Commission.<sup>23</sup>

Reactions to the publication of the proposals were mixed. While there is consensus between experts, businesses and unions that policies are needed to tackle the green transition challenges related to the manufacturing sector, disagreement exists about whether the GDIP is taking the right approach and

is at the required scale.<sup>24</sup> The concerns raised can be divided into those arguing that the scope is too narrow and the resources too limited, that the support comes at the expense of social and environmental safeguards, and finally that the proposals do not address the root causes of the problems identified.<sup>25</sup>

Three of the most important root causes insufficiently addressed are demand-side reduction, regional divergence, and labour and skills shortages. Given the strong causal connection between resource consumption and the crossing of planetary boundaries, the EU's material footprint needs to be reduced if it is to achieve the EGD targets.<sup>26</sup> While it is trying to do so through various pieces of legislation on the circular economy, including specific proposals around packaging waste and eco-design, both the CRMA and the NZIA miss a strong demand-reduction component. If it is to reduce Europe's dependence on imported materials, critics argue that it should also include a "sufficiency agenda" that includes stringent environmental conditionalities, public finance reshuffling and private sector engagement.<sup>27</sup>

*"A thriving Europe is built on thriving regions."*

A thriving Europe is built on thriving regions.<sup>28</sup> If the aim of the NZIA and the CRMA is to enhance European manufacturing, it is pointed out that it should address this regional component.<sup>29</sup> Current European industrial policy is expected to prioritise already thriving regions, while the loosening of state aid rules will benefit the member states with most fiscal space, amplifying existing centre-periphery dynamics.<sup>30</sup> It is therefore argued that industrial policy should focus on stemming brain and youth drain, which are especially damaging to regional competitiveness, and thus, Europe's as a whole.<sup>31</sup>

Lastly, while skills and labour shortages are considered to be the most serious problem by businesses of all sizes across the EU, especially for manufacturing, neither act has a clear approach for

how to deal with this issue.<sup>32</sup> Despite businesses ranking labour and skills shortages as a serious problem around twice as often as administrative and regulatory burden, and up to three times as often as a lack of financing, both acts primarily focus on the last two and ignore the labour aspect. While the NZIA does allocate around €11 million to net-zero academies, in which over 100,000 people should be trained in four-year cycles, it does not provide details on how high-quality training for the low investment of €110 per student can be expected to come to pass. That such an investment is likely to be insufficient is exacerbated by the trend that up to 50% of those being trained for manufacturing jobs end up being employed in other sectors, mainly due to geographical mismatches in supply and demand.<sup>33</sup> The CRMA, on the other hand, does even less to address labour and skills shortages.

While the GDIP aims to address some widely shared concerns, it is unclear if it is sufficiently ambitious and targeted to achieve its stated aims. To do this, three key areas would need to be addressed: reductions in demand for materials; improving regional cohesion; and directly addressing the labour and skills shortages in the manufacturing sector.

## 2.2 The European labour market and the green transition

The green transition is just one of four megatrends currently triggering substantial changes in the European labour market, along with demographic change, automation and shifts in supply chains.<sup>34</sup> While, of these four, it is likely to have the least impact in terms of absolute numbers, it is expected to have disproportionate consequences for specific regions and sectors, which makes it politically salient. This salience is reinforced by the perception that climate-policy-related factory and mine closures can be directly attributed to policymakers' actions.<sup>35</sup>

The labour market effects of the green transition in the EU are expected to be small – somewhere between -0.3% and 1.2% change of total employment, depending on the model and assumptions being used.<sup>36</sup> This is mainly because the sectors responsible for over 90% of European emissions only

employ 25% of its labour force. In turn, only a small minority of this 25% are employed in the extraction and refining of fossil fuels and manufacturing of renewables, which are the focus of such models.<sup>37</sup> The only sector that is expanding considerably as a result of the green transition is construction, notably in sectors like heat pump installation and solar panel fitting.<sup>38</sup> Despite these relatively small effects at the macro level, the consensus of these studies is that disruption will take place in specific regions and sectors, which should be explored in more detail.

*“There is a risk that the transition to a low-carbon economy will result in economic decline and unemployment in some regions, while certain green industries across Europe will face labour shortages.”*

Specifically for the labour market, the green transition's main challenge is that it will exacerbate the current labour and skills mismatch.<sup>39</sup> New jobs tend to have different skill requirements from occupations in declining industries, especially regarding digital proficiency. Also, existing green technology production facilities tend to be located in different localities than existing carbon-intensive industries. There is a risk that the transition to a low-carbon economy will result in economic decline and unemployment in some regions, while certain green industries across Europe will face labour shortages.<sup>40</sup>

What should be noted is that all these analyses assume that the green transition merely means a shift towards zero-carbon energy sources and does not include a change in the current economic system. If, however, the EU is to decouple, in absolute terms, its resource consumption from economic growth, as the International Resource Panel indicates is needed to reach net zero, then the labour market effects could well be an order of magnitude higher. Such a change could affect more than the 25% of European labour force employed in the high-emission sectors previously mentioned. Apart from fossil fuel industries, this would also include European cornerstone industries, such as automotive and steel manufacturing, agriculture, and the whole construction sector.<sup>41</sup>

Regardless of the scale of the transition, it is undisputed that it should be just. What a Just Transition means in practice is, however, subject to debate.<sup>42</sup> It encompasses different perspectives on what the root causes of an unjust transition are, who should be supported in the transition and what this support could look like. Where a narrower view of the Just Transition focusses on the workers, businesses and communities directly affected, ensuring “no one is left behind”, a broader view also aims to include those “already left behind”, and sees the transition as a chance to improve the well-being of all citizens.<sup>43</sup>

Considering these factors and to retain and build essential public support for a green transition, the EU has launched the JTM.<sup>44</sup> Where the NZIA and CRMA do not address regional divergence and labour shortage sufficiently, the JTM does target €55 billion in 2021-2027 to assist regions most impacted by the transition. The mechanism consists of the Just Transition Fund, consisting mostly of grants, the InvestEU “Just Transition” scheme to co-invest with private investment and a Public Sector Loan Facility. However, there is scepticism among civil society partners and regions about whether the size of the proposed funding matches the scale of the challenges, its adaptability to local circumstances, the focus on fossil fuel sectors instead of carbon-intensive industries more generally and its efficacy.<sup>45</sup>

The JTM is complemented by policies such as the Council Recommendation on Ensuring a Fair Transition and the Social Climate Fund. The former encourages member states to strengthen the EU’s Just Transition efforts through improving various labour-market-related conditions, while the latter offers financial assistance to the most vulnerable households and emissions reduction measures for housing, heating and mobility.<sup>46</sup> Both policies were received warmly, as they directly address Just-Transition-related issues, such as a challenging labour market environment for workers and energy poverty; at the same time, the solutions offered are considered inadequate. In particular, the non-binding nature of the Council recommendation and the size of the Social Climate Fund are considered missed opportunities.<sup>47</sup>

Overall, the Just Transition package is considered an important step in the right direction by civil society organisations, even though they point out substantial gaps in the EGD’s social dimension and transition mechanisms that can be improved.<sup>48</sup> Notably, the European Trade Union Institute indicates that the social and employment facets of the green transition – such as job transitions, workforce reskilling, distributional effects of decarbonisation policies and protection of social rights – are underdeveloped and potentially fragmentary in existing initiatives. A comprehensive EU Just Transition framework is needed, including legislation on the anticipation and management of change, ensuring expansive worker and citizen participation, and broadening the Just Transition Fund.

Some limited efforts to this effect can be found in the European Economic and Social Committee’s opinion on “Advancing the EU’s just transition policy framework: What measures are necessary?”<sup>49</sup> If put in place, such a framework should champion social dialogue at all levels, ensuring that new green jobs align with the ILO Decent Work agenda and the European Pillar of Social Rights, while also addressing a wide spectrum of the distributional impacts of climate policies, particularly concerning energy and transport poverty.<sup>50</sup> Therefore, it is of utmost importance that additional steps are taken to meet these requirements, specifically if they consider policies related to economic and industrial policy, such as the GDIP.

In conclusion, it seems that the European Commission is well aware of the challenges that need to be overcome to ensure that the green transition of the labour market is just, but that the proposed solutions are thus far likely to be insufficient to achieve these stated aims. That the transition needs to be just, if it is to happen at all, is an oft-repeated truism. And while green transition policies can alleviate and amplify current labour market issues, a better understanding is needed for why it is possible for persistent labour shortages to co-exist with un- and underemployment.



## 2.3 Labour market mobility challenges and potential policy solutions

*“The current labour and skills shortage is not a shortage of workers in and of itself, but a structural mismatch between demand and supply.”*

The current labour and skills shortage is not a shortage of workers in and of itself, but a structural mismatch between demand and supply, according to a recent report by the Commission.<sup>51</sup> It identifies a lack of labour mobility as the key challenge to be overcome by policymakers on the labour market, and provides an overview of potential policy solutions. This lack of labour mobility does not necessarily imply moving locations to find new employment, but rather it concerns all forms of switching one source of employment for another (see box).

Specifically, labour mobility can be defined by the ability to change professional activities through one or multiple of the following five actions:<sup>52</sup>

- 1. Internal role change:** Altering job responsibilities or workload without changing employer.
- 2. Employer transition:** Switching to a different company or starting one, which may involve changes in job roles, workload or location.
- 3. Geographical relocation:** Moving to a new region for a similar job, either with the same or a different employer.
- 4. Sector shift:** Transitioning to a different industry or sector, which can be within the same region or involve relocation.
- 5. Labour market (re-)entry:** Entering the labour market or returning to employment after a period of voluntary or involuntary absence.

Several barriers to labour mobility recur in the literature, as outlined in Table 2.1, which details five of the most-pressing barriers to labour mobility and provides a non-exhaustive list of applicable policy solutions. If the goal is to improve the efficiency and adaptability of the labour market, many positive social externalities can also be expected that improve the well-being of the labour force and European citizens more generally.<sup>53</sup>

An analysis of the labour market effects of the proposed GDIP will make the complementarity of such labour market interventions clear. Further analysis will specify which policies are most relevant for which region and sector, therefore avoiding the pitfall of a “one-size fits all” approach.

**Table 2.1. Barriers and solutions for labour mobility.**

Problem area	Problem details	Solutions
Labour mismatch	<ul style="list-style-type: none"> <li>• Senior workers are forced to leave the labour force</li> <li>• Challenge to combine family/caring and career</li> <li>• Groups with distance to the labour market face discrimination and other hurdles</li> <li>• Too little investment in productivity enhancing measures</li> <li>• Pensions/benefits are not transferable</li> </ul>	<ul style="list-style-type: none"> <li>• Include flexible working arrangements to accommodate employees who are not able or willing to work full time on location, i.e., leverage remote work or part-time work and guide workers who cannot work full time</li> <li>• Introduce a multi-pillar pension approach, including public pension, funded and supplementary pension and a bonus for working while receiving a pension</li> <li>• Invest in pre-school and daycare facilities</li> <li>• Invest in reaching out to and guiding people with distance to the labour market</li> <li>• Invest in productivity-enhancing technologies</li> </ul>
Skills mismatch	<ul style="list-style-type: none"> <li>• Skills and experience do not match new jobs</li> <li>• Credentials are not recognised or not relevant to activity</li> <li>• Companies are unable to locate workers with the right skills</li> <li>• Skills might be overabundant in one sector and lacking in another</li> </ul>	<ul style="list-style-type: none"> <li>• Grant equal access to quality and inclusive education, training and lifelong learning</li> <li>• Adapt the training offer and apprenticeships together with hiring businesses</li> <li>• Extend the system of automatic recognition of professional skills</li> <li>• Offer career guidance</li> <li>• Facilitate cross-sectoral transitions</li> <li>• Improve employers' staff-seeking abilities</li> </ul>
Lack of attractiveness of new job/sector	<ul style="list-style-type: none"> <li>• New job is less attractive than the old, because of different salary/benefits/status/flexibility</li> </ul>	<ul style="list-style-type: none"> <li>• Ensure fair wages, tax benefits and social protection systems.</li> <li>• Actively support quality employment, e.g., by increasing the stability of contracts, reducing undesirable working hours and monotony of work</li> <li>• Introduce green job subsidies</li> <li>• Improve the perception of jobs by the general public</li> </ul>

Problem area	Problem details	Solutions
Lack of attractiveness of new location	<ul style="list-style-type: none"> <li>• Lower quality of life</li> <li>• Inflexible housing market</li> <li>• Shortage of quality public services (health, education, IT)</li> <li>• Cultural and language barriers</li> <li>• Lack of a social network</li> <li>• Registration issues, e.g., health insurance</li> </ul>	<ul style="list-style-type: none"> <li>• Access to affordable, essential services and housing</li> <li>• Improve quality of life</li> <li>• Invest in quality public services</li> <li>• Promote transport accessibility</li> <li>• Expand housing support for low-income households</li> <li>• Fund integration and language courses</li> <li>• Establish social support groups</li> <li>• Streamline registration to access of public services</li> </ul>
Timing	<ul style="list-style-type: none"> <li>• Existing jobs disappear before new ones are created</li> <li>• New jobs are created, and hired for, before old jobs disappear</li> </ul>	<ul style="list-style-type: none"> <li>• Guarantee share of income during job changes</li> <li>• Provide meaningful voluntary activities for those between jobs</li> </ul>

**Enabling policies:**

- Coordinate policy action and inclusively involve social partners.
- Assess employment and social impact of fair transition policies.

**Sources:** Demitry, N., G. Koepke and S. Mewes (2022) “Just Transition in the European automotive industry. Insights from affected stakeholders”; “Job creation and local economic development 2023”. OECD; “Employment and social developments in Europe addressing labour shortages and skills gaps in the EU, 2023 annual review”. European Commission.

## 2.4 Expected labour market impacts of the GDIP

The impact assessments of both the NZIA and CRMA are sparse in details on their respective labour market impacts, despite both naming labour and skills shortages as a key risk.<sup>54</sup> The CRMA impact assessment admits that it is currently not feasible to assess the number of jobs created and provides a best estimate of 3,840 direct jobs at least, and 110,000-165,000 direct and indirect jobs in the best case. It does also provide an overview of the sectors that would be affected. The NZIA goes one step further and includes an overview of the expected labour market impacts for three different scenarios (Table 2.2). However, in the assessment itself, the Commission also refers to the potential for job creation in hydrogen (up to 440,000) and carbon capture and storage technologies (up to 170,000). Furthermore, it should be noted that, at the time of writing, negotiations are still ongoing for which technologies should be eligible for the NZIA.

Combining the estimates for both the NZIA and CRMA in the impact assessments, the GDIP could result in 1-1,2 million jobs created, or an increase of around 4% of the current workforce employed in manufacturing excluding construction in the 27 EU member states.<sup>55</sup> It is also almost five times

as many as the around 260,000 workers that are currently employed in extracting and refining of fossil fuels. If it is assumed that a Net-Zero economy includes phasing out fossil fuels, and the labour market impact assessments of the GDIP are correct, a 740,000-940,000, or 2-3% increase in manufacturing employment would be expected. While this falls within the earlier mentioned range of -0.3-1.2% change in the total workforce, it should be noted that none of the NZIA and CRMA policies are mentioned by these estimates as the main drivers of employment change. It should therefore be seen as additional growth in labour demand.

*“The most significant labour market challenge highlighted in both impact assessments is overcoming labour shortages.”*

The most significant labour market challenge highlighted in both impact assessments is overcoming labour shortages to achieve their targets. All these positions would need to be filled by qualified workers at the location of the production facilities. Apart from the net-zero academies, no mention is made of how this could be done. To support policymakers at all levels to facilitate this transition, a detailed breakdown is therefore needed at regional, sectoral and skill levels to understand the expected changes to the labour market as a

**Table 2.2. NZIA labour market impact assessment until 2030.** <sup>56</sup>

Technology	Status quo		NZIA policy proposal		NZIA+ scenario	
	Additional jobs (in thousands)	Investments in skills (million euros)	Additional jobs (in thousands)	Investments in skills (million euros)	Additional jobs (in thousands)	Investments in skills (million euros)
Wind	31	270	31	270	40	353
Solar PV	<1	3	25	223	66	578
Heat pump	28	243	28	243	60	529
Battery cell	139	1,214	261	2,284	294	2,578
Electrolyser	0	0	5	41	7	59
<b>Total</b>	<b>198</b>	<b>1,730</b>	<b>350</b>	<b>3,062</b>	<b>468</b>	<b>4,097</b>

**Source:** “Investment needs assessment and funding availabilities to strengthen EU’s net-zero technology manufacturing capacity”. European Commission.

result of the GDIP given future uncertainty, and if any complementing labour market policies would be effective.

To provide relevant information to policymakers on the labour market effects of the GDIP, this policy study explores these effects and potential labour market policies for four case regions. For this, the above labour market impact assessment needs to be translated into inputs that the SEER modelling tool being used can understand.

## 2.5 Exploring the labour market impacts of the GDIP on the selected case regions with the SEER modelling tool

The experimental setup consists of three parts. Firstly, a baseline analysis is made that does not include the GDIP or labour market policies. It does include a reduction in labour demand for coal mining to decrease to zero by 2040 linearly, in line with net-zero targets. Next, the impact of the GDIP is examined for three scenarios: low; medium; and high policy impacts (Table 2.3). Finally, two types of labour market policies are explored that could be employed to alleviate the disruptive effects of the GDIP. The results are presented at three levels: baseline; the effects of the GDIP for the high-impact scenario; and the impact of labour market policies

on the GDIP for the high-impact scenario. Each scenario is run ten times to account for uncertainty, and the results include the average of these ten runs, as well as the 25-75% quantiles, which cover the middle 50% of the outcomes of the runs.

Two labour market policies are explored, as shown in Table 2.4. The first consists of improving within-region labour mobility, either by facilitating job switching between sectors within the same region or to a different sector in the same region. The second labour market policy involves support to move to a different region. All transitions are based on skill matching, meaning that the worker is only eligible for jobs with a similar skill level as their previous employment. The percentage value for each of the steps in the baseline is the “normal” value; with P1, both values related to within-region labour mobility are at the maximum of 100%, while with P2 this is the case for relocation.

This chapter has thus provided the required inputs for a labour market analysis of the selected Just Transition regions by the SEER model in the context of the GDIP and possible complementing labour market policies. The next chapter proceeds with a detailed analysis of the case study regions and the results of the SEER policy impact exploration.

**Table 2.3. GDIP labour market changes input into the SEER model.**

Industry/scenario name	Low	Medium	High
<b>B7</b> Mining of metal ores	+10%	+20%	+30%
<b>C24</b> Manufacture of basic metals	+20%	+35%	+50%
<b>C25</b> Manufacture of fabricated metal products, except machinery and equipment	+25%	+35%	+50%
<b>C26</b> Manufacture of computer, electronic and optical products	+0%	+1%	+3%
<b>C27</b> Manufacture of electrical equipment	+10%	+20%	+24%
<b>E38</b> Waste collection treatment and disposal activities and materials recovery	+20%	+40%	+60%
<b>E39</b> Remediation activities and other waste management	+20%	+40%	+60%

**Table 2.4. Labour market policies.**

Policy name/policy lever	Same sectoring	Re-sectoring	Relocation
<b>P0</b> Baseline	50%	25%	10%
<b>P1</b> Improve within-region labour mobility	100%	100%	10%
<b>P2</b> Support relocation	50%	25%	100%

# GREEN ENERGY

INNOVATION  
AND  
SUSTAINABILITY



RENEWABLE

GREEN ENERGY  
(RENEWABLE)



---

# **3. CASE STUDIES**

---



# 3. CASE STUDIES

The following case studies have been selected to provide a comprehensive overview of the types of challenges that Just Transition regions are facing, and to explore how the GDIP could impact their respective labour markets. Furthermore, based on the above-described labour policies, the potential of such policies to support these regions and maximise the benefits of the GDIP are explored.

The four case studies include two single regions and two regional combinations, selected for their geographical spread and socio-economic diversity, and for the regional combinations, their vicinity to regions with similar challenges. All regions are Just Transition regions, and used to be or still are the mining and industrial heartlands of their respective countries. The selected regions are Hainaut (BE), north-western Spain (Asturias and Castilla y Leon), the border regions of Moravia-Silesia (CZ) and Silesia (PL), and Övre Norrland (SE).

Each region has been studied based on expert interviews, as well as data and literature analyses.<sup>57</sup>

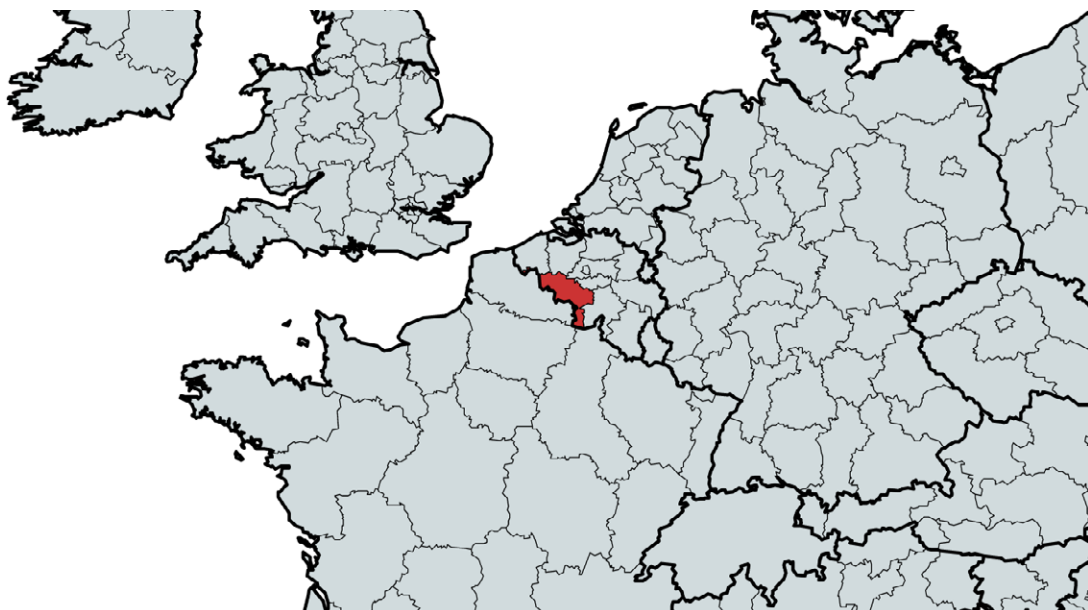
The experts are either regional policymakers or academics specialised in the specific region. The data originates from Eurostat and national statistical agencies and is complemented by a review of each region's territorial Just Transition Plan (TJTP).

The case studies are structured as follows: the introduction provides an overview of the regional context, including an overview of green transition industries, the labour market, a review of the TJTPs and the challenges each policymaker faces. The second part of the case study discusses the results of the model exploration of the potential impacts of the studied GDIP and labour market policies, as well as the baseline under which no policy is implemented.

## 3.1 Case study 1: Hainaut (Belgium)

Hainaut was Belgium's richest region based on its coal mining and heavy industries, but currently ranks near the bottom of national per capita GDP.<sup>58</sup> Nevertheless, it is in the middle of a promising

Figure 3.1. Hainaut (Belgium)



transition, with strong and growing sectors like life sciences, particularly biotechnology and pharmaceuticals, leading the way. Its strategic location has also fuelled growth in logistics and transportation, and the region is well integrated with the French and Flemish border region through the Eurometropole Lille-Kortrijk-Tournai cooperation. The region's perceived attractiveness is shown by its healthy population growth of 3.6%, although this is lower than the Belgian average (see Table 3.1).

