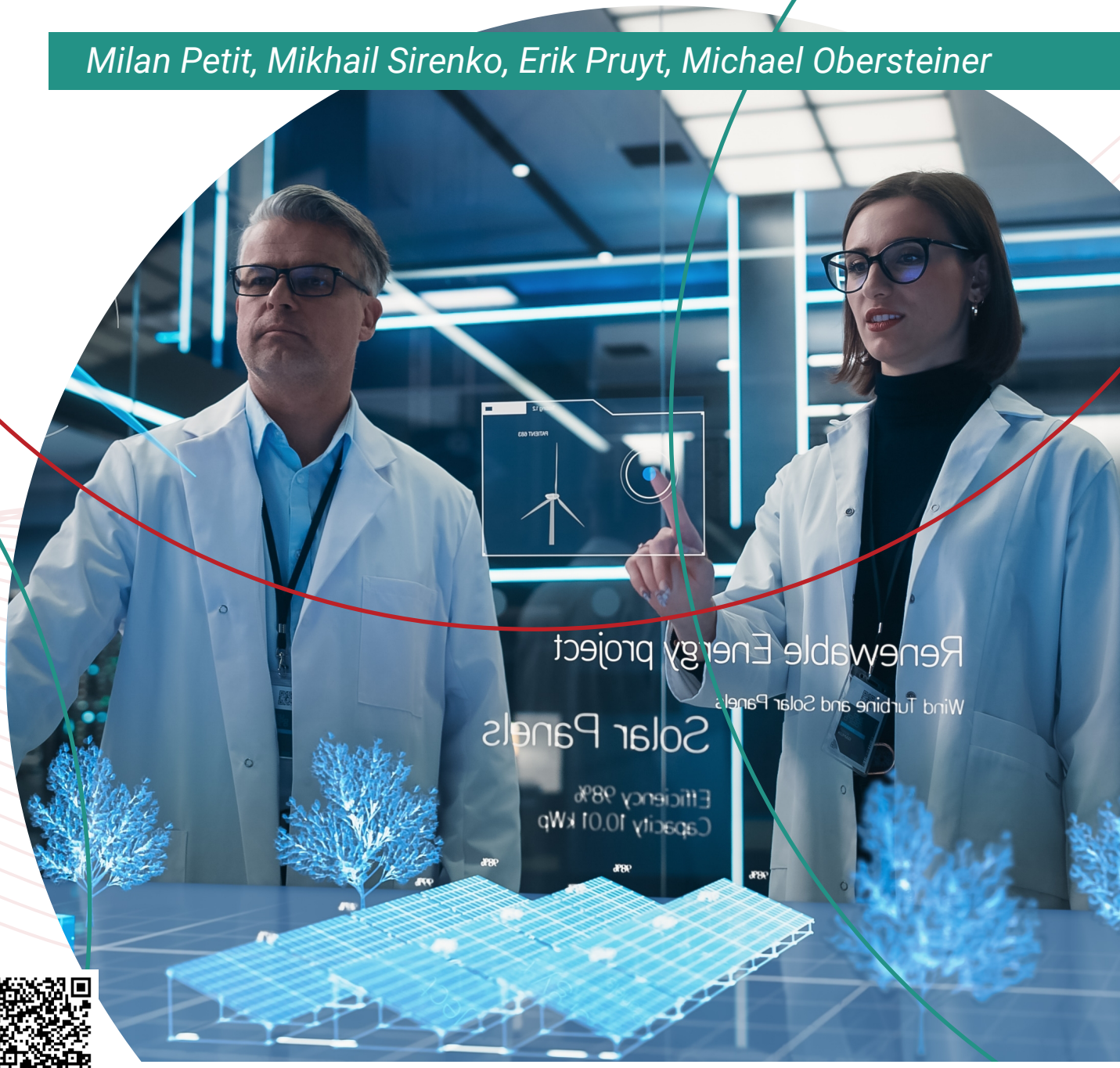
POLICY STUDY
February 2025

EXPECTED LABOUR MARKET EFFECTS OF THE GREEN DEAL INDUSTRIAL PLAN

A REGIONAL LABOUR POLICY APPROACH

Milan Petit, Mikhail Sirenko, Erik Pruyt, Michael Obersteiner



PEAS Center
Systems Transformation Hub
International Institute for Applied Systems Analysis
IIASA www.iiasa.ac.at
Project SEER
Environmental Change Institute
eci
University of Oxford
Friedrich Ebert Stiftung
FEPS
FOUNDATION FOR EUROPEAN PROGRESSIVE STUDIES