The region has an about average share of employment in manufacturing, excluding construction, compared to Belgium as a whole. However, this is down from a much higher level, with coal mining and related industries having almost disappeared, and manufacturing employment on a gentle decline. The region has strong employment in the manufacturing of electrical equipment and has innovative businesses related to advanced materials and green buildings. Next to biotech, it is well-positioned to explore future avenues in greenhouse gas capture, sustainable materials and biofuels.<sup>59</sup>

The green transition remains a double-edged sword for the region. The development of GDP-related sectors is well suited to the existing industrial infrastructure and skills of Hainaut and hold great potential. This is amplified by the development of a battery valley across the border in Hauts-de-France, and a burgeoning wind industry being developed to tap the North Sea's power, which could be complemented with clean hydrogen infrastructure. The transition, on the other hand, poses risks to traditional manufacturing sectors, such as steelmaking, and would require significant investments to upgrade Hainaut's ageing infrastructure.<sup>60</sup>

From a social perspective, it is a diverse region, spreading from the wealthy suburbs of Brussels in the east to the poorer border region with France in the west. The key labour challenges are manifold, with short-term, long-term and youth unemployment over twice the national averages. With participation rates also almost 10% below national averages, it comes as no surprise that over 30% of the population is at risk of poverty or social exclusion. Even so,

**Table 3.1. Key regional indicators.**

	Hainaut	Belgium
GDP (in millions)	€36,940	€502,312
Share of national GDP (%)	7	
Average annual GDP growth rate 2012-2021 (%)	2.21	2.66
GDP per capita	€27,300	€43,300
Manufacturing (excluding construction) employment as share of total (%)	12.1	11.4
Participation rate (%)	62	71
Female participation rate (%)	57	67
Unemployment rate (%)	10.5	5.6
Youth unemployment rate (%)	36.3	16.4
Long-term unemployment (%)	5.8	2.3
Job vacancies (%)		4.5
Persons at risk of poverty or social exclusion (%)	30.2	18.7
Crud rate of total population change (%)	3.6	5.4

**Sources:** "Structural business statistics", "National accounts", "Demography, population stock & balance", "EU statistics on income and living conditions" and "European labour force survey". Eurostat.

Belgium has one of the highest vacancy rates in the EU, especially in Flanders, and businesses on both sides of the language divide complain of a lack of skilled labour.<sup>61</sup>

*“The biggest challenge for Hainaut is re-integrating communities with concentrated structural long-term unemployment and providing them with the necessary skills and confidence to participate in the labour market.”*

The biggest challenge for Hainaut is re-integrating communities with concentrated structural long-term unemployment and providing them with the necessary skills and confidence to participate in the labour market. In particular, including young, elderly, female and low-skilled citizens is difficult. While upskilling the workforce is a regional priority, only a small share of workers are currently in training.<sup>62</sup> Given the availability of jobs in the region, and especially in neighbouring regions that are within the distance of a driving commute, the benefits for both workers and Hainaut could be considerable.

Wallonia’s TJTP, which includes Hainaut’s major urban areas, Tournai, Charleroi and Mons, address all the above-mentioned challenges. They also include measures to improve the region’s public transport, cycling and walking infrastructure, as well as measures to support the greening of companies and buildings, the restoration of polluted industrial areas, and support for innovative businesses, especially SMEs. While it offers a comprehensive approach to facilitating a transition, and mixing Just Transition funds with regional, federal and other European funds, the distribution of funding does not reflect the relative priority of challenges. Whereas most funding is allocated to support businesses with greening, or to support nascent green industries, a larger share could have been reserved for including those outside of the labour market.<sup>63</sup>

### 3.1.1 Model exploration

Based on the model results for Hainaut, it can be observed that complementing the GDIP with labour

market policies seems to be a no-regret option, although with limited effect given uncertainty. As can be seen from the employment data in Figure 3.2, it decreases slightly when no policies are implemented, while it stabilises under the GDIP, and increases when complemented by the labour market policies. By 2035, the combination of GDIP with labour market policies is also above the 75% quantile of the baseline, indicating that the effects are likely to be positive even when accounting for uncertainty.

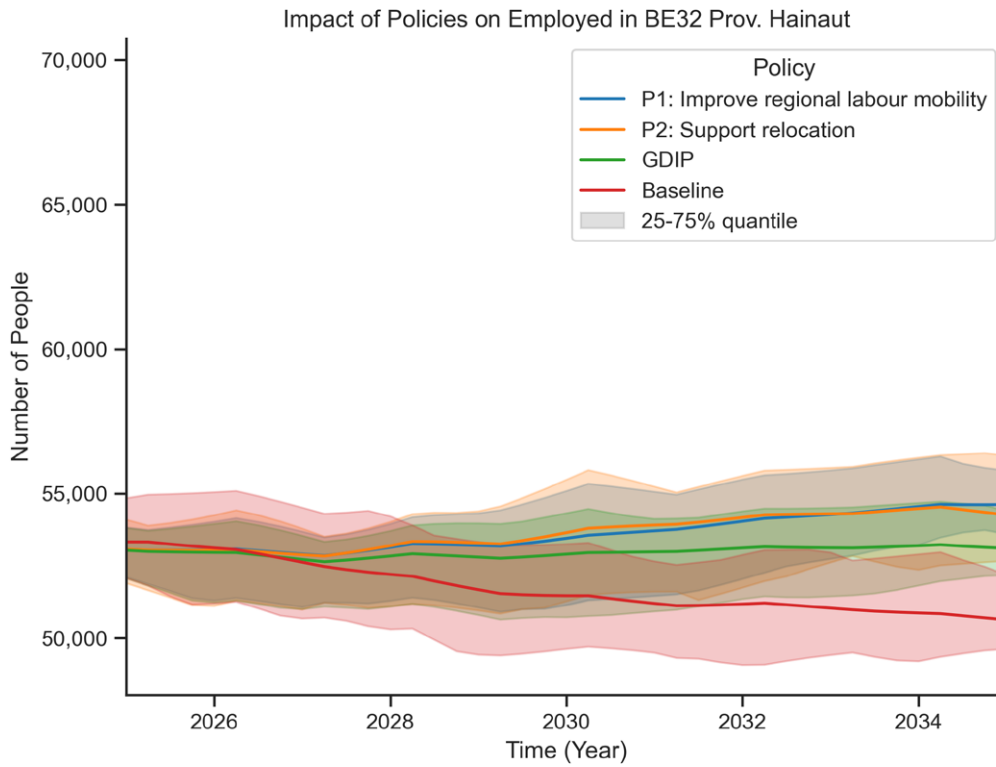
This effect is even more clearly observable for unemployment (Figure 3.3), where GDIP would lead to a small but relatively certain decrease in unemployment, and this effect is even stronger when complemented with labour market policies.

For workforce shortages, the expected increase as a result of GDIP would be neutralised by adding labour market policies, as shown in Figure 3.4. However, such policies would not reduce the workforce shortage to below the baseline.

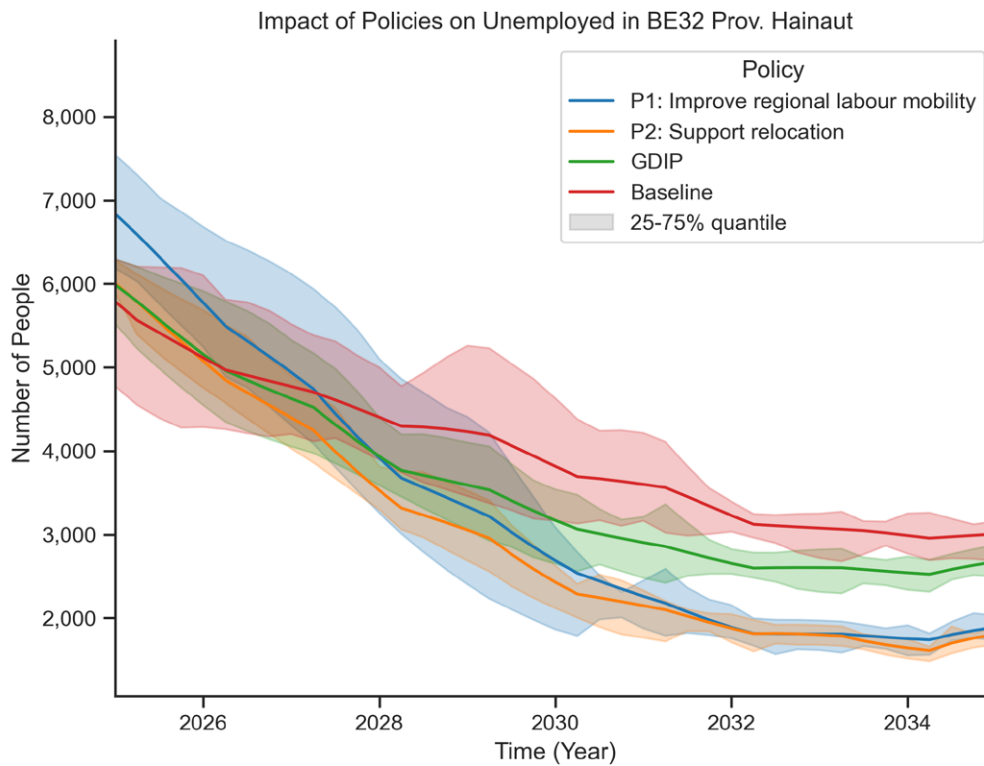
While these results are an exploration of plausible futures, the dynamics that are exhibited provide some useful insights for policymakers. Firstly, we find little evidence that jobs are leaving the region based on the baseline results, as seen by the combination of lower unemployment and increase in workforce shortages with a reduction in the number of employed. GDIP and the green transition more broadly will likely only have very localised effects, but at the regional level its effect should be small. The degree to which technological change will impact the region cannot be derived from Figures 3.2-3.4.

Furthermore, it seems that supporting within-region labour mobility slightly, but within the boundaries of uncertainty, outperforms supporting relocation, confirming that it is not the lack of local jobs that is the issue, but rather local barriers to labour mobility need to be overcome. Lastly, the studied labour market policies are insufficient to decrease labour shortages compared to the baseline, and thus, more ambitious labour market policy options could be considered if business concerns are to be addressed.

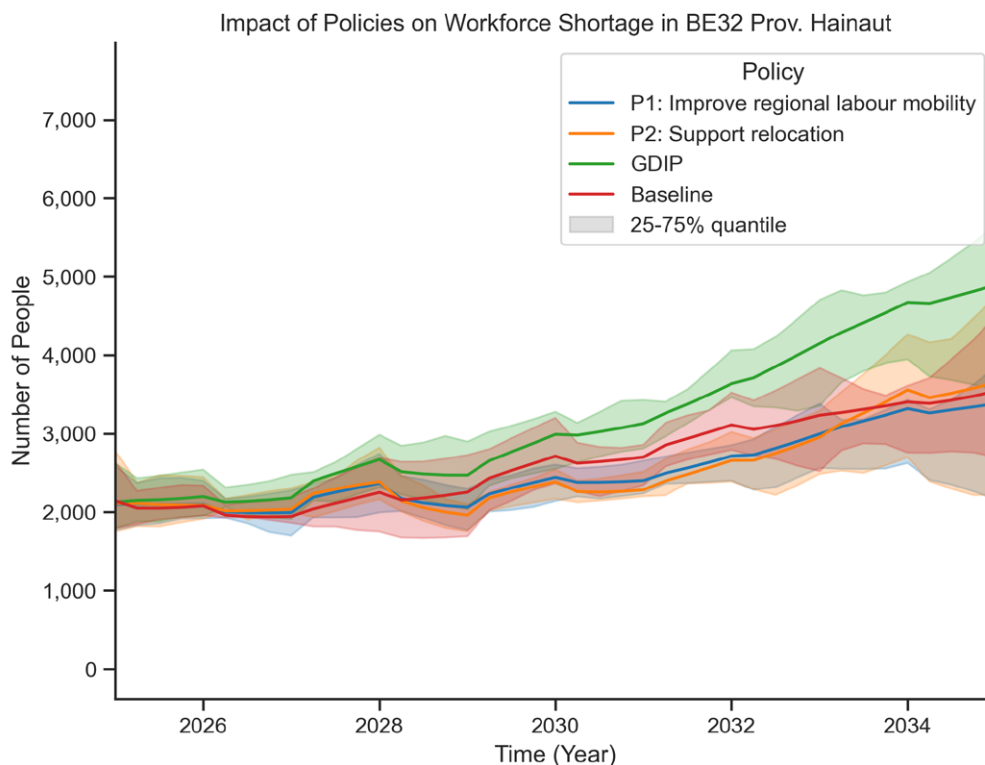
**Figure 3.2. Impact of policies on number of employed in Hainaut (2025-2035).**



**Figure 3.3. Impact of policies on number of unemployed in Hainaut (2025-2035).**



**Figure 3.4. Impact of policies on workforce shortages in Hainaut (2025-2035).**



### 3.2 Case study 2: Asturias and Castilla y León (Spain)

While Asturias and Castilla y León as a whole have quite different socio-economic profiles, northern León shares Asturias' mining and industrial heritage, and its status as a Just Transition region.<sup>64</sup> Both regions are very close to the Spanish average, with regard to per capita income, and only account for a minor share of its GDP, as can be seen in Table 3.2. They are, however, key regions for the Spanish green transition, not only because of the Just Transition, but also because they hold great potential for GDIP technologies related to wind energy, batteries and hydrogen. Furthermore, Castilla could become a leader in sustainable and drought-resisting farming.<sup>65</sup>

The biggest socio-economic challenge by far is the decline in population, especially in the form of youth drain, which is much higher than the Spanish average. Consistently high youth unemployment rates are the likely main cause, especially the rate

for Asturias is a European outlier. Solving the lack of quality employment is therefore the regional authorities' highest priority.

For most other socio-economic indicators, Castilla y León is close to or outperforms the national average, while Asturias is slightly below. Both regions are considered to be pleasant to live in, with relatively good public services, especially in urban areas, whereas especially public transport in rural areas is lacking. Despite the quality of life, as a result of high unemployment rates and lower than average participation rate in Asturias, over 20% of the population are at risk of poverty. Also, as a result of youth drain, both regions are amongst the oldest in Europe, with a median age of around 50.

Regarding local manufacturing, both regions are in transition. On one hand, supported by the national and EU Just Transition programmes, coal mining has been almost completely phased out, with most of the coal miners finding replacement employment in other manufacturing jobs, or around restoring

**Figure 3.5. Asturias and Castilla y León (Spain)**



the former coal mines.<sup>66</sup> While policymakers are no longer worried about transitioning away from coal, they are concerned with the potential effects of the green transition on steelmaking in both regions and car production, which is one of Castilla y León's strongest sectors. At the same time, they are confident that their existing industrial and manufacturing infrastructure forms a strong base to expand the green technologies mentioned earlier.

Furthermore, based on patent application data, they show potential for regional collaboration to develop nascent technologies, such as marine energy and advanced materials, while geothermal and hydropower could also be relevant given their geological characteristics.<sup>67</sup>

*“The Spanish Just Transition plans are an exemplary case for how to approach such plans in a comprehensive and holistic manner.”*

The Spanish Just Transition plans are an exemplary case for how to approach such plans in a comprehensive and holistic manner. Apart from providing transition support for local businesses

and workers in mining industries, the local and regional authorities engaged with multiple social partners and communities to create transition pathways together that included financially, socially and environmentally sustainable employment opportunities. That this approach has been successful was confirmed by the recent report by the Spanish government that as many jobs were created as there were coal miners in the region at the time of programme implementation.<sup>68</sup> Nevertheless, the limits to well-designed Just Transition programmes are also made clear by the Spanish case, as there is still a regional scarcity of quality jobs, especially for the young.

For the regions to thrive, interregional cooperation combined with diversifying regional policies shows potential. Partnerships with international firms, academic institutions and other governmental bodies play a crucial role in this diversification. For instance, collaboration in vocational education and reskilling programs can provide the workforce with the skills needed for new industries.<sup>69</sup> Asturias has shown interest in developing its maritime economy, while Castilla y León is focusing on leveraging its agricultural heritage to tap into sustainable

**Table 3.2. Key regional indicators.**

	Asturias	Castilla y León	Spain
GDP (in millions)	€23,442	€58,119	€1,206,842
Share of national GDP (%)	2	5	
Average annual GDP growth rate 2012-2021 (%)	0.93	0.95	1.59
GDP per capita	€23,200	€24,400	€25,500
Manufacturing (excluding construction) employment as share of total (%)	12.8	14.2	11.4
Participation rate (%)	69	75	74
Female participation rate (%)	66	71	70
Unemployment rate (%)	12.7	9.8	12.9
Youth unemployment rate (%)	37.8	26.7	29.8
Long-term unemployment (%)	5.2	3.6	5.0
Job vacancies (%)			0.9
Persons at risk of poverty or social exclusion (%)	25.3	22.1	26.0
Crude rate of total population change (%)	-6.6	-4.2	0.7

**Sources:** “National accounts”, “Demography, population stock & balance”, “EU statistics on income and living conditions”, “European labour force survey” and “Structural business statistics”. Eurostat.

farming and food technology sectors. While the focus on creating new jobs is justified, the quality of employment, ongoing skills development and social inclusion measures should also be integral parts of the strategy.

### 3.2.1 Model exploration

The Spanish model results show very similar dynamics for both regions, with benefits to employment and unemployment for the studied policies, and a trade-off regarding the two labour market policies.

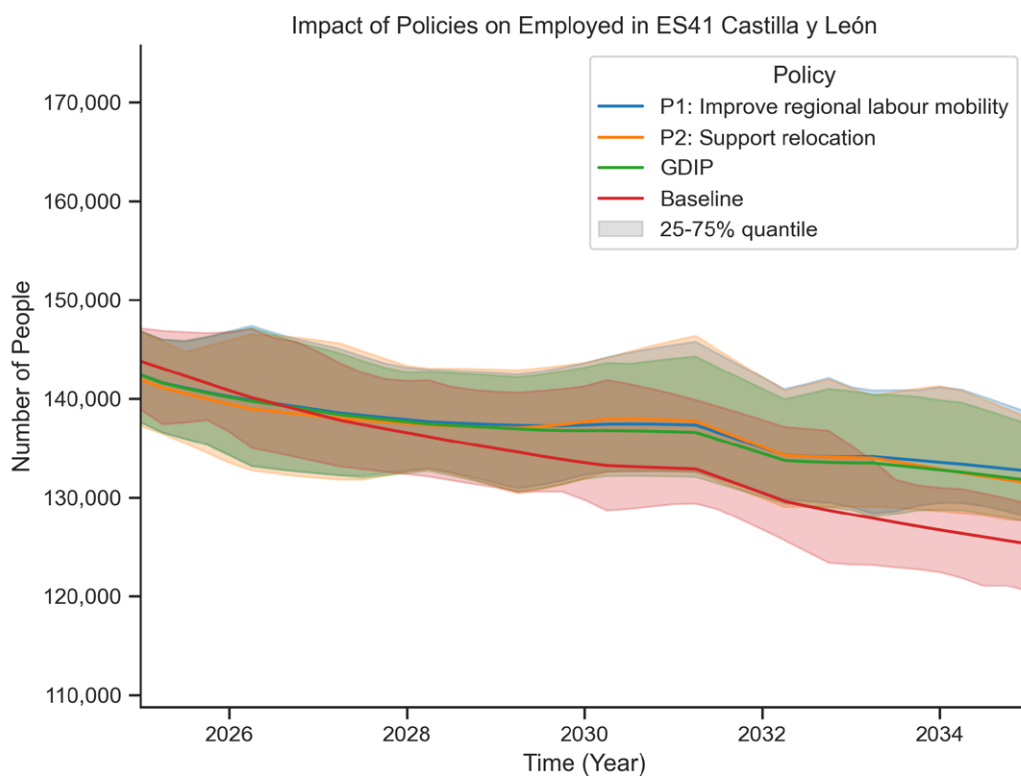
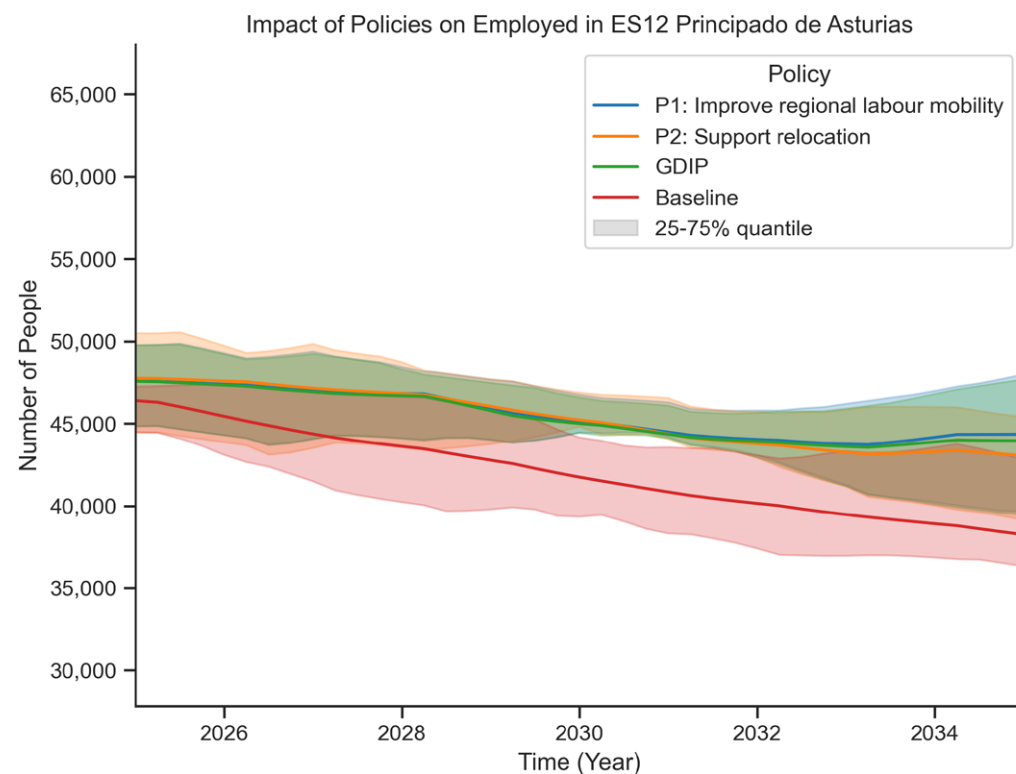
The employment data in Figure 3.6 shows a slight decrease in employment under the baseline for both regions, while under GDIP it almost stabilises. Labour market policies do not make an observable impact on employment compared to the GDIP. By 2035, there is still some overlap between the spread of

possibilities between baseline and GDIP, indicating that the effects are within the range of uncertainty.

For unemployment, a different picture emerges in Figure 3.7. GDIP and supporting within-region labour mobility would decrease unemployment, but within the quantile. The labour market policy of supporting relocation is to decrease unemployment to outside the baseline quantile. This indicates that supporting relocation compared to improving within-region labour mobility could be a more effective policy if the aim is to reduce unemployment.

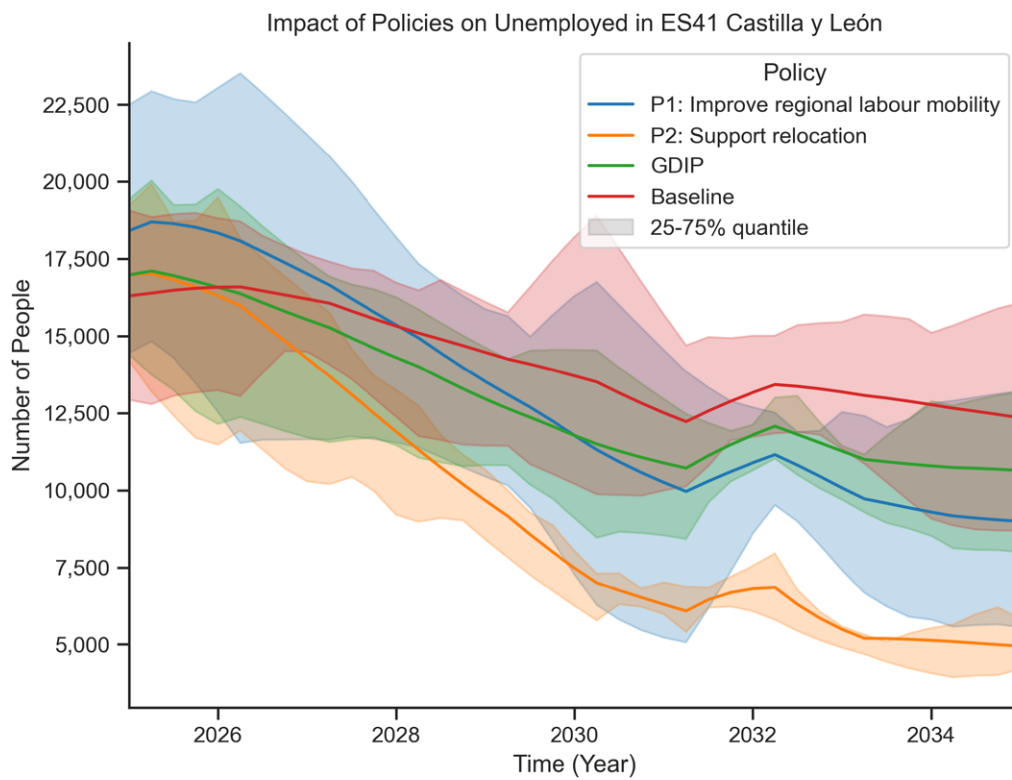
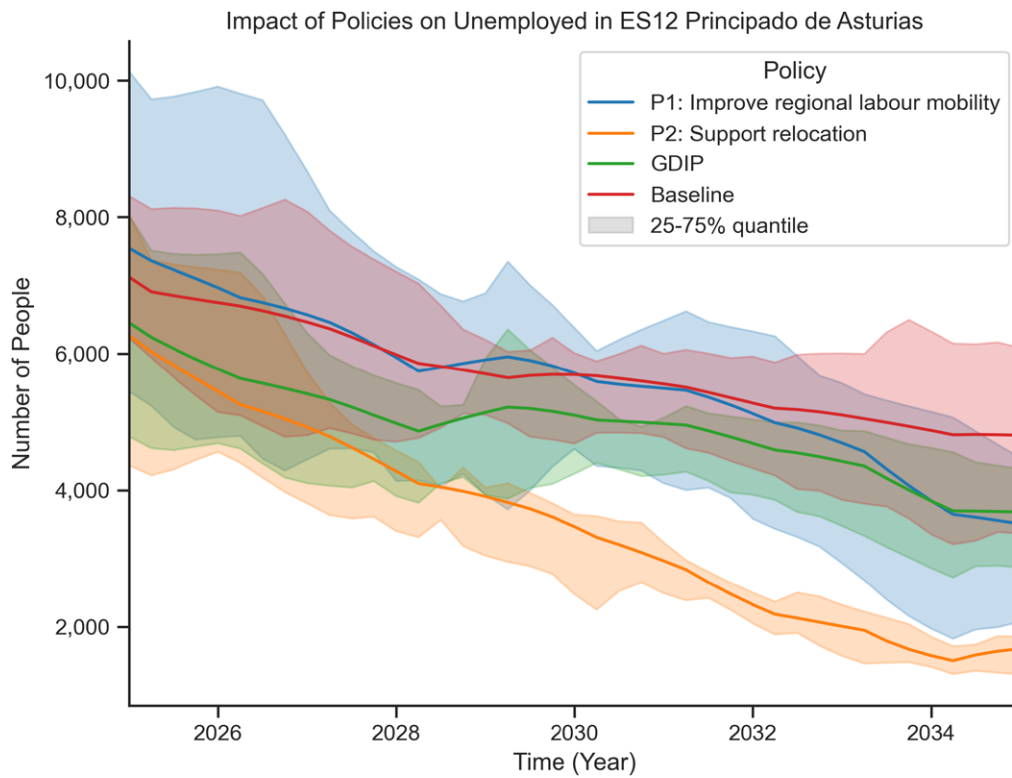
The cost of supporting relocation however becomes clear in figure 3.8 as it increases workforce shortage above the level under the GDIP. In contrast, improving within-regional labour mobility would reduce workforce shortage to within the baseline quantile for the baseline, effectively neutralising the effects of the GDIP.

**Figure 3.6. Impact of policies on number of employed in Asturias and Castilla y León (2025-2035).**

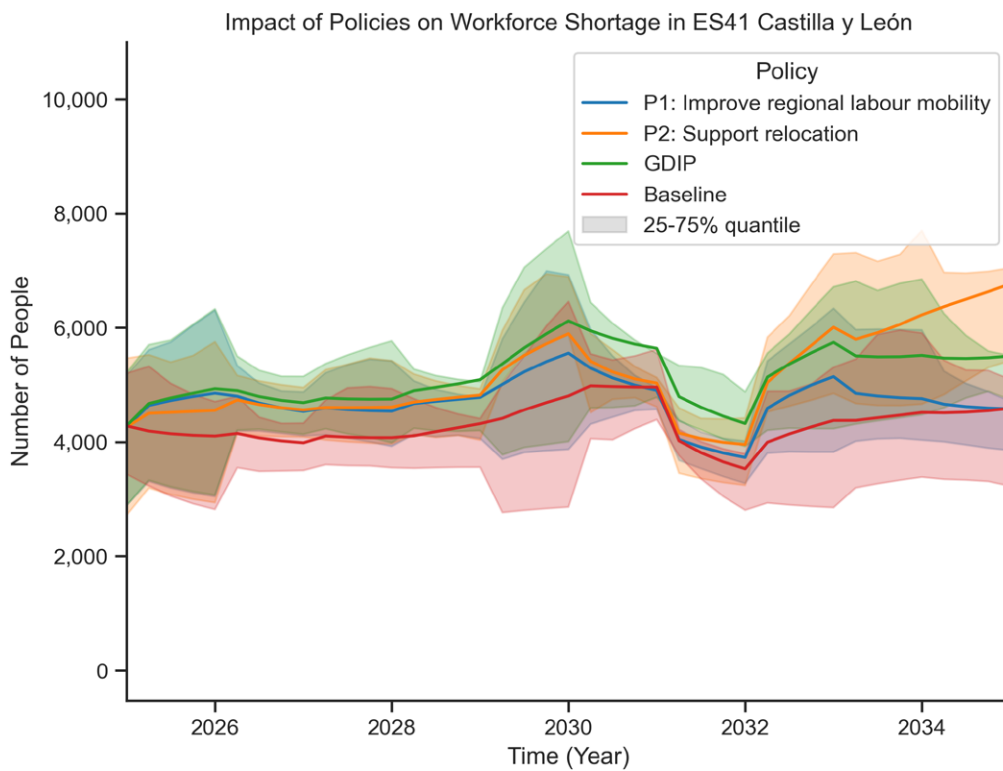
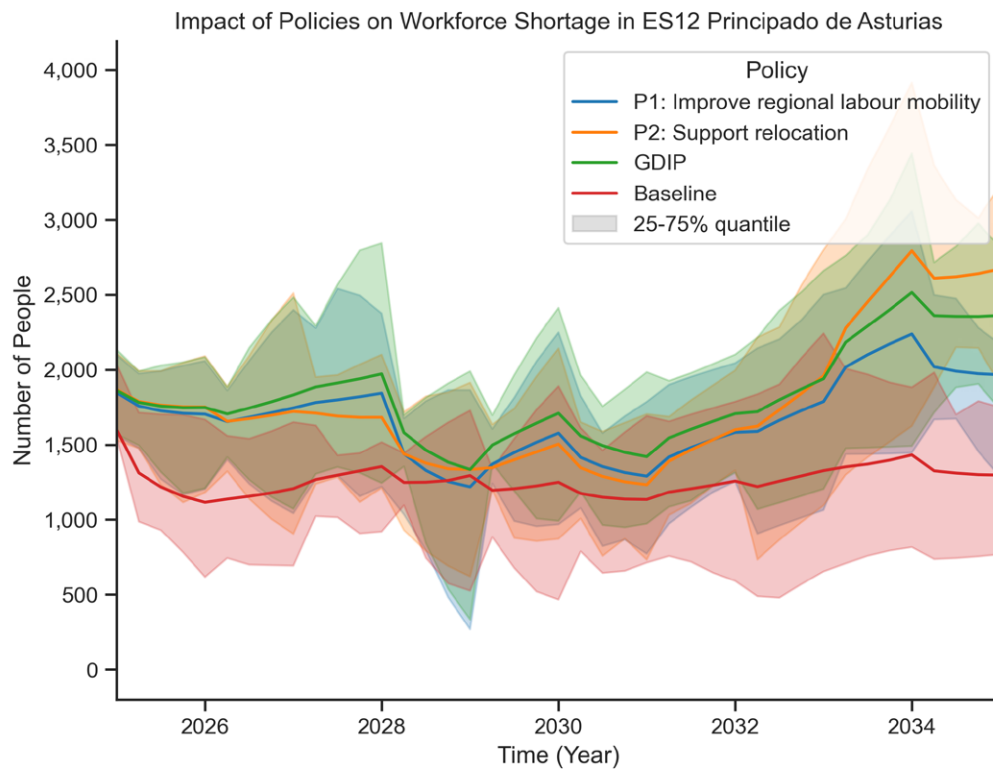




**Figure 3.7. Impact of policies on number of unemployed in Asturias and Castilla y León (2025-2035).**



**Figure 3.8. Impact of policies on workforce shortages in Asturias and Castilla y León (2025-2035).**



These results show that for local policymakers in north-western Spain, there is no single optimal policy. Improving within-region labour mobility could help local businesses and reduce workforce shortages; however, supporting relocation could lead to a larger decrease in unemployment, benefiting manufacturing workers. Figures 3.6-3.8 also show that the GDIP and complementing labour market policies are insufficient for tackling the various challenges the regions are facing by themselves, indicating that more ambitious packages are warranted.

What can also be derived from the results is that demographic change will be a driver of change, as both unemployment and employment decrease under the baseline. This is further corroborated by the high median age of the population. While the effects of the green transition are likely to continue to be locally concentrated, technological change effects are likely to be diffuse and uncertain.

### 3.3 Case study 3: Moravia-Silesia and Silesia (Czechia and Poland)

Moravia-Silesia in Czechia and Silesia in Poland are adjacent regions that are two of Europe's most

heavily industrialised areas. Historically, their economies have been coal mining centres, and the manufacturing core of their national economies and Central Europe more broadly (see Table 3.3). As a result, they have been amongst the biggest recipients of Just Transition and related funds and possess an industrial ecosystem with great potential for the development of green industries, especially batteries.

Where both regions have slightly lagged their respective countries' average GDP growth between 2012 and 2021, their respective economies are still developing strongly. Logistics, steelmaking, and automotive industries, as well as heavy industry more generally, are the pillars of their shared economy, and Silesia has Europe's largest number of coal miners, at around 70,000.<sup>70</sup> Although most companies in these sectors do not offer knowledge-intensive jobs that can improve regional diversification, the presence of many international firms, especially in Silesia, has led to a burgeoning tech scene. The diversification of their economies is also enhanced by their collective cooperation with the Zilina region across the Slovakian border in the Tritia partnership.

Figure 3.9. Moravia-Silesia (Czechia) and Silesia (Poland)



**Table 3.3. Key regional indicators.**

	Moravia-Silesia	Czechia	Silesia	Poland
GDP (in millions)	€21,184	€238,249	€68,692	€574,772
Share of national GDP (%)	9		12	
Average annual GDP growth rate 2012-2021 (%)	2.85	3.89	3.45	4.08
GDP per capita	€17,700	€22,300	€15,400	€15,100
Manufacturing (excluding construction) employment as share of total (%)	32.8	28.4	31.5	23.4
Participation rate (%)	76	77	72	74
Female participation rate (%)	70	70	66	67
Unemployment rate (%)	4.0	2.2	2.2	2.9
Youth unemployment rate (%)	8.9	6.8	8.3	10.8
Long-term unemployment (%)	1.2	0.6	0.6	0.9
Job vacancies (%)		4.2		0.9
Persons at risk of poverty or social exclusion (%)	15.5	11.8	10.5	15.9
Crude rate of total population change (%)	-4.6	2.1	-8.2	-4.9

**Sources:** “National accounts”, “Demography, population stock & balance”, “EU statistics on income and living conditions”, “European labour force survey” and “Structural business statistics”. Eurostat.

In mining, both regions took a different path: Moravia Silesia is on track to close their last coal mine next year, while Silesian coal communities expect that mining will continue until after 2040. This belief was strengthened by the European Commission’s continued inclusion of coking coal on its list of critical raw materials this year, which is the primary product of Silesian coal mines.<sup>71</sup> Although Eurostat shows that employment in the coal sector increased by 3% last year, the overall employment trend is slowly downwards.

With regard to future growth opportunities, an analysis of patent application data shows that the regions offer distinct yet complementary avenues for technological advancement and inter-regional collaboration. Moravia-Silesia currently excels in heating, ventilation and air conditioning systems,

and advanced materials, which offer a strong basis for heat pump manufacturing. Silesia, on the other hand, is home to innovation in drones and recycling technologies and shows potential for biofertilisers and heat pumps. Both regions show a blend of existing specialisations and untapped potential, particularly in sustainable technologies like recycling and energy efficiency.<sup>72</sup> This presents an opportunity for them to deepen their collaboration to strengthen their innovative capacity.

The biggest challenge to this bright future is their shared exposure to youth and brain drain. According to local policymakers, this is mainly driven by a perceived low quality of life in the region. That only the mountainous municipalities with ample natural beauty in both regions see a net growth of the population confirms this observation. Furthermore,

while Moravia-Silesia does have lower average salaries and higher unemployment rates than the rest of Czechia, this is not the case for Silesia, which reports a higher negative population change. The recent cost-of-living crisis, especially the increase in heating costs, is affecting a large share of the population, and is identified as another priority by policymakers, especially in Silesia.

The industrial heritage of both regions is a source of pride, but also the source of a second labour market challenge. New companies in sectors outside the coal and steel industries find it difficult to compete for qualified workers with the high salaries, substantial benefits and social cohesion that these traditional industries can offer. The strong local ties that exist in both regions further complicate the situation, with one study observing that workers in Silesia demand among the highest wage premium to work outside their locality, and this effect was strongest in mining communities.<sup>73</sup> This is observable in unemployment data as well, with neighbouring municipalities having unemployment rates that can diverge by up to 6%. Other labour-market-related challenges for both regions are the relatively low participation rates of women, elderly and the low skilled; re-integrating the long-term unemployed in the labour market; the lack of entrepreneurial activity; and the lack of digital skills.

Lastly, policymakers expressed confidence that the transition from coal mining to other forms of employment would occur once the coal mines were closed. This is mainly due to the high demand for the transversal skills of miners in construction-related jobs in both Czechia and Poland, although they acknowledge the challenge of convincing coal miners to make the change. What is a greater cause for concern in Silesia is the workers in mining-supply industries, who tend to be less skilled. Their biggest worry regarding the green transition is related to the steel and automotive industries, which are responsible for over 120,000 direct jobs in both regions, and many more indirect jobs.

Based on expert interviews, it seems that their respective TJTPs address most of the mentioned challenges. They combine supporting businesses for

the transition with strong investments in education, re-skilling and upskilling. They are considered leaders in the implementation of their plans, due to their experience, professional approach and strong multi-level stakeholder approach. However, it seems that their plans are not focusing enough on the challenges identified locally that are essential for a Just Transition, such as stemming brain and youth drain through improving the quality of life. Furthermore, while co-investments for transitioning are popular with business and deemed a success, especially for larger companies, uptake for re- and upskilling co-investments have lagged behind. A focus on stimulating entrepreneurial activities is also lacking. Lastly, both regions are able to successfully combine the various types of available funding at European and national levels, with cooperation with national authorities being productive in some areas, while difficult in others. In conclusion, both regions offer many valuable lessons for other Just Transition regions at earlier stages in their journey, such as how to combine different sources of funding, and what kind of institutional capacity is needed for this.

*“Both regions identify [interregional] cooperation and collaboration as the key to future success.”*

Overall, both regions identify cooperation and collaboration as the key to future success, on the inter-regional level with Zilina, on national and international levels, between local and international firms with a local presence, and by partnership between these businesses, civil society, research and technologies institutes, training providers, and the public sector. Furthermore, the development of long-term transformation plans that can be integrated with data-driven policy solutions could further support local policymakers to tackle the challenges at hand.

### 3.3.1 Model exploration

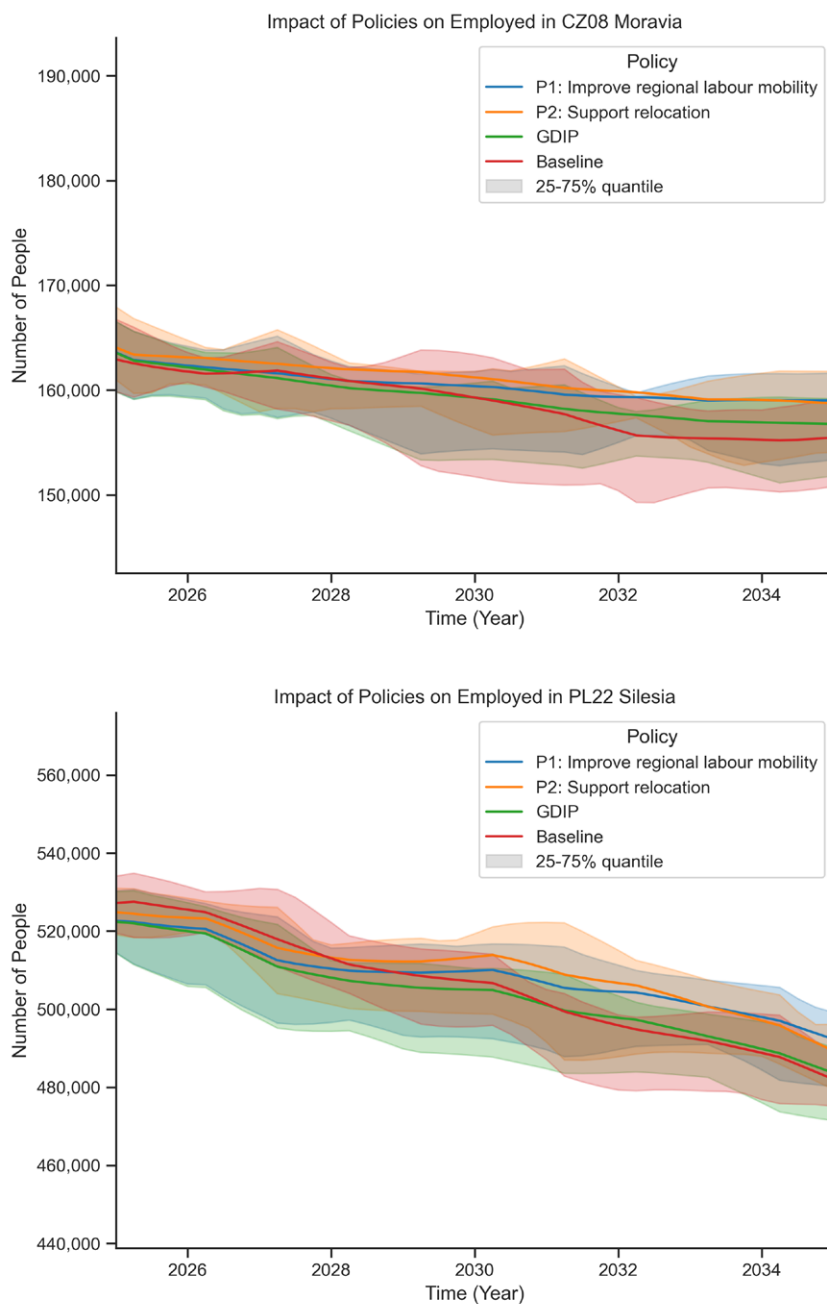
The labour dynamics for Moravia-Silesia and Silesia are very similar, showing their likeness despite being in different countries and with different sizes of labour forces. Both show very limited impact from

the GDIP, while labour market policies can reduce unemployment and have some effect on workforce shortages.

Based on employment data in Figure 3.10, we see a slight decrease in employment for Moravia-

Silesia, and a larger one for Silesia, with GDIP for both regions being within the baseline quantile. Both labour market policies are just outside these boundaries, but it can be concluded that none of the studied policies are likely to have a measurable impact on employment in either region.