Policy Study published in February 2025 by

THE FOUNDATION FOR EUROPEAN PROGRESSIVE STUDIES (FEPS)

European Political Foundation - Nº 4 BE 896.230.213
Avenue des Arts 46 1000 Brussels (Belgium)
www.feps-europe.eu
@FEPS_Europe

Friedrich-Ebert-Stiftung Climate and Social Justice

Cours Saint Michel 30e, 1040 Brussels (Belgium)
https://justclimate.fes.de/
@fes_brussels

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

Systems Transformation Hub

Place du Congrés, 1, 1000 Brussels (Belgium)
www.systemstransformationhub.org

The Center for Policy Exploration, Analysis and Simulation (PEAS) – PEAS Center

Pisuissestraat 449, 2353 BP The Hague (The Netherlands)
www.peas.center

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
@ecioxford

International Institute for Applied Systems Analysis (IIASA)

Schlossplatz 1, A-2361 Laxenburg (Austria)
www.iiasa.ac.at
@IIASAVienna

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

Front page photo: shutterstock.com/g/gorodenkoff
Copy-editing: Aoife Thomas
Graphic design: Agencia Downtown

Legal deposit registration number: D/2025/15396./10
ISBN: 978-2-39076-015-3

ACKNOWLEDGEMENTS

The authors of this report are especially grateful for the financial support provided by the Foundation for European Progressive Studies and Friedrich Ebert Stiftung for this report series, and to Luis Sáez 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. Furthermore, they would like to thank their reviewers, Taube van Melkebeke (Green European Foundation), Patricia Urban (Centre for European Policy Studies), Kevin Le Merle (United Nations University) and Thomas Fröhlich (Foundation for European Progressive Studies) for their valuable input and time.

TABLE OF CONTENTS

EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

This study explores the potential impact of green industrial policies, such as the Green Deal Industrial Plan (GDIP), on the European manufacturing workforce through a modelling approach. **The model reveals three distinct types of regional economies** -growth-stretched, stable-flow and transition-phase- each with unique challenges and opportunities:

1. **Growth-stretched** economies are characterised by strong demand for manufacturing employment, but also have higher than average vacancy rates and little room to expand in response to industrial policies
2. **Stable-flow** economies have around the average reduction of workforce employed in manufacturing and an increase in number of vacancies, with some room to benefit from industrial policies
3. **Transition-phase** economies are expected to see the largest decline in workforce employed in manufacturing, but have the biggest potential to benefit from industrial policies

In the baseline scenario, **total manufacturing employment is expected to decline in line with the working-age population**, while **demand** for manufacturing employment **should decrease less,** leading to **lower unemployment and higher vacancy rates.**

The **GDIP scenario suggests that the manufacturing workforce could experience higher rates of employment, and lower unemployment rates**, compared to the baseline, but with increased vacancy rates, particularly in growth-stretched metropolitan economies. It is estimated that around 33% of jobs created will be vacancies. The results are however within the bounds of uncertainty, indicating that the **effects are likely to be locally concentrated**, but not measurable at regional and sectoral level.

Complementing the GDIP with labour market policies likely yields better outcomes for all but one policy option, indicating the benefits of broader policy packages.

The effectiveness however varies depending on the geographical context, creating trade-offs within and between regions. Policies supporting labour mobility within regions are expected to benefit businesses in transition-phase places and unemployed workers in growth-constrained labour markets, while supporting relocation to other regions would benefit businesses in growth-constrained markets, and unemployed workers in transition-phase economies.

Combining multiple policies such as reskilling and improving within region labour mobility would **yield collectively better labour market results**, even though **no analysed policy option is sufficient to significantly decrease unemployment or vacancy rates** for the European manufacturing labour force.

"The effectiveness of industrial policies depends on a well-functioning European labour market."