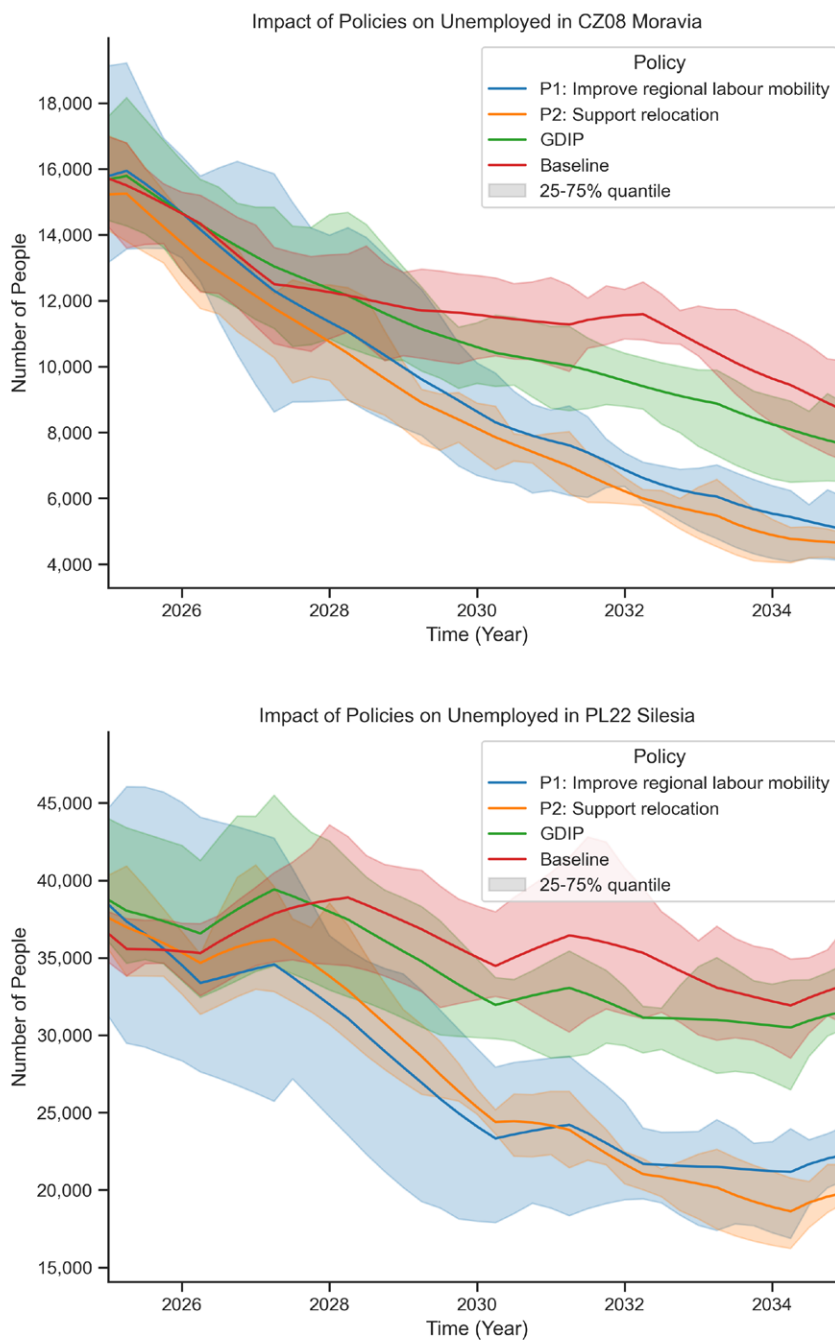
**Figure 3.10. Impact of policies on the number of employed in Moravia-Silesia and Silesia (2025-2035).**



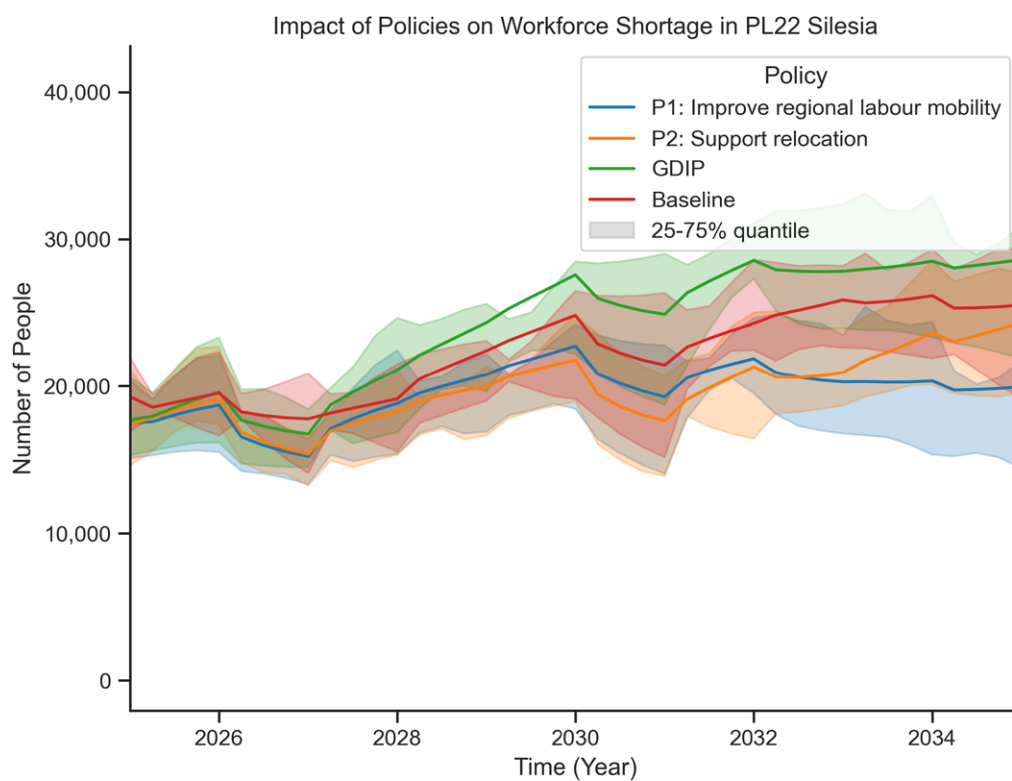
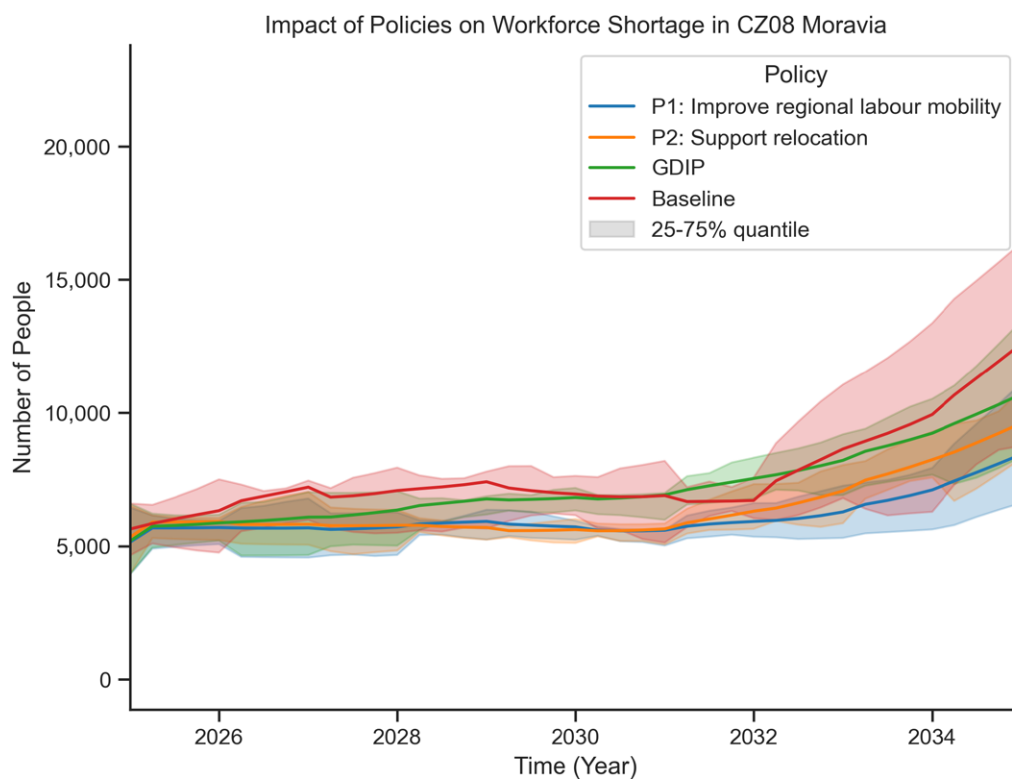
Unemployment, as seen in Figure 3.11, does show measurable impact of both labour market policies, while the GDIP is again within the baseline quantile. What can furthermore be observed is that the model confirms the confidence of miners that they will find other jobs, as the baseline includes a reduction of employment in coal mining by 2040. This means that

during the analysed period, around 40,000 coal miners in the model would need to find new employment in Silesia in the studied period, which does seem to stabilise but not increase unemployment. Both labour market policies do decrease unemployment outside the baseline quantile, with supporting

**Figure 3.11. Impact of policies on the number of unemployed in Moravia-Silesia and Silesia (2025-2035).**



**Figure 3.12. Impact of policies on workforce shortages in Moravia-Silesia and Silesia (2025-2035).**





relocation slightly outperforming improving within-region labour mobility for Silesia.

Workforce shortages show the opposite result for the labour market policies, as shown in Figure 3.12. Improving within-region labour mobility is likely to reduce workforce shortages most, while the impact of supporting relocation is within the uncertainty bounds of the baseline. GDIP also does not seem to have much of an effect on increasing workforce shortages.

Based on this exploration, it is likely that the GDIP will have minimal effects on both regions at the level of the manufacturing sector, while implementing labour market policies could help address some of their socio-economic challenges. What is also clear is that Silesia workforce shortages will continue, even if coal is phased out, if its economic and demographic trends continue as they have so far.

Nevertheless, this data should not be interpreted to indicate that there will be disruption in these regions as a result of the green transition. Instead, it is likely that such a transition will have highly localised effects, which are not visible in the data at regional and sectoral levels. Further research is therefore needed to corroborate this hypothesis and guide

policymakers' efforts in ensuring this transition is just.

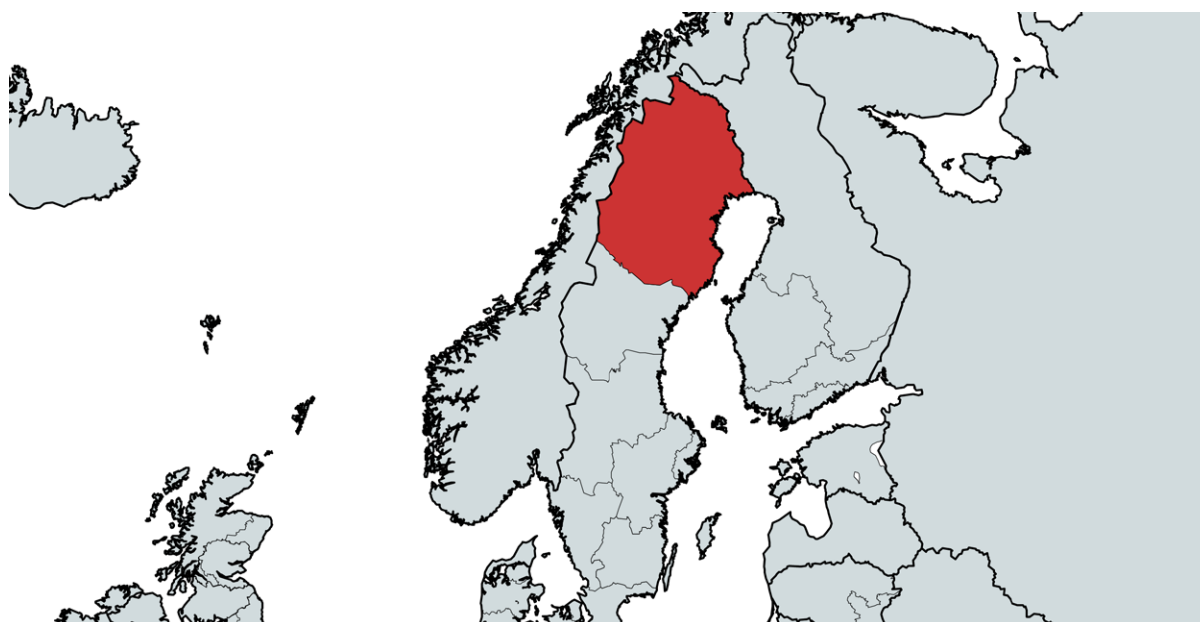
### 3.4 Case study 4: Övre Norrland (Sweden)

Övre Norrland in Sweden has a strong mining and industrial heritage and could become one of Europe's leading green industrial regions. The region has historically leaned on mining, particularly iron ore, steelmaking and renewable energy production, notably hydroelectric power.<sup>75</sup> While the recent discovery of the largest deposit of rare earths in Europe will likely lead to a mining boom, the biggest increase in employment is expected in the battery, electric vehicle and power industries, according to local experts, with green steel also mentioned as a potential growth industry. Finding the workers to realise these dreams is clearly the biggest challenge for this region.

*“Local authorities expect somewhere between 50 and 100% increase in the local labour force over the next 20 years to reach about 400,000 workers.”*

Local authorities expect somewhere between 50 and 100% increase in the local labour force over the next 20 years to reach about 400,000 workers. Of

Figure 3.13. Övre Norrland (Sweden)



this 100-200,000, around 50,000 could be employed permanently in the various manufacturing industries, while the rest would be needed in the construction of public infrastructure and the provision of public services, such as health care and education. With the high labour participation rates shown in Table 3.4, the region and its employers have been actively recruiting in the rest of Sweden and abroad.

Despite knowing what needs to be done, policymakers find themselves in a fiscal straitjacket, only able to allocate resources based on the current regional tax income, making infrastructural investments for future growth a difficult proposition. Specialised roles, like those in steel mill construction, can draw expertise from outside the region temporarily, but the majority of jobs require workers to be physically present, creating another layer of complexity in planning for future growth.

To attract foreign talent, it is essential that regional authorities are able to provide high-quality public services to increase the quality of life, especially given the challenging circumstances of the polar winter.<sup>76</sup> Public resources are also constrained due to local socio-economic challenges, including caring for the elderly and a relatively high share of people at risk of poverty in remote areas. Another challenge for local policymakers is how to expand mining activities whilst adhering to the strictest environmental and social standards, as well as respecting the historic rights of the indigenous Sami communities.

Other socio-economic challenges are related to low-skilled workers, who make up 15% of the workforce and face a high unemployment rate of 20%. This suggests a potential misalignment between the jobs available and the skills possessed by this segment of the population. It could also indicate that lower-skilled workers live in remote areas with weak

**Table 3.4. Key regional indicators.**<sup>74</sup>

	Övre Norrland	Sweden
GDP (in millions)	€27,911	€537,085
Share of national GDP (%)	5	
Average annual GDP growth rate 2012-2021 (%)	2.19	2.25
GDP per capita	€53,300	€51,600
Manufacturing (excluding construction) employment as share of total (%)	13.8	12.5
Participation rate (%)	82	84
Female participation rate (%)	80	81
Unemployment rate (%)	5.1	7.5
Youth unemployment rate (%)	17.8	21.7
Long-term unemployment (%)		1.9
Job vacancies (%)		2.6
Persons at risk of poverty or social exclusion (%)	16.5	18.6
Crude rate of total population change (%)	2.8	7.0

**Sources:** “National accounts”, “Demography, population stock & balance”, “EU statistics on income and living conditions”, “European labour force survey” and “Structural business statistics”. Eurostat.

transport links. Furthermore, Övre Norrland's older population poses its own set of challenges and opportunities. While many retirees would be open to (part-time) work given the right circumstances, current organisational structures are not equipped to accommodate their needs or wishes. On the other hand, many more are in need of some form of care, while the influx of employees from elsewhere is putting extra strain on its health care system.

Övre Norrland's TJTP is heavily focussed on supporting companies with the transition to cleaner production methods, which makes it very interoperable with proposed green industrial policies. However, it seems that the national government lacks a focussed approach for specific regions, but rather supporting a broader geographic area with the green transition of businesses. Its focus on businesses also comes at the expense of addressing the root causes of the lack of infrastructure and public services to accommodate the desired increase in the workforce. This can be partly explained by current requirements for Just Transition plans to focus on established industries and sectors at risk of the transition. In this particular case, the biggest challenge for regional authorities is how to facilitate the growth of expanding industries, which, in turn, would benefit the region as a whole. The case could therefore be made that Just Transition support should also be made available to support such interventions that benefit green industries.

Looking ahead to 2040, Övre Norrland's economic prospects appear promising but hinge on it managing to become an attractive location for foreign talent to relocate to, without degrading public services for the existing population. To surmount these challenges, Övre Norrland is focusing on multi-tiered collaborations. Partnerships with neighbouring regions and international entities are already in place, aiming to share best practices and pool resources. Cooperation extends to local industries and educational institutions for skills development and re-skilling initiatives, aimed specifically at youth and low-skilled workers. Longer-term economic sustainability is being looked at through diversification into sectors like technology and IT.

### 3.4.1 Model exploration

Unfortunately, the model is not able to adjust changes in demand on the regional level, just on the sectoral level. The model results therefore showed a rate of increase in employment, decrease in unemployment and increase in workforce shortages proportionate to the other regions, which under normal circumstances might have been the likely outcome. However, given the expectation of local authorities and experts that a disproportionate share of the new jobs created at the European level will be located in Övre Norrland, these results are highly unlikely. Therefore, these are not included in this report, as they do not contain relevant information for policymakers working on these challenges.

---

# **4. COMPARATIVE ANALYSIS**

---

## 4. COMPARATIVE ANALYSIS

The analysis of the selected Just Transition regions shows that they are navigating a complex landscape of economic transition, sustainability goals and labour market challenges. Each offers a unique set of opportunities and hurdles, shaped by its history, resources and current policies. Their experience of the transformation underway enriches our understanding of Europe’s economic fabric. The role played by social, environmental and political complexity in constituting this fabric further underlines the need for future research to adopt a broad-based understanding of societal interdependencies. Indeed, all regions mentioned the added value of learning from their peers, and the need to identify shared challenges and organise a common response.

The following chapter therefore provides a comparative analysis of the case study regions,

based on the interviews, data analysis and model exploration. This forms the basis for the subsequent section on implications and recommendations for policymakers.

### 4.1 Challenges and opportunities of the studied Just Transition regions

Engagements with local policymakers and experts yielded valuable insights into the complexities of the Just Transition of their respective regions. While no region has yet found the optimal process, and all face considerable challenges, optimism abounded, strengthened by the conviction that their regions would be able to achieve a Just Transition.

All regions share a strong mining and industrial tradition but show distinct development paths for

**Table 4.1. Overview of regional socio-economic challenges with the highest relevance, per region.**

	Hainaut	Ast & CyL	M-Sil & Sil	Ö-Norrland
Ageing	High	High	High	High
Cost-of-living crisis	High	High	High	High
Low participation rates	High	High	High	Low
High unemployment	High	High	Medium-S	Low
Lack of quality employment	Medium	High	Medium	Low
Youth & brain drain	Medium	High	High	Medium
Low (perceived) quality of life	Medium	Low	High	Medium
Labour & skill shortages	Medium	Medium	High	High
Availability of public services	Medium	Medium	Medium	High

#### Relevance

Low	Low
Medium	Medium
High	High

their manufacturing industries. While Hainaut is focussing on biotech and could benefit from the manufacturing of batteries and renewable energy technologies in neighbouring regions, Asturias and Castilla y León see hydrogen, wind and marine energy as cornerstones of their future industry. Moravia-Silesia and Silesia are continuing to diversify their manufacturing industries across a variety of sectors, including all types of green technologies, and Övre Norrland positions itself as the desired home for the green steel, battery and automobile industries and the mining of critical materials for the green transition. All regions, therefore, could benefit from the GDIP, which could contribute to a Just Transition if managed properly.

*“How can we keep our young and skilled here, and how can we attract those from other regions to move here?”*

For a successful Just Transition, local experts identified multiple socio-economic challenges that should be addressed, as listed in Table 4.1. The two most-pressing challenges for each region are demographic change and inequality, especially related to the cost-of-living crisis. This was confirmed both by local experts and by participants in a Just Transition expert workshop, as can be seen in Figures 4.1 and 4.2. Where local experts differed from their counterparts in Brussels was their assessment of the relative importance of the green transition. A key question that all interviewees seemed to grapple with is “how can we keep our young and skilled here, and how can we attract those from other regions to move here?”

The local view of the green transition is that it is amplifying local socio-economic challenges related to energy poverty, labour shortages and increasing unemployment in coal mining communities, but does not cause any new challenges in and of itself. Therefore, the preferred approach is to target the root causes of these challenges directly, rather than expecting green transition policies to solve these issues. This does not mean that local policymakers expect that the green transition’s effects are not disruptive. Rather, they stressed that tackling social challenges directly was a more effective Just

Transition strategy than delaying or weakening green transition proposals. They additionally emphasised the value they place on the provision of long-term support with policies such as the JTM and the GDIP.

All policymakers, however, did mention that their assessment of the relative importance of the green transition was based on the current narrow definition that includes only the shift from high- to low-carbon energy sources. If, however, a broader definition is used that would see disruption to Europe’s energy-intensive and automotive industries, each region would need a much more ambitious Just Transition programme. They were, therefore, clear that this is what they would expect from the next Commission: to come up with a clear plan for the future of these industries.

*“The regional approach to the Just Transition was at the optimal level of subsidiarity.”*

Another consistent message from local experts was that the regional approach to the Just Transition was at the optimal level of subsidiarity. While it might be expected from regional policymakers to argue that they are best suited to tackle this issue, they also acknowledged that a democratic mandate and sufficient capacity was a requirement for a successful regional approach. And that this is not everywhere the case. Especially regarding the Just Transition, they pointed out the highly localised concentrations of workers and businesses active in sectors associated with both high- and low-carbon energy sources. At the same time, they argued that municipalities do not possess the capacity to deal with such transitions. While a local transition approach which does not involve the region in which it is located would not lead to sustainable change. For this, each local economy is too dependent on the region in which it is located.

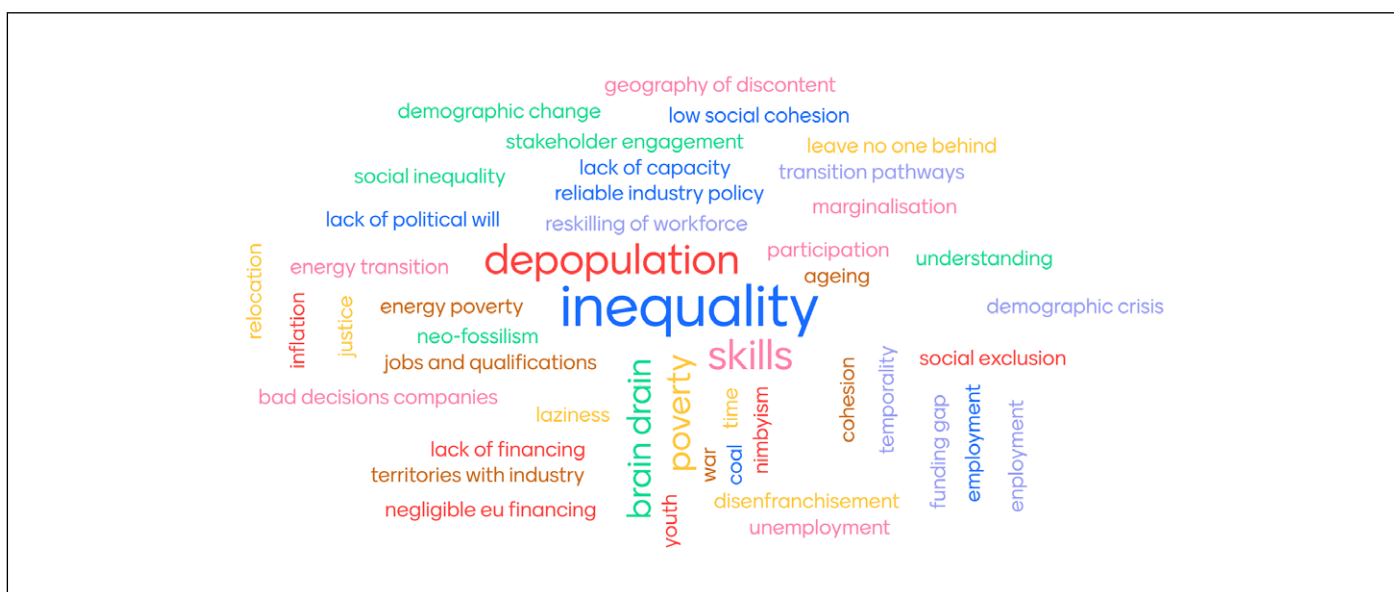
For resilient local economies, a few specific challenges were common. Skills shortages were deemed a top priority for businesses in manufacturing sectors for all regions, even Spanish regions with high existing unemployment. While a reduction in manufacturing employment was not welcomed by local policymakers, developing a

diverse economic ecosystem, including a significant share of locally owned SMEs, was deemed more important for sustainable economic development. For this, all regions, except Övre Norrland, identified a lack of digital and entrepreneurial skills as the main challenge to be overcome, as well as support for local business owners to adapt to the green and digital transitions. Multinational companies were viewed as a valuable addition to local economies, especially if they were supplied by locally owned companies, or if they located their digital operations locally.

To overcome skills shortages, all regions indicated that they were actively attracting skilled workers from elsewhere, within and outside the EU. In all regions, except Övre Norrland, increasing participation rates were also identified as a priority. However, it did not seem to receive as much attention as encouraging skilled immigration. Despite participation rates in the selected regions being below national averages and relatively few women participating in their labour markets. Despite all regions experiencing an ageing labour force, none prioritised encouraging the elderly to remain professionally active.

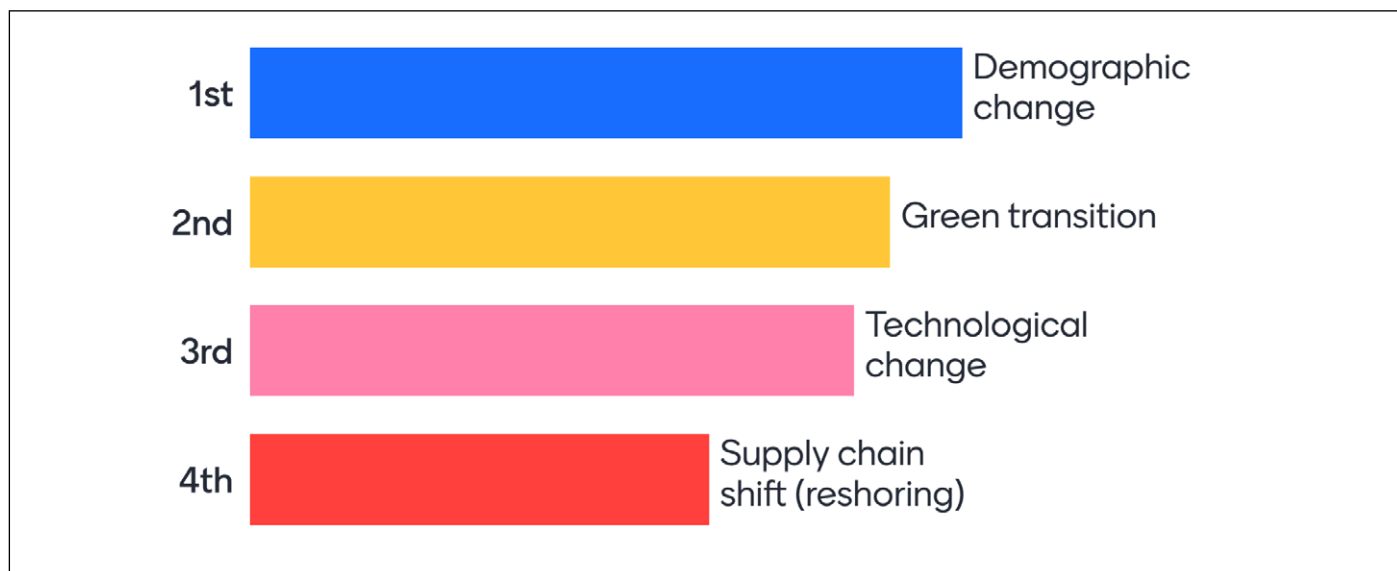
Finally, all local experts agreed that local and regional authorities lacked sufficient (financial) resources to deal with the challenges at hand. Most professed to have a good understanding of the changes expected, and the needs of their citizens and businesses for the transition. But only the most-experienced Just Transition regions in Spain, Poland and Czechia believed that they had the required institutional capacity to deal with these. All regions were positive about their cooperation with European institutions and programmes, although some did find the existing JTM and other regional programmes to be insufficiently flexible at adapting to changing local circumstances. Cooperation with national authorities was seen as much more mixed, with Spanish and Czech national authorities being viewed most positively, Swedish and Polish national authorities being viewed most negatively, and in Belgium the Walloon government being seen as more helpful than the federal level. Inter-regional cooperation was rated highly by all regions, either in terms of economic cooperation, such as the Eurometropole and Tritia, or through cooperation with regions further away and through knowledge exchanges.

**Figure 4.1. Overview of the most-pressing socio-economic challenges for Just Transition regions.**



**Source:** “Ensuring a Just Transition in Times of Industrial Transformation” workshop 6 December 2023.

**Figure 4.2. Relative size of magnitude of the impact of megatrends on European Just Transition regions according to the participants of the workshop "Ensuring a Just Transition in Times of Industrial Transformation."**



**Source:** "Ensuring a Just Transition in Times of Industrial Transformation" workshop 6 December 2023.

The interviews and research also yielded clear differences between the studied regions, as can be seen in Table 4.1. Each of the four regions could be viewed as representing a distinct archetype of Just Transition challenges. Nevertheless, it should be noted that each region does have each of the challenges listed. What the overview indicates is which challenges are *relatively* most pressing for each respective region.

The first archetype is Hainaut, which is grappling with concentrated long-term unemployment in specific communities that tend to be mainly low-skilled workers and those at risk of poverty. At the same time, such regions, which include many of Western Europe's former steel and coal producing areas, face skills shortages in areas closely located to these left-behind communities. Other challenges, such as brain drain, quality of public services and quality of life, are present in some of the localities, but are not deemed the most pressing at the regional level.

The Spanish regions are the second archetype, where a lack of quality employment is the biggest challenge. Combined with high youth unemployment,

this resulted in a strong outflow in the region's young and skilled workforce. That this relocation is mostly for economic reasons can be seen from the high perceived quality of life for both regions. The regions also grapple with some skills shortages and a lack of public services in the more rural regions. Similar regions can be found across mostly southern European member states.

Moravia-Silesia and Silesia are exemplary for the third archetype of Just Transition regions, which see a combination of ageing with brain and youth drain, despite being able to offer sufficient economic opportunities. While the even-better economic opportunities on offer elsewhere might influence this, local experts singled out the low perceived quality of life as the biggest culprit. Multiple variations of this were offered, from a less international environment than their respective capitals, to a less diverse cultural and gastronomic scene, and from a lack of public green spaces to a low quality of air. Public services were rated quite highly, especially with regard to the quality of educational institutions, while public transport had room for improvement. While both regions are unique for their relative importance



of the manufacturing sector, similar areas can be found across Central Europe.

The last archetype, which might be unique to Just Transition regions, but not to Europe’s metropolitan areas, is Övre Norrland’s challenge of a lack of public services to deal with the expected growth in its labour force. This is related to a lack of affordable housing, health care and educational facilities. Furthermore, it appears paramount that the transition in the region be delivered without forgetting the rights of local populations in need of care or support, and with the consideration of preserving indigenous knowledge key in stewarding the land.

## 4.2 Exploring the effects of the GDIP and complementing labour market policies

Continuing the comparative analysis of the previous section, the following subchapter provides an overview of the model results per region in a series of

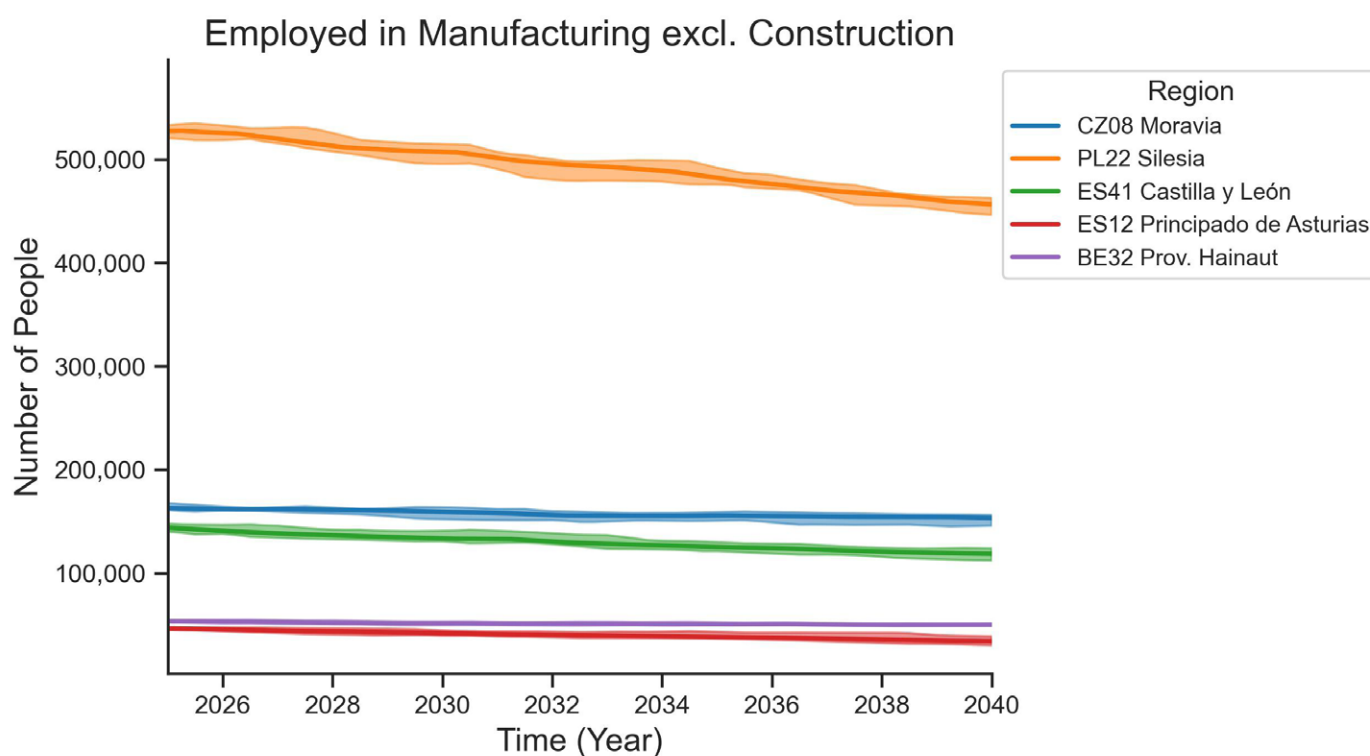
graphs that show the effects of the three scenarios – baseline, GDIP, and GDIP with complementing labour market policies – for all regions except Övre Norrland for the number of employed, the number of unemployed and workforce shortages. This enables a comparative assessment of the policy impacts, and thus, exposes the underlying labour market dynamics relevant for achieving a Just Transition.<sup>77</sup>

### 4.2.1 Baseline

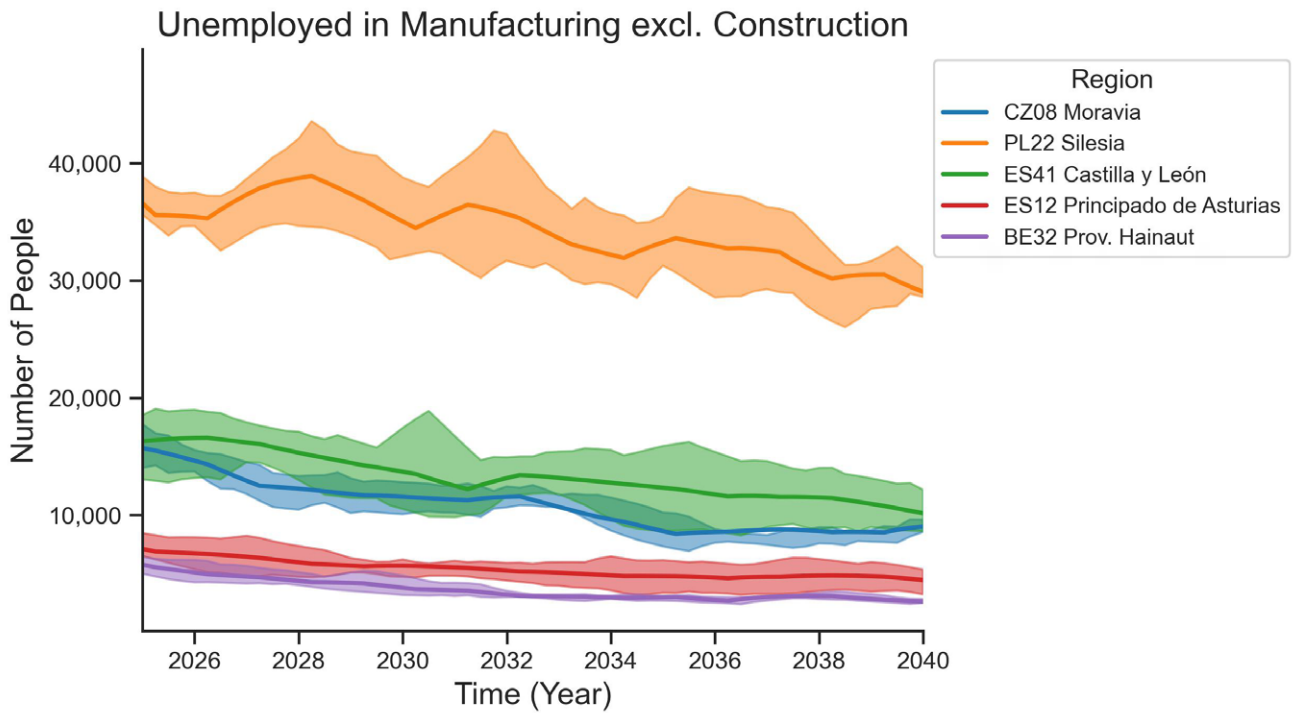
*“The assessment of interviewed policymakers that demographic change has a significant impact is confirmed.”*

The baseline outcomes are based on extrapolating past trends and differing industry growth rates to account for uncertainty; it also includes phasing-out coal mining by 2040 in a linear manner. As can be seen in Figure 4.3, a slight decrease to a stabilisation of employment can be seen for all

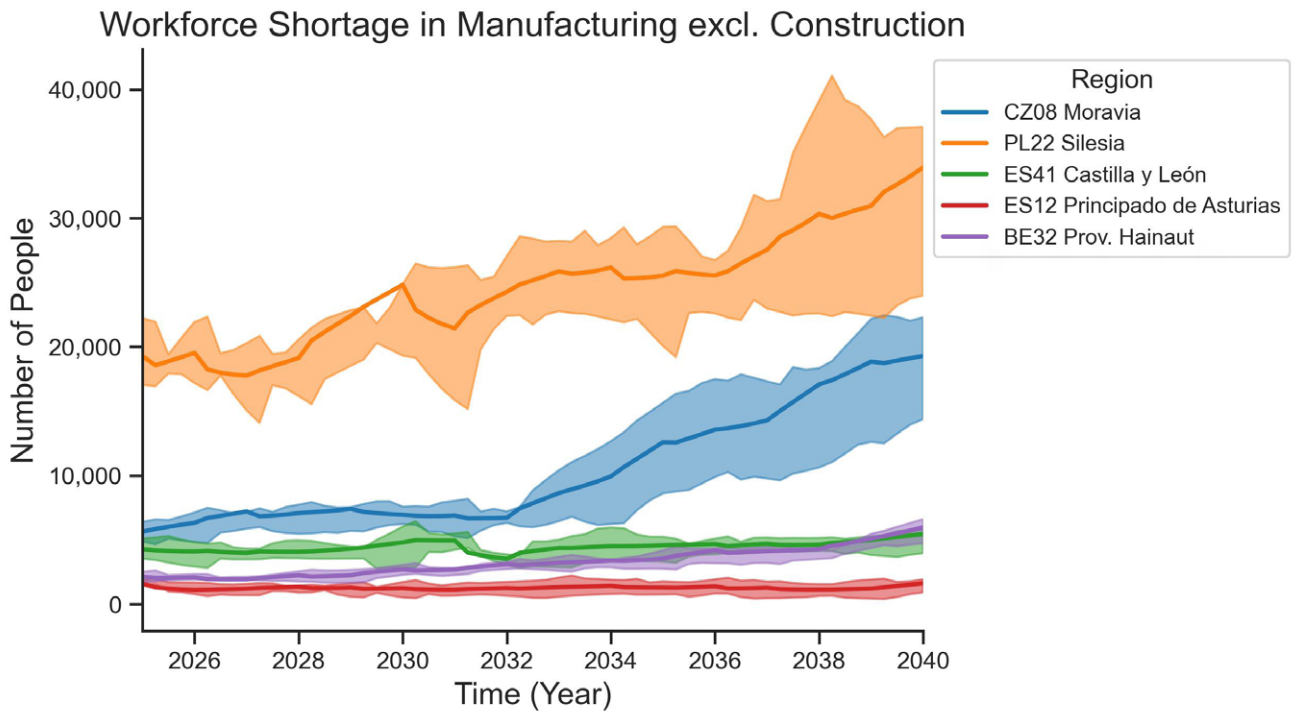
**Figure 4.3. Number of those employed in manufacturing, excluding construction, under the baseline per region.**



**Figure 4.4. Number of those unemployed in manufacturing, excluding construction, under the baseline per region.**



**Figure 4.5. Workforce shortages in manufacturing, excluding construction, under the baseline per region.**



regions. In Figure 4.4, a decrease in unemployment for those with experience in the manufacturing sector is observable, and in Figure 4.5, workforce shortages strongly increase for all regions, except in Spain, which increase slightly. Based on these results, the assessment of interviewed policymakers that demographic change has a significant impact is confirmed.

While a reduction in employment could also indicate deindustrialisation, this is unlikely based on the decrease in unemployment and increase in workforce shortages. The relatively larger spread of the 25-75% quantiles for unemployment and workforce shortages compared to employment shows that differences in economic development have a more marked effect on unemployment and workforce shortages than employment. Lastly, what is surprising is that Silesia exhibits a slight decreasing trend in unemployment, despite the closure of coal mines. Although these effects will undoubtedly be marked at the local level, it seems

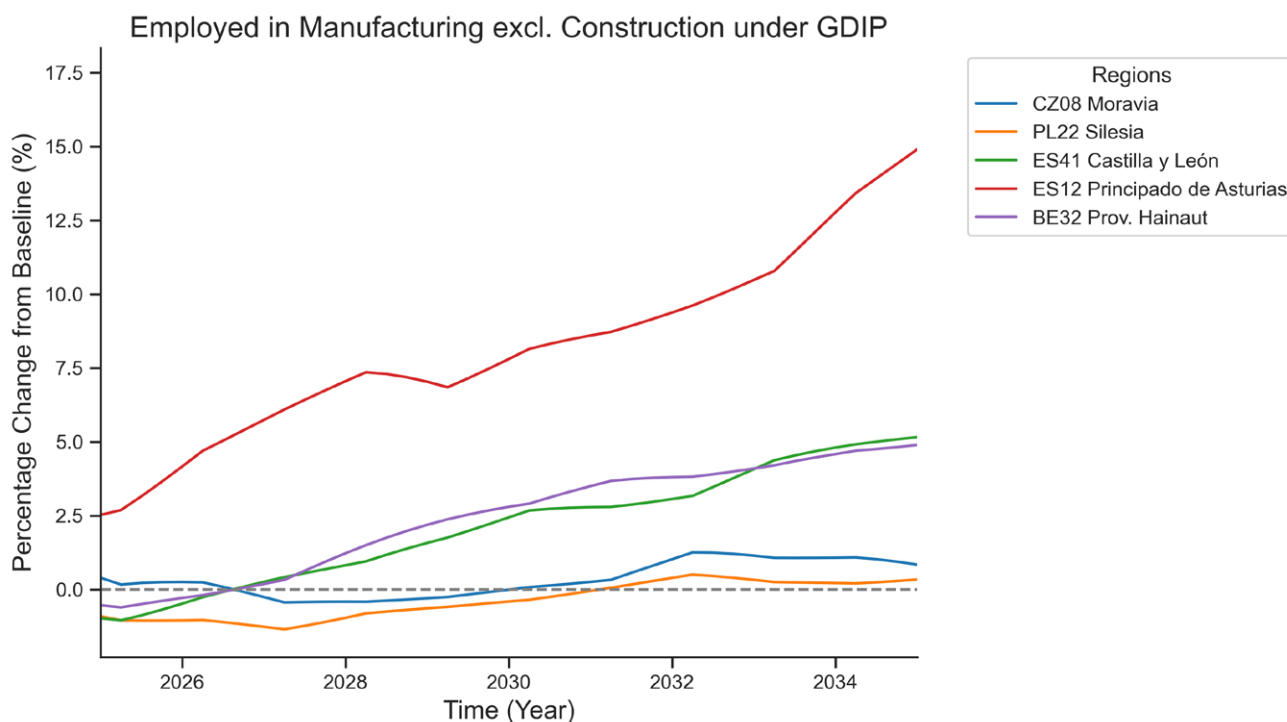
that Silesia’s manufacturing sector’s demand for labour is strong enough at the regional level that it should be able to offer most job-seeking coal miners employment at a suitable skill level without much disruption.

#### 4.2.2 GDIP

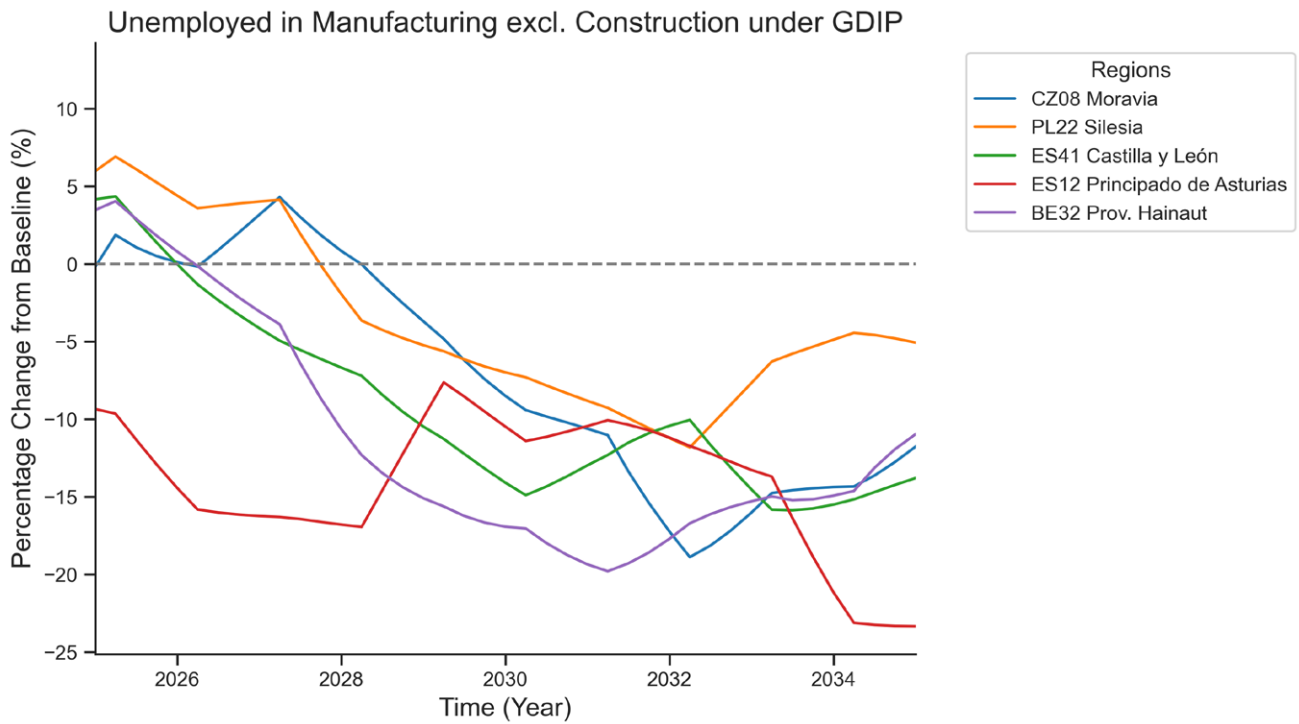
The GDIP scenario includes the effects of what could happen if the NZIA and CRMA policies, as described earlier, are implemented. To simplify the interpretation and focus on the specific effects of the selected scenario, only the highest policy impact scenario is shown. The effects of the other low and medium policy scenarios are similar to the high scenario, but less strong. Figures 4.6-4.8 show the relative increase or decrease of implementing the GDIP compared to the baseline.

For employment, the possible effects of the GDIP seem to differ between regions, as can be seen in Figure 4.6. Asturias is expected to benefit most,

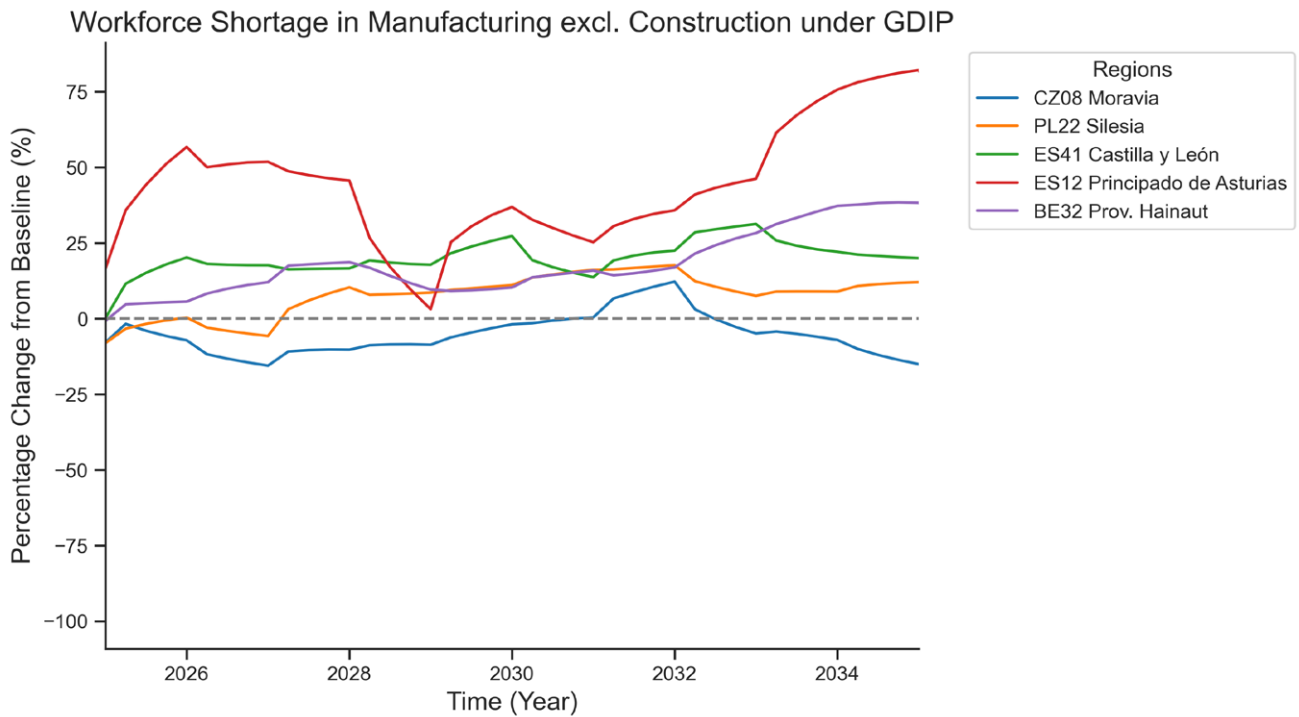
**Figure 4.6. Percentage change in the number of employed under the GDIP high scenario compared to the baseline in manufacturing, excluding construction, per region.**



**Figure 4.7. Percentage change in the number of unemployed under the GDIP high scenario compared to the baseline in manufacturing, excluding construction, per region.**



**Figure 4.8. Percentage change in workforce shortages under the GDIP high scenario compared to the baseline in manufacturing, excluding construction, per region.**



with Silesian regions seeing little to no measurable effect, and the other regions somewhere in between. Nevertheless, even the benefits for Asturias are within the 25-75% quantile of the baseline, indicating that the effects are highly dependent on other trends, especially regarding technological change.

As can be seen in Figure 4.7, the effects of the GDIP on unemployment go beyond that of employment, with all regions seeing a decrease, and with Asturias again benefiting most. Nevertheless, the effects are all within the quantile of the baseline, showing the importance of the other trends.

Lastly, as shown in Figure 4.8, the GDIP will lead to an increase in workforce shortages for all regions, apart from the Silesias, where the effects are too uncertain to be different from the baseline.

*“It is still likely that the GDIP will have a significant impact on the labour market of the localities where the targeted sectors are, or will be, located.”*

While the labour market impacts of the GDIP estimated by the SEER model are not as large as indicated in figure 4.2, this is likely due to the small relative size of the GDIP sectors of total regional employment. Despite the small observable effects, it is still likely that the GDIP will have a significant impact on the labour market of the localities where the targeted sectors are, or will be, located.

### 4.2.3 Complementing GDIP with labour market policies

The GDIP scenario with labour market policies is shown as the percentage change of implementing either of the labour market policies under the GDIP high impact scenario, compared to the case of only implementing the GDIP. P1, the dashed line, depicts the improvement of within-regional labour mobility, while P2, the dotted line, represents supporting relocation to other regions.

*“Complementing the GDIP with labour market policies seems to be a no-regret option for all regions.”*

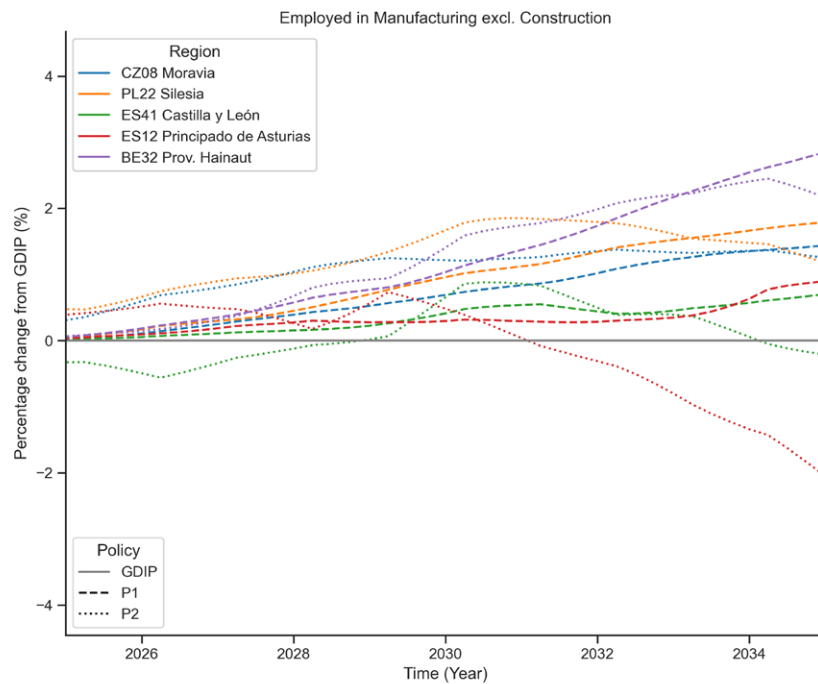
Based on the results in Figures 4.9-4.11, it seems that complementing the GDIP with labour market policies seems to be a no-regret option for all regions, although their quantifiable impact is likely limited. As can be seen in Figure 4.9, both labour market policies would increase the number of employed in all regions by 2035, except in Spain, in the case of supporting relocation. Unemployment also decreases for all regions for both labour market policies and moves to outside the baseline quantile for all regions, except Spain, under the policy of improving within-region labour mobility. The expected increase in workforce shortages as a result of the GDIP is likely to be neutralised and even reduced compared to the baseline for most regions under both policies, except north-western Spain, in the case of supporting relocation.

*“A trade-off exists between improving within-region labour mobility and supporting relocation.”*

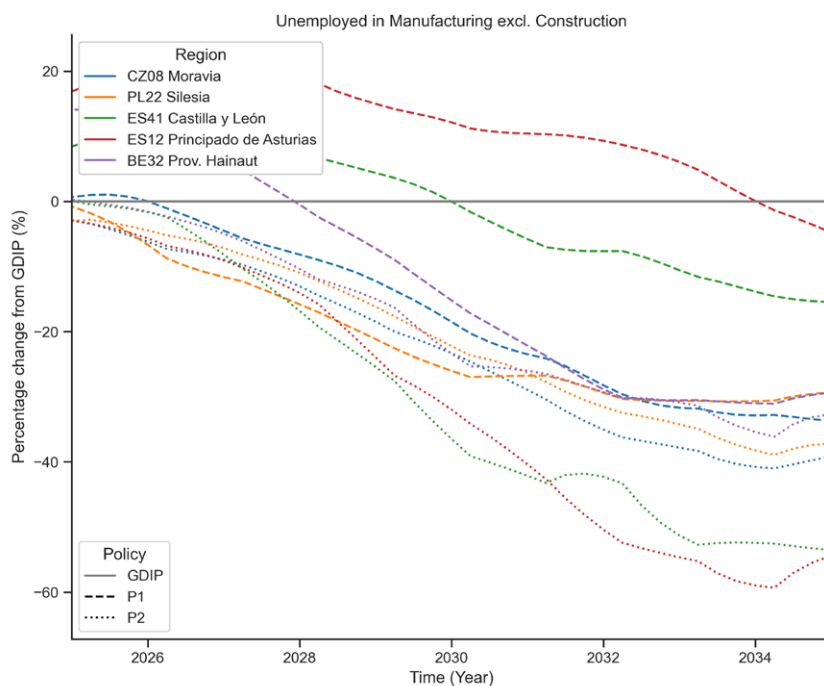
Thus, it becomes clear that a trade-off exists between improving within-region labour mobility and supporting relocation. This is especially the case for the Spanish regions, but can also be observed for the rest. On one hand, supporting relocation to other regions is likely to outperform improving within-region labour mobility in reducing unemployment. At the same time, supporting relocation does lead to less-desirable outcomes for employment and workforce shortages compared to the other labour market policy, and even in some cases compared to the GDIP. The resulting reduction of employment and increase in labour shortages could have negative effects on the local economy, and the ability of the regions to thrive, even though supporting relocation is better at reducing unemployment.

Overall, it can be observed that the studied labour market policies are effective at reducing unemployment in the manufacturing sector for the included regions, but might not lead to the decrease that would be socially desirable. Of the two policies, improving within-region labour mobility is especially well suited for reducing workforce shortages, but likely not by enough to counteract trends working in the other direction, such as ageing. If the goals of

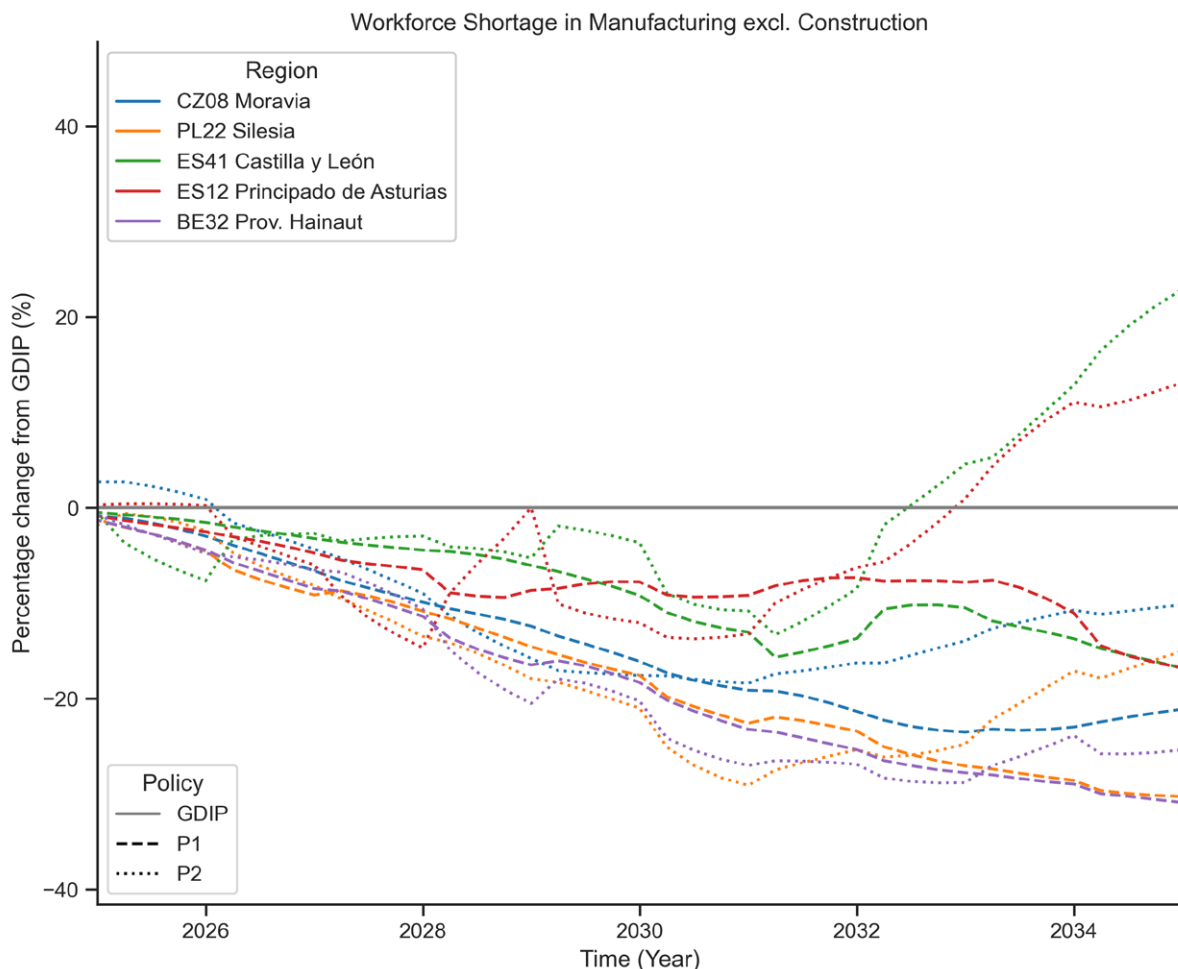
**Figure 4.9. Percentage change in the number of employed under the GDIP high scenario and labour market policies compared to the GDIP high scenario in manufacturing, excluding construction, per region.**



**Figure 4.10. Percentage change in the number of unemployed under the GDIP high scenario and labour market policies compared to the GDIP high scenario in manufacturing, excluding construction, per region.**



**Figure 4.11. Percentage change in workforce shortages under the GDIP high scenario and labour market policies compared to the GDIP high scenario in manufacturing, excluding construction, per region.**



reducing workforce shortages and unemployment to manageable levels are to be achieved, improving within- and between-region labour mobility is a good first step, with more ambitious policies required. For example, policy packages that combine various measures that address the root causes of labour mobility barriers in an integrated approach. What this could look like is discussed in the next chapter.

### 4.3 Limitations of modelling

The results from the modelling exercise offer several noteworthy insights, but they also come with their own set of limitations, underscoring the need for careful interpretation and further research.

One significant takeaway is that the study of total employment indicators, even when differentiated at regional and industry-specific levels, may not be the most effective lens for evaluating the impacts of green industrial policies like the CRMA and the NZIA. The reason is that these policies often target sectors that make up a small proportion of the overall workforce, even in specific regions that specialise in such industries. Consequently, their influence can be masked by broader trends, especially demographic changes, which appear to have a substantial impact on labour market indicators across all regions.

However, the model does reveal that labour market policies aimed at improving mobility within a

region and supporting relocation do appear to have some positive effects on tackling labour market mismatches, be it in terms of skills or other factors. It remains that the efficacy of these policies varies considerably by region, and could be further influenced by the way in which they are implemented.

Future research should, therefore, focus on refining the model to account for the granular impacts of targeted industrial policies on specific sectors and regions. This could involve running scenario-based simulations that factor in demographic trends and sector-specific nuances. Researchers could also explore the integration of qualitative data to enrich the model's predictive capabilities. Moreover, there is a clear need for an in-depth analysis to understand why certain labour market policies have varying impacts in different regions. Such insights would be valuable for policymakers seeking to formulate more effective and targeted interventions.

In conclusion, while the model provides a starting point for understanding the effects of industrial policies and labour market interventions, it should be used with caution. The findings underscore the need for a more-nuanced approach to studying the effects of policies that are region specific and sector specific. By focusing on these granular levels, researchers and policymakers could develop more effective strategies to address the challenges of sustainable economic development.





---

# **5. IMPLICATIONS OF THE OUTCOMES AND POLICY RECOMMENDATIONS**

---

## 5. IMPLICATIONS OF THE OUTCOMES AND POLICY RECOMMENDATIONS

*“What is needed is a systems approach that combines measures already proposed at the EU, national or regional level in an ambitious and integrated manner.”*

The research conducted provides critical insights for policymakers at the EU level, emphasising the necessity of complementing the GDIP with labour market policies. However, it also shows that, to achieve a Just Transition, a piecemeal approach, consisting of individual labour market policies, is unlikely to be sufficient. What is needed is a systems approach that combines measures already proposed at the EU, national or regional level in an ambitious and integrated manner.

Some concrete and possibly surprising results came out of our research, of which five stand out. Firstly, the labour market effects of the green transition, especially that of the GDIP, will be locally concentrated and regionally small. This result would only hold true if the transition remained concentrated in energy-production industries, and would be different if energy-intensive and automotive industries were affected. Secondly, a regional approach is deemed most effective given the unique and local character of these challenges. Thirdly, inter-regional approaches are deemed most effective to achieve a Just Transition, with regard to both economic cooperation and to knowledge exchange. Fourthly, green transition policies can amplify or alleviate, but not solve, socio-economic challenges, while social policies are crucial for the green transition to be a success. Lastly, the studied policies of GDIP, improving within-region labour mobility and supporting relocation do yield better socio-economic outcomes than the baseline, but are insufficient to address the socio-economic challenges identified per region.

Other insights relate to more practical issues. The most urgent challenge was not seen to be helping coal miners transition to new employment; instead, the primary focus for policymakers lies in transitioning their communities as a whole. Such transitions take time, long-term commitment and sufficient resources, all of which are in short supply. The JTM was, however, seen as something that offered exactly that. On the other hand, local policymakers did find this and other European funding insufficiently flexible to adapt to changing circumstances, such as the energy crisis. At the same time, TJTPs mostly focussed on supporting the transition of businesses, while prioritising the social issues identified above has received less space.

To effectively address these challenges and implement these solutions, a systemic approach, similar to the one adopted by Spanish regions, is required. This approach combines various elements into a cohesive strategy, as shown in Table 5.1, ensuring that labour market interventions contribute to long-term socio-economic resilience and sustainability, as well as being adaptive to local and urgent needs. Such approaches should include measures that address the following elements, which we list with the relevant institutions or organisations working on them.

A more detailed breakdown of the labour mobility challenges was already provided in Chapter 2, and so what follows in Table 5.2 is a non-exhaustive list of examples of existing initiatives. Overarching all these challenges is the Council recommendation on ensuring a fair transition towards climate neutrality.<sup>78</sup>

A follow-up study will go into more depth on how a Just Transition programme with a systems approach can be best designed, and what such a programme could include.

**Table 5.1. Elements of a system-change approach and associated measures.**

Elements of a system-change approach	Concrete measures in place or proposed
Develop and support region-specific and community-focussed transformation plans, a “place-based approach”	The JTM and related initiatives, such as the Just Transition Platform, as well as cohesion funding more broadly, and many national initiatives
Improve economic resilience of regions by supporting inter-regional economic cooperation and knowledge exchange, as well as supporting local SMEs	<p>The Committee of the Regions, the Interreg platform, various interregional cooperations such as Eurometropole, various initiatives by DG REGIO and others on interregional cooperation; see also private initiatives such as the European Clusters Alliance. For SMEs, see the work done by DG GROW, as well as the JTM</p> <p>All the above-mentioned initiatives also build on and strengthen the institutional capacity of regional authorities, such as forecasting skills and labour needs</p>
Stem youth and brain drain, as well as adapt to ageing	The above-mentioned programmes also attempt to address brain and youth drain, especially with regard to creating regional economic opportunities. However, adapting to ageing societies is still a relatively new challenge with few proven solutions, while improving local quality of life is detailed below
Support citizens with the cost-of-living crisis	The Social Climate Fund and similar national initiatives support those most at risk with targeted financial support in the short term, while in the long-term well-paid, quality employment (see table 5.2) is essential. As some of these initiatives already do, this should be combined with support with the transition to lower-carbon forms of energy, especially heating and mobility.
Ensure local context is taken into account, and ensure a long-term approach	Multiple regional Just Transition programmes and the requirement for Territorial Just Transition Plans already aim to empower local stakeholders through civil and social dialogue.

**Sources:** “The Just Transition Mechanism”. European Commission; “Regional industrial transitions to climate neutrality”. OECD; “Just Transition Platform toolkit”; “2021-2027 programme manual, version 2”. Interreg Europe, December 2022; “Spain, 4 years towards a just energy transition”.

**Table 5.2. Labour mobility barriers and measures to overcome them.**

Labour mobility barrier	Concrete measures in place or proposed
Labour mismatch	Invest in increasing participation rates, especially of women, disadvantaged groups and the elderly; see primarily the Council recommendation
Skills mismatch	Support human capital development, e.g., by the year of skills, the pact for skills, the EURES platform and the matching tool for immigrants by DG HOME
Attractiveness of jobs	Improve pay and working conditions; see the Council recommendation and work by Eurofound
Attractiveness of location	Improve quality of life; invest in public services and especially the availability of affordable housing, health care, education and mobility.
Timing and transition challenges	Financial support for the transition period, e.g., the various Just Transition programmes

**Source:** “European year of skills”. European Commission; “Fit for 55 climate package: Impact on EU employment by 2030”. Eurofound; “Job creation and local economic development 2023”. OECD; Gensheimer et al. “Territorial perspective on green industrialisation”.

*“This study confirms the importance of engaging with local and regional actors in addition to data and literature review analyses.”*

Finally, for researchers working on the Just Transition and related fields, this study confirms the importance of engaging with local and regional actors in addition to data and literature review analyses. Where EU policymakers indicated that some of the regional findings surprised them, such as the relative importance of transitioning coal miners, local policymakers did not. Nevertheless, they did indicate that discussing these topics with researchers helped them identify some of the root causes of the issues they are dealing with on a daily basis, such as the quality-of-life challenge underlying

the youth and brain drain. Furthermore, local policymakers found insights from their peers most useful, either in written form or shared in discussion fora, showing the importance of including detailed case studies and organising knowledge-exchange events. Lastly, policymakers at all levels welcomed support with forecasting economic changes, shifts in labour demand and insights into how to anticipate these, although emphasising that such insights need to be granular to be actionable.

## 5.1 Region-specific recommendations

Hainaut should focus on (re)integrating the long-term unemployed in the labour market, as well as those in left-behind communities, women and the low skilled. Focus should therefore be on supporting them to find new employment in all industries through targeted integration programmes, while also supporting employers, especially in biotech, to find and train the workers they lack. Working closely together with local employers, training providers and employment agencies, as well as with neighbouring regions, and those leading in the aforementioned technologies, could yield clear benefits.

For Asturias and Castilla y León, demographic change is the number one priority in the long term, while reducing unemployment, specifically for the youth, is the short-term challenge. While the expansion of new industries in clean energy could help with this, most job opportunities will likely be created in service sectors, likely with digital skills. Collaborations with regions that have successfully addressed youth unemployment is therefore strongly recommended, as well as exchange with other regions facing youth drain, such as Moravia-Silesia and Silesia. Lastly, economic policies should specifically target industries that lack young workers to consider north-western Spain as an attractive place to establish (knowledge) production facilities.

In Moravia-Silesia and Silesia, it is clear that the biggest challenge is not job opportunities, but rather improving the attractiveness of the regions and their jobs to local workers: miners as well as the young and highly educated. At the same time support is needed to address the energy poverty crisis. Similar to the Spanish, and to a lesser extent Belgian regions, more efforts should be invested in increasing the quality of public services to increase (perceived) quality of life. Collaborations with regions that have managed to do so is therefore also recommended. Finally, expanding Just Transition support to be able to tackle socio-economic challenges related to the energy transition more broadly is advisable.

In northern Sweden, it is clear that most support is needed to build the social and public infrastructure to

accommodate the influx of workers, and that social policy and especially financial support should be directed towards this, both at national and EU levels. Interregional collaboration is advised with regions that have a large pool of workers with experience in expanding green industries, for example, the six other regions in this study. Care should be taken here to ensure the exchanges are set up to stem youth and brain drain, not accelerate it.

---

# CONCLUSION

---

# CONCLUSION

*“A hopeful and sometimes surprising narrative emerges of the potential of the GDIP for Just Transition regions.”*

Based on the results described above, a hopeful and sometimes surprising narrative emerges of the potential of the GDIP for Just Transition regions, and the expected benefits of enhancing it with labour market policies. At the same time, any successful Just Transition needs to address the complex and intertwined socio-economic challenges of each region, some of which are shared, while others are context specific. Furthermore, it is clear that the green transition is just one of four megatrends affecting the European labour market, and if Europe and its regions are to thrive, it must be able to deal with them through an integrated approach. The expected benefits are not to be underestimated: a fairer, greener and prosperous Europe, with greater well-being for all its citizens.

Acknowledging the limitations of the research approach, we come to three conclusions.

Firstly, the labour market effects of the green transition will be felt locally and should be dealt with regionally and solved inter-regionally. Most affected manufacturing jobs in both high- and low-carbon energy systems are in niche industries that employ a small share of any region’s manufacturing workers, but are often concentrated in a few localities. As a result, Just Transition programmes should be able to be sufficiently targeted at the regional level for them to be effective, while also taking into consideration the various levels of institutional capacity at sub-national level to implement them effectively. The offered solutions are mostly of inter-regional nature, both through strengthening economic cooperation to benefit from each region’s comparative advantages, as well as enhancing knowledge exchange between regions grappling with similar challenges.

Secondly, green transition policies can alleviate but not solve socio-economic challenges, and social policies are essential for a green transition. That the transition needs to be just to happen is an oft-repeated truism, which this research has expanded on to demonstrate that this can only happen with well-designed social policies. While the green transition can worsen, or improve, socio-economic challenges, their root causes are elsewhere. Weakening or delaying green transition policies will, therefore, not solve any of such challenges, while leaving out social policies from green transition programmes is bound to lead to delays or their demise. Specifically, labour market shortages are a threat to a speedy green transition and Europe’s prosperity, while reducing inequality and improving resilience in the face of demographic and technological change is essential to retain public support for the EGD.

Thirdly, Just Transition objectives can only be achieved with a systems approach. While almost all of the individual solutions are well-known, few regions and no countries have yet adopted an integrated approach that deals with the root causes of the described socio-economic challenges. The programmes that do this are of too-limited scope to make a difference at regional and sectoral levels. Where some of the studied Just Transition programmes have been able to facilitate the transition for those already employed, including those in left-behind communities is a bigger challenge. This is a hopeful finding, as the solutions are already known and have proven to work on a smaller scale. The challenge remains how to integrate these at a large enough scale, which will be the focus of the next study in this series.

On a methodological point, a case-based approach, including interviews with policymakers, turns the affected regions from objects to subjects in their Just Transition stories, and are especially helpful to dispel narratives of despair and dependence.



This combined with data analysis can help identify commonalities between such regions, as well as unique characteristics that can help policymakers experiment and learn from one another. Lastly, modelling possible futures enables the exploration of policies and their expected effects, which can guide discussions by showing the order of magnitude of effects, and the underlying dynamics that lead to them. Nevertheless, research cannot and should not determine which policies are optimal under all circumstances; rather, it can inform the democratic process of policymaking in a complex environment.

*“A Just Transition in a thriving and green Europe is possible, even for the hardest-hit regions.”*

A Just Transition in a thriving and green Europe is possible, even for the hardest-hit regions. Policymakers at all levels are working tirelessly to make this a reality and have made substantial progress in recent years, for example, through the JTM. This and subsequent studies can hopefully contribute to the continuation, expansion and improvement of these efforts to support policymakers to achieve a Just Transition for all European regions.



---

# **ANNEX 1: MODEL DESCRIPTION**

---

# ANNEX 1: MODEL DESCRIPTION

## System dynamics modelling

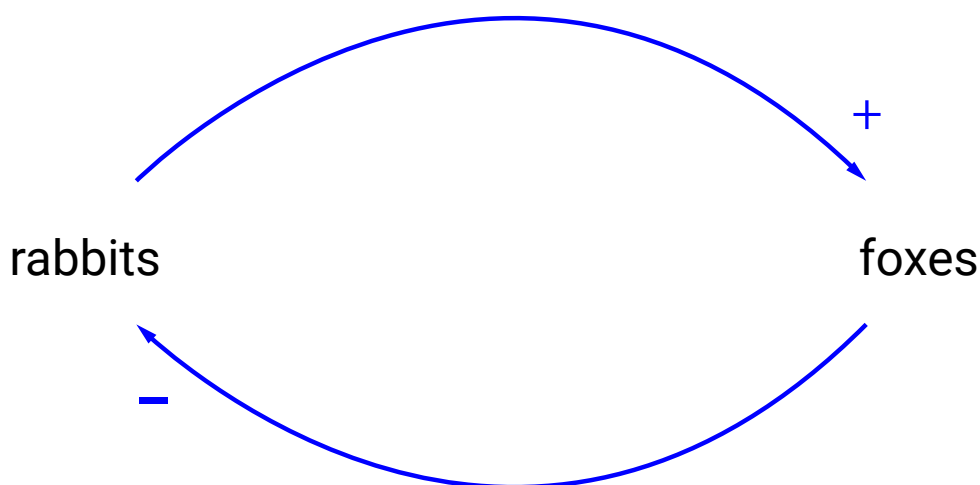
System dynamics (SD) modelling is one out of top three computational simulation modelling paradigms, along with discrete-event simulation (DEVS) and agent-based modelling (ABM). At its core, SD models complex dynamic systems and helps to understand them by building a causal theory of the interaction of their numerous parts represented in a causal loop diagram (CLD).<sup>79</sup> It also allows non-linear relations between system elements, feedback loops and delays to be taken into account.

A CLD visualises how different elements in a system are interrelated. The relationship between these elements is marked by either positive or negative polarities. Positive polarity, often indicated by a "+" sign, signifies that the two variables change in the same direction. For instance, an increase in the rabbit population would lead to an increase in the

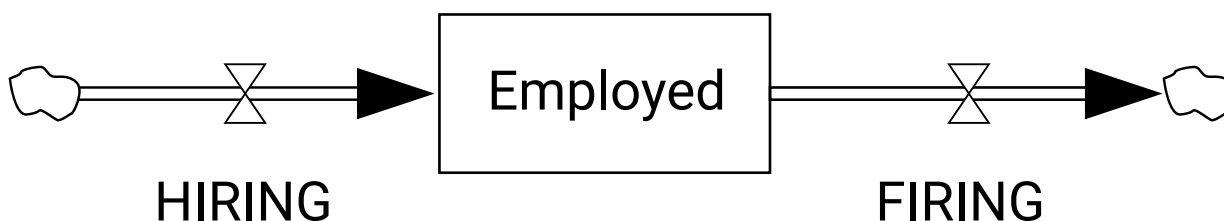
fox population, given that rabbits are a food source for foxes (Figure 1A). Conversely, negative polarity, denoted by a "-" sign, indicates that the variables change in opposite directions. In the context of our example, this could be interpreted as follows: an increase in the number of foxes, predators to rabbits, would subsequently cause a decrease in the rabbit population. Then these interactions are viewed collectively; they form what is known as a balancing feedback loop, contributing to the dynamic equilibrium of the ecosystem. The stability and behaviour of such a loop are contingent upon the specific quantities and proportions within the system. An imbalance, such as an excessive number of predators, can disrupt this equilibrium, potentially leading to the collapse of the system.

Another way of presenting an SD model is in a set of stocks and flows diagram (SFD), where stock accumulates a specific resource and the inflow and

**Figure Annex 1A. A CLD examining the behaviour of an ecological system consisting of rabbits and foxes.**



**Figure 2A. An SFD representing an oversimplified labour market model.**



outflow decrease. Importantly, the change in stock value happens over time. Thus, we can observe its change at any given point in time. For example, stock can represent all employed persons of a certain country with an inflow hiring and outflow firing (Figure 2A). The inflow and outflow usually have rates to model how quickly the change is happening and may form feedback loops, creating non-linear behaviour.

While a CLD is more often used to depict a certain idea qualitatively, SFDs are typically based on data and used for quantitative analysis. In the simplest case, to make a quantitative model, one should specify the following in the simulation software (e.g., Vensim, Stella, AnyLogic):

- 1) units for time (e.g., year), a time step (e.g., month), and start and end times;
- 2) initial stock value; and
- 3) inflow and outflow equations.

Using the example from Figure 2A, the number of initially employed persons and how many people get hired and fired per time unit (e.g. a year) are known. Next, we can simulate the model and observe the change in either stock or inflow and outflow. Note that when we simulate the model, it becomes represented as a set of differential equations that will be solved.

DEVS models them through changes of states at specific (discrete) points in time. One of the most common applications of DEVS is supply chain modelling, where elements are stocks of certain goods, facilities for loading them, transport and clients. ABM is centred around the concept of an emergent phenomenon that can be created from the individual interactions of an agent with the environment. A typical application of an ABM is infectious disease modelling, when a disease appears if two or more agents interact with an infected one.

While all three paradigms aim to understand complex systems, our decision to use SD for this study is threefold. Firstly, the nature of the policy question. We are interested in a high-level understanding. The impact of the European Green Deal Industry Plan can be observed on the country and regional scales, and insights on such a scale (opposite to an individual) will be beneficial. Secondly, the long-term impacts. We expect that policies will have an impact for a prolonged period. Thirdly, we expect the concept of delay to play an important role. Time is needed to change a job, a sector, or move to another region or country, and education will play an important role. We also argue for a more comprehensive analysis of such a complex problem with other simulation modelling paradigms and models (e.g., economic, optimisation, behavioural).

---

# **ANNEX 2: THE SEER MODEL**

---

# ANNEX 2: THE SEER MODEL

## Model introduction

The SEER model is developed to support policymakers working on labour-market-dynamics-related issues, specifically in the context of the green transition. Its granular capability can distinguish intricacies down to the regional level (NUTS2<sup>80</sup>), sectoral level (NACE2<sup>81</sup>), job category (ISCO2<sup>82</sup>) and skill level (ISCED<sup>83</sup>). This capability makes it an asset for policymakers spanning various governance tiers. They can systematically identify and scrutinise labour market trends, while also conducting hotspot analyses to understand the geographic and sectoral implications. This includes potential shifts in (un)employment rates and emerging workforce shortages.

It should be noted that the model is set up to be exploratory, not for accurate point predictions of the abovementioned metrics.<sup>84</sup> The outcomes will always be "envelopes" (i.e., ranges over time) of plausible futures, given the uncertainties involved. In this way, policymakers can understand which dynamics and trends are most likely to affect their regions and sectors of interest, and how they interact with the studied policies.

The SEER model includes the following entities: 27 countries and 229 regions. Based on Eurostat data, they all have corresponding numbers for the number of employed people in 16 industries or 63 subindustries and 31 types of jobs. As for the spatial and temporal resolution and the extent, spatial resolution is either on NUTS0, NUTS1 or NUTS2, and the time step in the model represents 0.25 years, and simulations are run for ten years from 2025 until 2035.

To ensure comparability and the possibility to easily update the results in the future, the model sources all data from Eurostat. There are seven

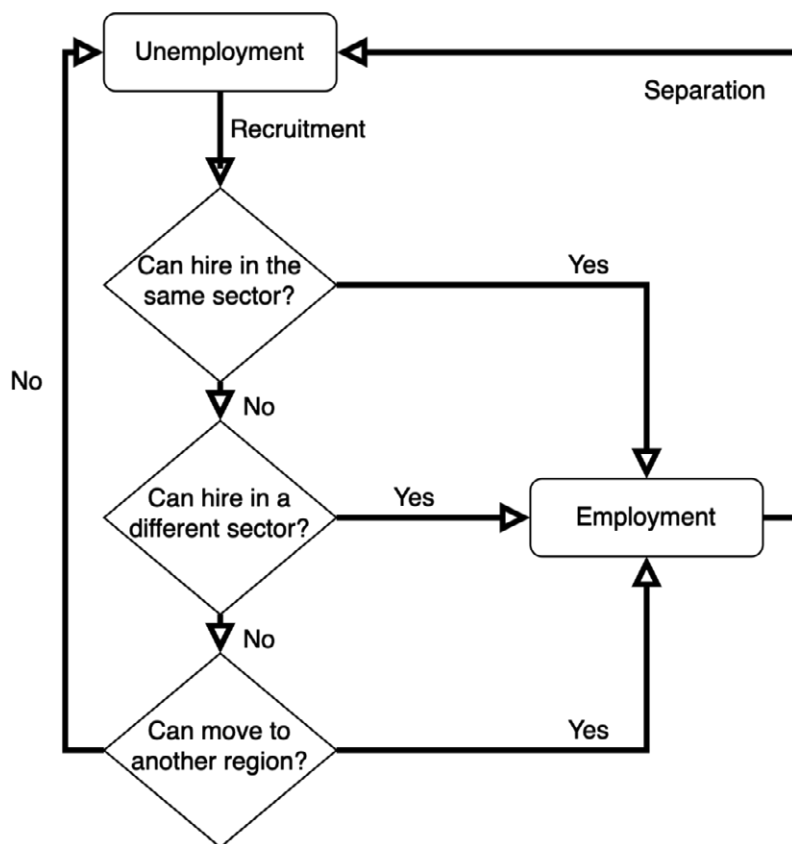
major constraints regarding the model and the data that should be considered. The first is that labour market data at the regional level in Eurostat is only available at NACE2 level, meaning, for example, that it cannot analyse the increase in employment for manufacture of batteries and accumulators, only for the manufacture of electrical equipment. Secondly, the model does not (yet) allow skill levels of the currently unemployed to be distinguished between. Thirdly, the model only shows results at the NACE1 level, which, in this case, means all manufacturing and mining industries, excluding construction. Fourthly, the policy intervention in the model of re- and upskilling is still under construction and was unavailable for this specific analysis. Fifthly, migration between regions is currently unbounded and unfocused, meaning that there is no difference in likelihood for workers moving between neighbouring regions, or to a region on the other side of Europe. Sixthly, the carrying capacity of regions is not included, meaning that it could be possible that in the model a region would have more workers than can be housed, educated or cared for. Lastly, not all the relevant relationships are included yet, such as linking retirement and graduation with population structures. These processes are currently included by manner of extrapolation of past trends.

Despite these shortcomings, the model provides crucial answers by linking large datasets that can be mobilised to serve public policy. It thereby is an important complement to the existing policy impact assessment tools of the European Commission and national authorities.

## The core module – labour dynamics

The most important processes in the model, which are repeated at every time step, are recruitment and separation, which are the **inflow** and **outflow** into a **stock** of employment (Figure 3A). Currently, the model operates with the use of the following

**Figure 3A. A simplified SFD of the key flows in the model, showing how workers move from employed to unemployed and vice versa.**



mechanism of hiring: people are recruited in case of a shortage for a job that matches their qualifications. Separation, in turn, is operationalised in the following way: organisations will separate from their employees if there are not enough jobs available in the sector where they are employed. These workers will become unemployed.

Figure 3A. A simplified SFD of the key flows in the model, showing how workers move from employed to unemployed and vice versa.

Once a worker is unemployed, they enter a sequential process that determines if they are hired again. All recruitment is based on skill matching (i.e., workers can only be employed in a job with a similar skill level to their previous job); the availability of jobs, as measured by labour demand in a particular sector; and the probability of being hired, which reflects

the challenge of job seeking. The three steps of the recruitment process are in order of priority:

- 1) Samesectoring is a process where unemployed workers are hired when there is a shortage in the workforce for a specific type of job within a specific industry and region. Essentially, it involves hiring from the existing pool of unemployed workers qualified for a particular job role within the same industry.
- 2) Resectoring is an alternate hiring route, separate from samesectoring. It involves hiring unemployed workers for the same type of job role within the same region but in a different industry.
- 3) Relocation is another alternative hiring route where unemployed workers who haven't been hired through samesectoring or resectoring



might be hired in other regions but for the same type of job and within the same sector.

Each of these three steps has a different probability of success. For example, with an initial pool of 100 unemployed individuals and a 50% success rate for "Can hire in the same sector", only 50 will find employment through that route, if there is sufficient labour demand.

Policy interventions in the model function by changing the probability of success for workers to find employment through one of the channels. For example, through investment in local job-matching services, the chance of finding a job in the same sector and region (samesectoring) could improve from 50 to 75%, meaning 75 of the 100 will be employed.

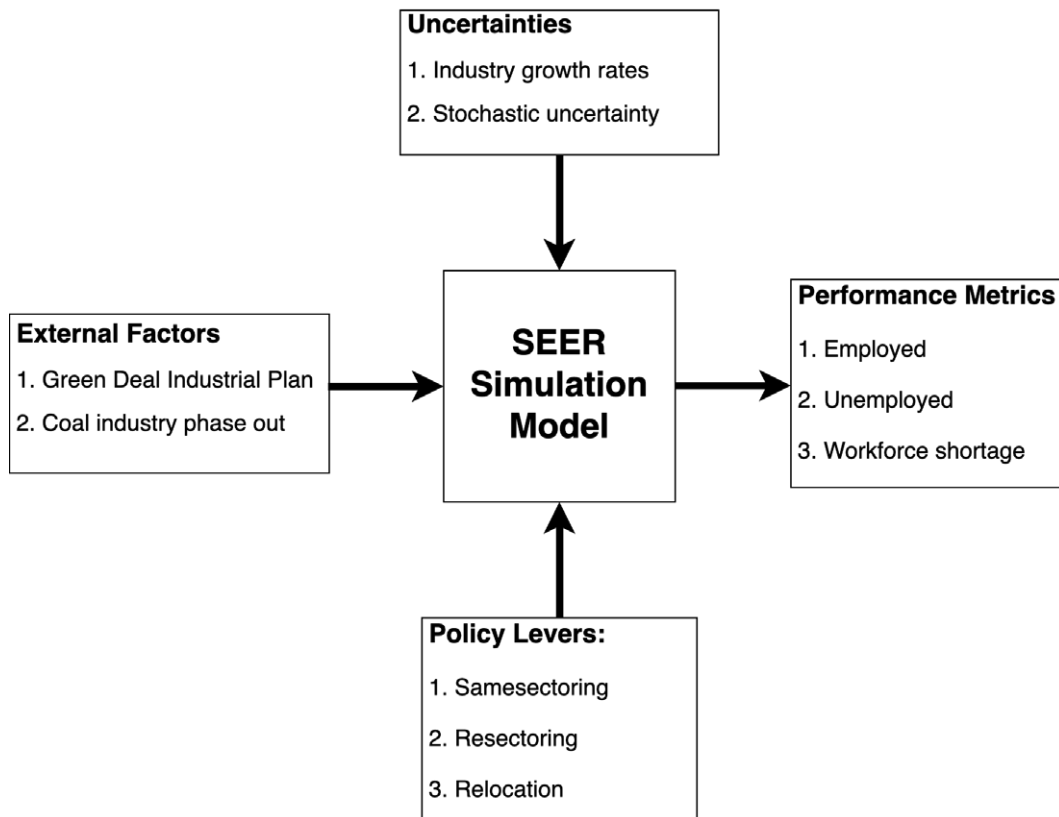
Lastly, as job seeking takes time as well as effort, we use a set of parameters to capture those **delays**. For instance, for samesectoring, it is defined by the parameter "time to hire". By default, it is a quarter of a year, which means gaps in the workforce are practically filled immediately compared to the time step of the model.

In this way, the stocks of employed and unemployed and their connecting flows form the model's main feedback loop. This loop is driven by the model's structure and data behind it, and thus, allows for non-linear behaviour.

### Model inputs and outputs

The inputs and outputs of the SEER model can be seen from the XLRM framework in Figure 4A (external factors, policy levers, relations in the

**Figure 4A. SEER model in the XLRM framework.**



system and performance metrics). The external factors determine labour market demand in the form of the two studied policies of the Green Deal Industrial Plan and coal industry phase out by 2040. The policy levers that facilitate the Just Transition are those that can improve or decrease the probability of finding a job in the same sector and same region, in another sector and the same region, or in another region in the same sector. For uncertainty, the model has an extensive number of constants, potentially viewed as uncertainties. However, for the purposes of this study, we are concentrating on two primary categories: industry growth rates and stochastic uncertainties that allow us to alternate the model's random seeds. Finally, while the model allows us to explore multiple performance metrics (such an option is primarily driven by the fact that we can observe them across multiple scales across different attributes), we focus on the following: number of employed and unemployed persons; and workforce shortages.

For a complete overview of the model, see PEAS Center<sup>85</sup> and Pruyt.<sup>86</sup> A model as text can be sent upon request.

### Modelling CRMA and NZIA labour market impacts

The labour market impacts of the CRMA are difficult to assess, as no sectoral nor regional breakdown was provided in the impact assessment. We therefore compiled the data shown in Table 1A of the sectors most relevant to the case regions for a low, medium and high policy impact scenarios, and tested these with experts. We selected the five most relevant sectors, and provided each with a value of expected labour demand growth until 2035 as a result of the CRMA.

### Modelling NZIA labour market impacts

The labour market effects of the NZIA are based on Table 2.2 and translating them into growths rates based on the current size of the workforce for each sector in Table 2A. As the carbon capture and storage and hydrogen technologies were not included in the table, and had less-clear estimates, we did not include them for this assessment.

**Table 1A. Estimating CRMA labour market impacts at the regional level.**

CRMA, inc. in labour demand (%) by 2035	Low	Medium	High
B7 Mining of metal ores	+10%	+20%	+30%
C24 Manufacture of basic metals	+20%	+35%	+50%
C25 Manufacture of fabricated metal products, except machinery and equipment	+20%	+35%	+50%
E38 Waste collection treatment and disposal activities and materials recovery	+20%	+40%	+60%
E39 Remediation activities and other waste management	+20%	+40%	+60%

**Table 2A. Estimating NZIA labour market impacts at the regional level.**

Industry/scenario name	Low	Medium	High
C25 Manufacture of fabricated metal products, except machinery and equipment	+1.2%	+1.2%	+2.3%
C26 Manufacture of computer, electronic and optical products	+0.0%	+1.0%	+2.6%
C27 Manufacture of electrical equipment	+10.0%	+20.1%	+24.1%
C28 Manufacture of machinery and equipment n.e.c. <sup>87</sup>	+0.5%	+0.5%	+0.6%

For the technologies included a translation was necessary from total jobs per technology to increase expected in labour demand per NACE sector. For an increase in labour demand for the wind sector, it was assumed that 50% of such jobs would be in the “Manufacture of fabricated metal products, except machinery and equipment”, related to the production of all elements except the turbine, and 50% of jobs in “Manufacture of turbines”, which is part of “Manufacture of machinery and equipment n.e.c.”. For solar PV, it was assumed that 50% of jobs for “Manufacture of electronic components and boards”, part of “Manufacture of computer, electronic and optical products”, and 50% of jobs in “Manufacture of electrical equipment”. For heat pumps, it was assumed that all jobs were in “Manufacture of central heating radiators and boilers”, part of “Manufacture of fabricated metal products, except machinery and equipment”. For battery cells, it was assumed that all jobs would be part of “Manufacture of batteries and accumulators”, part of “Manufacture of electrical equipment”. For electrolyzers, it was assumed that all jobs were part of “Manufacture of electrical equipment”.

---

# **ANNEX 3: EXPERT INTERVIEW METHODOLOGY AND QUESTIONNAIRE**

---

# ANNEX 3: EXPERT INTERVIEW METHODOLOGY AND QUESTIONNAIRE

## Expert interview methodology

For the stakeholder interviews, we approached policymakers and experts in each of the studied regions through the personal networks of the researchers and the FEPS institutional network. Each of the potential candidates was emailed the questionnaire given below, with the request to fill it out or for an (semi-structured) interview. At the next stage, we emailed all interviewees with the draft text of their respective regions for feedback. Simultaneously, to complement the ongoing work, we conducted multiple off-the-record conversations with experts to sense check our analysis based on regional statistical data.

In total, we received the following input from our stakeholder outreach:

Two completed questionnaires (Hainaut and Moravia-Silesia)

Five semi-structured interviews (1× Moravia-Silesia, 2× Silesia, 2× Övre Norrland)

Four feedback documents (1× Moravia-Silesia, 2× Silesia, 1× Övre Norrland)

For the Spanish regions, we were unfortunately only able to conduct off-the-record conversations. This complemented the extensive documentation that the regional and national governments provided on the relevant Just Transition programmes.

## Questionnaire

Each of the experts contacted received an email with the below context and questionnaire:

Context

Project SEER, supported by the Foundation for European Progressive Studies, is working on a report about the labour market impact of the European Green Deal. The report will also analyse labour market policies that can ensure a fair and smooth transition for everyone involved.

Specifically, we aim to support local and regional authorities to prepare for the labour market effects of the European Green Industrial Plan. For this, we intend to develop a set of recommendations and tools that include the specific context of a region.

For our first report, we are looking for three to five Just Transition regions as case studies, and we would love to understand your region better. To support this process, we would highly appreciate it if you could fill out the following questions, or if you would have time to discuss these questions via video call in the near future.

### Section 1: Introduction

1.1 What is your current position or role within your organisation/region?

1.2 In which region are you based or does your work primarily focus?

1.3 How many years of experience do you have in your current field?

### Section 2: Current state and challenges

2.1 Can you identify which industries in your region are currently experiencing growth in their labour forces and which ones are witnessing a contraction?

2.2 Which specific job roles (e.g., software engineers, technicians) are in increasing demand, and which ones are diminishing in your region?

2.3 Are there particular skills that are currently in shortage or surplus in your region's labour market?

2.4 Can you elaborate on the key socio-economic challenges currently prevalent in your region?

2.5 How does your region collaborate or plan to collaborate with other regions on matters related to Just Transition?

### Section 3: Policy application

3.1 Can you describe the main policies that are currently in place to support the Just Transition in your region?

3.2 Could you provide details on any policies or initiatives aimed at matching workers with new employment opportunities?

3.3 Are there existing or planned policies designed to attract workers from other regions or facilitate the mobility of your citizens to explore job opportunities in other areas?

3.4 What Just Transition policies do you deem to be most effective, and which the least effective, why?

### Section 4: Future strategies and policies

4.1 Are you aware of the proposed European Green Industrial Plan, and if so, how do you anticipate it impacting on your region's economy?

4.2 What are your plans for future Just Transition policies, and how will they differ from current policies?

4.3 What do you consider to be the greatest challenge to achieving a Just Transition?

### Section 5: Personal perspectives

5.1 What have been the key challenges you've encountered in shaping and implementing Just Transition policies?

5.2 What types of information or data do you find most valuable in informing your policymaking on Just Transition?

5.3 In which areas would you like to receive additional support or assistance in relation to Just Transition policymaking?

### Section 6: Conclusion

6.1 Do you have any additional comments or insights you would like to share regarding Just Transition and related policies in your region?

# ENDNOTES

- 1 OECD (2023) *Regional Industrial Transitions to Climate Neutrality* (Paris: OECD Publishing); European Commission (2023) “A Green Deal Industrial Plan for the net-zero age”. 2 January 2023.
- 2 Eurobarometer (2022) “Special Eurobarometer report 527: Fairness perceptions of the green transition”.
- 3 Youngs, R. and N. Kambli (2023) “Climate action, social justice, and democracy: Europe’s new trilemma”. Carnegie Europe, 2 February.
- 4 Brandon, K. (2022) “The cost-of-living crisis: Accelerating or delaying a green transition?” SEI, 20 December.
- 5 Williams, C (2023) “Homeland economics”. *The Economist*, 7 October.
- 6 “Stockholm declaration - BusinessEurope’s Council of Presidents”. BusinessEurope, 24 November 2022.
- 7 “A Green Deal Industrial Plan for the net-zero age”. European Commission.
- 8 “Proposal for a Regulation of the European Parliament and of the Council on establishing a framework of measures for strengthening Europe’s net-zero technology products manufacturing ecosystem (Net Zero Industry Act)”. 2023.
- 9 Eurobarometer (2022) “Special Eurobarometer report 527: Fairness perceptions of the green transition”.
- 10 “The Just Transition Mechanism: Making sure no one is left behind”. European Commission.
- 11 “European labour force survey”. Eurostat; “Structural business statistics”. Eurostat
- 12 Eurofound and European Commission Joint Research Centre (2019), “European Jobs Monitor 2019: Shifts in the employment structure at regional level”, European Jobs Monitor series, Publications Office of the European Union, Luxembourg.
- 13 NUTS or nomenclature of territorial units for statistics. The model operates on NUTS0, NUTS1 and NUTS2 scales
- 14 NACE or statistical classification of economic activities in the European Community.
- 15 ISCO or international standard classification of occupations.
- 16 ISCED or international standard classification of education.
- 17 For a more detailed description of this study’s methodology, in particular of the model, please see the Annex provided.
- 18 Hackenbroich, J. and S. Dullien (2022) *European Industrial Policy: A Crucial Element of Strategic Autonomy* (Brussels: FEPS), 19 May.
- 19 “A Green Deal Industrial Plan for the net-zero age”. European Commission.
- 20 *Territorial perspective on green industrialisation*». ESPON EGTC, Nordregio, October. 2023.
- 21 “The key provisions in the EU’s Net Zero Industry Act”. Friedrich-Ebert-Stiftung blog, 30 March 2023.
- 22 “Proposal for a Regulation of the European Parliament and of the Council establishing a framework for ensuring a secure and sustainable supply of critical raw materials and amending regulations (EU) 168/2013, (EU) 2018/858, 2018/1724 and (EU) 2019/1020”. 2023.
- 23 “Proposal for a regulation of the European Parliament and of the Council on establishing a framework of measures for strengthening Europe’s net-zero technology products manufacturing ecosystem (Net Zero Industry Act)”.
- 24 *EU acts to secure access to critical raw materials*”. Economist Intelligence Unit, 17 April 2023; „The key provisions in the EU’s Net Zero Industry Act”. Friedrich-Ebert-Stiftung blog.
- 25 Tagliapietra, S., R. Veugelers and J. Zettelmeyer (2023) „Rebooting the European Union’s Net Zero Industry Act”. Bruegel Institute, 28 June; ‘The Critical Raw Materials Act must tackle supply problems in line with European values’. Transport & Environment, 26 April 2023; „The key provisions in the EU’s Net Zero Industry Act”. Friedrich-Ebert-Stiftung blog.
- 26 Oberle, B. et al. (2019) *Global Resources Outlook 2019: Natural Resources for the Future We Want* (Nairobi: United Nations Environment Programme).
- 27 “A system change compass: Implementing the European Green Deal in a time of recovery”. Systemiq and Club of Rome, October 2020; I. Brachet (2023) “Europe’s socio-ecological transformation requires a very different industrial plan”. Foundation

for European Progressive Studies blog, 15 March. [https://www.systemiq.earth/wp-content/uploads/2020/11/System-Change-Compass-full-report\\_final.pdf](https://www.systemiq.earth/wp-content/uploads/2020/11/System-Change-Compass-full-report_final.pdf); Isabelle Brachet, *Europe's Socio-Ecological Transformation Requires a Very Different Industrial Plan*, (Foundation for European Progressive Studies) (blog

- 28 European Commission, Directorate-General for Regional and Urban Policy (2023) "[Regional trends for growth and convergence in the European Union](#)". Commission Staff Working Document, 1 June 2023.
- 29 Rodríguez-Pose, A. and F. Bartalucci (2023) "Regional vulnerability to the green transition". Publications Office of the European Union. DOI: 10.2873/739058
- 30 Dullien, S. and J. Hackenbroich (2022) "European industrial policy: A crucial element of strategic autonomy". IMK policy brief, no. 130.
- 31 European Commission, Directorate-General for Research and Innovation (2023) "Brain drain: Are European countries losing talent?". Publications Office of the European Union. DOI: 10.2777/766987
- 32 "[SMEs and skills shortages](#)". Eurobarometer, November 2023.
- 33 Basset, G. and O. Lluansi (2023) «[Pénurie de compétences et réindustrialisation: Un étonnant paradoxe](#)». La Fabrique de L'Industrie, 25 July.
- 34 "[Job creation and local economic development](#)". OECD.
- 35 Rodríguez-Pose, A. and Bartalucci, F. (2023) "Regional vulnerability to the green transition". Single Market Economics Paper, Working Paper 16. European Commission.
- 36 Eurofound (2023) "Fit for 55 climate package: Impact on EU employment by 2030". Publications Office of the European Union; A. Vandeplass et al. (2022) "The possible implications of the green transition for the EU labour market". Directorate General Economic and Financial Affairs (DG ECFIN).
- 37 European Commission (2019) *Employment and Social Developments in Europe 2019* (European Commission), chapter 5.
- 38 "Fit for 55 climate package: Impact on EU employment by 2030". Eurofound.
- 39 "[EU solar jobs report 2023: Bridging the solar skills gap with quality and quantity](#)". SolarPower Europe, 2023; "[EU: Wind Energy Industry Jobs 2030](#)". Statista.
- 40 "Regional industrial transitions to climate neutrality". OECD.
- 41 Galgóczi, B. (2020) *Towards a Just Transition: Coal, Cars and the World of Work* (Brussels: ETUI, The European Trade Union Institute); "[A system change compass: Implementing the European Green Deal in a time of recovery](#)". Systemiq and Club of Rome.
- 42 La Gioia, A., A. Fransolet, M. Hudon et al. (2023) "'Just Transition' visions: An analysis of the perception of the Belgian actors". Université Libre de Bruxelles, 24 February. DOI: 10.13140/RG.2.2.22151.37285
- 43 La Gioia et al.
- 44 "The Just Transition Mechanism". European Commission.
- 45 "[Joint statement on social climate fund](#). European Alliance for a Just Transition, March 2022; A. Crespy and M. Munta (2023) "Lost in transition? Social justice and the politics of the EU green transition". *Transfer: European Review of Labour and Research*, 2(29): 235-251. DOI: 10.1177/10242589231173072; M. Akgüç, K. Arabadjieva and B. Galgoczi (2022) *Why the EU's Patchy 'Just Transition' Framework Is Not up to Meeting Its Climate Ambitions* (Brussels: ETUI).
- 46 "The Just Transition Mechanism". European Commission; "Proposal for a Council Recommendation on ensuring a fair transition towards climate neutrality". European Commission, 14 December 2021.
- 47 "EU member states commit to action for a Just Transition towards climate neutrality in new Council recommendation". Solidar <https://www.solidar.org/en/news/eu-member-states-commit-to-action-for-a-just-transition-towards-climate-neutrality-in-new-council-recommendation>; "[Why adopting the Social Climate Fund is the right choice for the EU](#)". Euractiv, 18 April 2023.
- 48 "[Joint statement on social climate fund](#). European Alliance for a Just Transition; "[SOTEU: Causes of the social justice emergency unaddressed](#)". European Trade Union Confederation press release, 13 September 2023; M. Akgüç, K. Arabadjieva and B. Galgoczi (2022) *Why the EU's Patchy 'Just Transition' Framework Is Not up to Meeting Its Climate Ambitions*; I. Brachet (2023) "[Europe's socio-ecological transformation requires a very different industrial plan](#)".
- 49 "[Advancing the EU's Just Transition policy framework: What measures are necessary?](#)" European Economic and Social Committee, 14 December 2023.



- 50 M. Akgüç, K. Arabadjieva and B. Galgoczi (2022) *Why the EU's Patchy 'Just Transition' Framework Is Not up to Meeting Its Climate Ambitions*.
- 51 "Employment and social developments in Europe: Addressing labour shortages and skills gaps in the EU". European Commission, 2023 Annual Review.
- 52 Sullivan, S. E. and A. Al Ariss (2021) "Making sense of different perspectives on career transitions: A review and agenda for future research". *Human Resource Management Review*, 1(31): 100727. DOI: 10.1016/j.hrmr.2019.100727
- 53 Demitry, N., G. Koepke and S. Mewes (2022) "Just Transition in the European automotive industry. Insights from affected stakeholders". NELA; "Job creation and local economic development 2023". OECD; "Employment and social developments in Europe: Addressing labour shortages and skills gaps in the EU". European Commission.
- 54 European Commission (2023) "Impact assessment accompanying the proposal for a regulation of the European Parliament and of the Council establishing a framework for ensuring a secure and sustainable supply of critical raw materials". Commission Staff Working Document, March; European Commission (2023) "Investment needs assessment and funding availabilities to strengthen EU's net-zero technology manufacturing capacity". Commission Staff Working Document, 28 March.
- 55 "Structural business statistics". Eurostat.
- 56 "Investment needs assessment and funding availabilities to strengthen EU's net-zero technology manufacturing capacity". European Commission,
- 57 See the Annex for more details on the interview process.
- 58 Brunet, S. and F. Vesentini (2023) *Les Chiffres-Clés de La Wallonie, Edition 2023* (Wallonia: IWEPS).
- 59 Bachtrögler-Unger, J., P.-A. Balland, R. Boschma et al. (2023) *Technological Capabilities and the Twin Transition in Europe: Opportunities for Regional Collaboration and Economic Cohesion* (Berlin: Bertelsmann Stiftung). DOI: 10.11586/2023017
- 60 "ERDF/JTF Programme Wallonia 2021-2027". FEDER, FTJ, January 2021.
- 61 "SMEs and skills shortages". Eurobarometer.
- 62 "Implications of the climate transition on employment, skills, and training in Belgium". Federal Public Service Health, Food Chain Safety and Environment, June 2023; Brunet, S. and F. Vesentini (2023) *Les Chiffres-Clés de La Wallonie, Edition 2023*.
- 63 Brunet, S. and F. Vesentini (2023) *Les Chiffres-Clés de La Wallonie, Edition 2023*.
- 64 "Estadísticas territoriales". INE.
- 65 Bachtrögler-Unger, J., P.-A. Balland, R. Boschma et al. (2023) *Technological Capabilities and the Twin Transition in Europe: Opportunities for Regional Collaboration and Economic Cohesion*; "Spain, 4 years towards a just energy transition". Ministry for Ecological Transition and Demographic Challenge of the Kingdom of Spain, May 2023.
- 66 "Spain, 4 years towards a just energy transition". Ministry for Ecological Transition and Demographic Challenge of the Kingdom of Spain.
- 67 Bachtrögler-Unger, J., P.-A. Balland, R. Boschma et al. (2023) *Technological Capabilities and the Twin Transition in Europe: Opportunities for Regional Collaboration and Economic Cohesion*.
- 68 "Spain, 4 years towards a just energy transition". Ministry for Ecological Transition and Demographic Challenge of the Kingdom of Spain.
- 69 "Regional industrial transitions to climate neutrality". OECD; Rodríguez-Pose, A. and F. Bartalucci (2023) "Regional vulnerability to the green transition".
- 70 Statistics Poland (2022) *Statistical Yearbook of the Regions - Poland 2022* (Poland: Statistics Poland); Czech Statistical Office (2022) *Statistical Yearbook of the Moravskoslezský Region - 2022* (Czech Republic: Czech Statistical Office).
- 71 Krzysztozek, A. (2023) "Coking coal remains on EU critical raw materials list after Polish pressure". Euractiv, 20 March 2023.
- 72 Bachtrögler-Unger, J., P.-A. Balland, R. Boschma et al. (2023) *Technological Capabilities and the Twin Transition in Europe: Opportunities for Regional Collaboration and Economic Cohesion*.
- 73 Christiaensen, L., C. Ferré, T. Gajderowicz et al. (2022) "Towards a just coal transition labor market challenges and people's perspectives from Silesia". Jobs Working Papers, no. 70. World Bank.
- 74 "National Accounts". Eurostat; "Demography, population stock & balance". Eurostat; "EU statistics on income and living conditions". Eurostat; "European labour force survey". Eurostat; "Structural business statistics". Eurostat.

- 75 "Regional statistics Sweden", Statistiska Centralbyrån.
- 76 Gensheimer et al. "Territorial perspective on green industrialisation".
- 77 For more details on the model setup and inputs, see Chapter 2.4 and the annex provided.
- 78 "Proposal for a Council Recommendation on ensuring a fair transition towards climate neutrality". European Commission.
- 79 Erik Pruyt, *Small System Dynamics Models for Big Issues: Triple Jump towards Real-World Dynamic Complexity*, 2013
- 80 NUTS or nomenclature of territorial units for statistics. The model operates on NUTS0, NUTS1 and NUTS2 scales.
- 81 NACE or statistical classification of economic activities in the European Community
- 82 ISCO or international standard classification of occupations.
- 83 ISCED or international standard classification of education
- 84 Steve Bankes, "Exploratory Modeling for Policy Analysis," *Operations Research* 41, no. 3 (June 1993): 435–49, <https://doi.org/10.1287/opre.41.3.435>.
- 85 PEAS Center, "Documentation of the SEER Workforce Model Version 3c [WorkforceModel\_SEERdata\_v03c.Mdl]" (SEER, 2023), [https://www.systemiq.earth/wp-content/uploads/2023/05/Operator\\_and\\_Developer\\_Guide-and-Model-Documentation.pdf](https://www.systemiq.earth/wp-content/uploads/2023/05/Operator_and_Developer_Guide-and-Model-Documentation.pdf).
- 86 E. Pruyt, "Operator & Developer Guide - SEER Work Force Model V03" (SEER, 2023), [https://www.systemiq.earth/wp-content/uploads/2023/05/Operator\\_and\\_Developer\\_Guide-and-Model-Documentation.pdf](https://www.systemiq.earth/wp-content/uploads/2023/05/Operator_and_Developer_Guide-and-Model-Documentation.pdf).
- 87 Please note that it was not possible to change C28 as input to the model, but given its maximum expected change was 0.6%, this was not considered to have a significant impact.

---

# **AUTHORS, ABOUT FEPS & PARTNERS**

---

## About the authors



### MILAN PETIT

Milan is co-founder and lead of Project SEER, which aims to provide EU policymakers and other stakeholders with a better evidence base for a European economic transition that leaves no one behind. Previously, he worked for Systemiq, a systems change agency, where he co-authored multiple reports and on the European Green Deal, plastic pollution, and the circular economy. He is also Co-founder of the Sustainable Storytelling Academy Europe, and doing a PhD on a Systems approach to the European Just Transition.



### MIKHAIL SIRENKO

Mikhail is a Researcher at the Delft University of Technology and Wageningen University & Research and has a background in applied mathematics and cybernetics. He is also a Disaster Risk Management Consultant at the World Bank. Currently, Mikhail works at the intersection of computational modelling for policy-making. He studies how complex systems like cities or countries can recover, adapt, and transform given various shocks, e.g., a heatwave or a pandemic, and stresses such as social inequality.



## MICHAEL OBERSTEINER

Michael Obersteiner is Director at the Environmental Change Institute (ECI) at Oxford University. His research experience stretches from biophysical modelling in the areas of ecosystems, forestry and agriculture to economics, finance and integrated assessment and he has published over 250 scientific papers. Under his leadership several national and international organisations, including inter alia the European Commission, WWF, OECD, and other national and international institutions have received science-based policy advice using quantitative modelling techniques.



## KEVIN LE MERLE

Kevin Le Merle is a researcher and policy analyst on questions of climate, environmental, and energy justice. As a PhD Fellow, Kevin Le Merle is attached to the Department of Political and Social Sciences of Ghent University and United Nations University Institute of Comparative Regional Integration Studies, where he is carrying out his research on global distributive justice principles and applying these to the external impacts of the European Green Deal.

Before joining Ghent University, Kevin worked as policy analyst for the Foundation for European Progressive Studies where he spearheaded research on Climate, Environment, and Energy Policy. His past experiences also include collaborations with the Cambridge Institute for Sustainability Leadership, and United Nations University, where he authored research on the EU's climate legislation with the aim to bridge the gap between global climate justice and pragmatic policy practice.

## ABOUT THE FOUNDATION FOR EUROPEAN PROGRESSIVE STUDIES (FEPS)

The Foundation for European Progressive Studies (FEPS) is the think tank of the progressive political family at EU level. Its mission is to develop innovative research, policy advice, training and debates to inspire and inform progressive politics and policies across Europe.

FEPS works in close partnership with its 68 members and other partners -including renowned universities, scholars, policymakers and activists-, forging connections among stakeholders from the world of politics, academia and civil society at local, regional, national, European and global levels.

**FEPS**  
FOUNDATION FOR EUROPEAN  
PROGRESSIVE STUDIES



European Political Foundation - No 4 BE 896.230.213  
Avenue des Arts 46 1000 Brussels (Belgium)  
[www.feps-europe.eu](http://www.feps-europe.eu)  
@FEPS\_Europe

## ABOUT FRIEDRICH-EBERT-STIFTUNG

The EU Office of the Friedrich-Ebert-Stiftung (FES), with its headquarters in Brussels and activities in Brussels and Strasbourg, was opened in 1973. The EU Office participates in the European integration process, backs and accompanies the interests of the Federal Republic of Germany in Europe and contributes to shaping the external relations of the European Union.



Rue du Taciturne 38, BE-1000 Brussels (Belgium)  
<https://brussels.fes.de/>  
@fes\_brussels

## ABOUT SEER

SEER (Socio-economic Effects of an EGD implementation and Reform) works to support policymakers in implementing SCC-aligned EGD policies, by providing a detailed understanding of the socioeconomic effects of system change. The project is building a trusted and evidence-based tool suite for decision-makers at all levels working on Just Transition topics.

**Project SEER**

Project SEER is a consortium consisting of Systemiq, The Centre for System Solutions, the Center for Policy Exploration Analysis and Simulation, Oxford University's Environmental Change Institute, and the Club of Rome.  
[www.systemiq.earth/portfolio/seer](http://www.systemiq.earth/portfolio/seer)

## ABOUT THE ENVIRONMENTAL CHANGE INSTITUTE

Since their inception in 1991, the ECI at the university of Oxford has helped governments, business and communities anticipate and respond to the risks of environmental change. They have an international track record for research in climate, ecosystems and energy and a growing expertise in the fields of food, water and health.



School of Geography and the Environment,  
University of Oxford, OUCE, South Parks Road, Oxford,  
OX1 3QY (United Kingdom)  
[www.eci.ox.ac.uk](http://www.eci.ox.ac.uk)  
[@ecioxford](https://twitter.com/ecioxford)

## ABOUT IIASA

The International Institute for Applied Systems Analysis (IIASA) is an international research institute that advances systems analysis and applies its research methods to identify policy solutions to reduce human footprints, enhance the resilience of natural and socioeconomic systems, and help achieve the Sustainable Development Goals.



Schlossplatz 1, A-2361 Laxenburg (Austria)  
[www.iiasa.ac.at](http://www.iiasa.ac.at)  
[@IIASAVienna](https://twitter.com/IIASAVienna)

This report assesses the Green Deal Industrial Plan (GDIP) and its impact on Europe's labour market, focusing on the Net-Zero Industry Act and the Critical Raw Materials Act. It assesses the effectiveness of complementing the GDIP with labour market policies in Just Transition regions, highlighting the challenges of labour shortages and structural unemployment. The study's mixed-method approach provides insights into the structural mismatch in the labour market, emphasising the need for labour mobility. Regional case studies from Belgium, Spain, Czechia, Poland and Sweden offer varied perspectives on this transition. The report concludes with policy recommendations, emphasising a systems approach for a balanced, effective transition. It aims to guide policymakers in achieving a Just Transition for all European regions, underlining the need for integrated solutions to foster a socially just and well-functioning European labour market.

**POLICY STUDY PUBLISHED IN APRIL 2024 BY:**



**Project SEER**



**FEPS**  
FOUNDATION FOR EUROPEAN  
PROGRESSIVE STUDIES



*Copyright © 2024 by FEPS*

ISBN: 978-2-931233-73-3 9782931233733  
KBR Legal Deposit Number: D/2024/15396./14