For policymakers, this study demonstrates that **the effectiveness of industrial policies depends on a well-functioning European labour market.** Achieving this requires addressing three common policy optimisation challenges:

1. **Combine a regional approach with EU-wide coordination**, to maximise collective gains and fairly distribute costs and benefits.
2. **Focus on long-term investment needs within current fiscal constraints**, to enhance competitiveness and improve social outcomes.
3. **Consider the complexity of implementing integrated policy pathways**, to strengthen their robustness and remain cost-effective.

1. INTRODUCTION

1. INTRODUCTION

While predicting the future is notoriously difficult, exploring potential future scenarios that are based on present-day dynamics is slightly easier. That is why the SEER model (estimating Socioeconomic Effects of the European green deal implementation and Reform) was designed to explore how the future of the European labour market could look under various future scenarios related to the European Green Deal (EGD). Specifically, it aims to analyse the effects of industrial, environmental and labour market policies on various labour market indicators at regional, sectoral and skill level. This allows for an assessment of these policies at higher granularity and enables the identification of underlying dynamics that can support policymakers to achieve a Just Transition.[1]

For this series of reports for the Foundation of European Progressive Studies (FEPS), the potential of labour market policies for the Green Deal Industrial Plan (GDIP) is assessed. The analysis focuses on the impact of industrial policies like the GDIP on job creation, unemployment reduction and potential labour shortages, examining these effects at regional, sectoral and skill levels.

For this second model exploration, the analysis of the five Just Transition regions is expanded to all EU regions, and two additional labour market policies are added: re- and upskilling, and a policy combination promoting within regional labour mobility with re- and upskilling. Specifically, we are interested to see if the trends observed in the first policy study are also visible when including all European regions.

The aim of the research is to provide policymakers with insights into the trade-offs involved with different policies they might have to consider. It can also help policymakers identify regions in Europe with similar challenges, fostering cooperation and an exchange of experiences. Additionally, it can help policymakers identify regions with complementary challenges, enabling collaboration to address these challenges effectively.

This study starts with a short description of the SEER model and methodology, followed by an analysis of the results, for the baseline, GDIP, and various labour market policy scenarios. Each section includes the results at EU, national and regional level.

Background: key findings of the previous policy study

For the first report in this series, the effects of the GDIP policies, specifically the Net Zero Industry Act (NZIA) and the Critical Raw Materials Act (CRMA), on five Just Transition regions were analysed using the SEER model. Furthermore, the potential of complementing these policies with two types of labour market policies, first supporting within region labour mobility, which helps workers find jobs within their regions, and secondly by promoting relocation, which encourages workers to take up jobs in other regions, was tested. The results of this analysis were validated through interviews with local stakeholders and experts.

Based on the outcome of this study, we concluded that for the studied regions the effects of the GDIP were too small to be observed outside the bounds of uncertainty even at regional and sectoral level. Only labour shortage clearly increased as a result of these policies. Only when complemented with labour policies did unemployment reduce

significantly, while labour shortage reverted to the baseline.

We also found that a trade-off exists between promoting labour mobility within regions and between regions. Specifically, for the regions with the highest unemployment rates, supporting relocation was more effective in reducing unemployment, but at the cost of increased workforce shortage, thus hurting local businesses. On the other hand, supporting within region labour mobility decreased local workforce shortage more, but was not as effective in reducing unemployment.

For the studied regions, it is most likely that ageing is the main challenge for manufacturing industries. Deindustrialisation, as measured by an increase in unemployment for those working in manufacturing, was, however, not observed. Even though the total number of workers in manufacturing industries declined, it was accompanied with decreases in the unemployment rate for the same demographic, and an increase in the vacancy rate. This indicates that if any deindustrialisation takes place, it might be the result of labour shortages, and it is unlikely to cause unemployment.

Stakeholder consultations confirmed that the results of the model were in line with their expectations for all regions except one. In the case of Northern Sweden, which is expected to benefit from a boom in critical mineral mining and clean technology manufacturing, the model results only showed a slight increase in employment for this region in the case of the GDIP. This is explained by the current setup of the model, which calculates the effects of industrial policies by increasing the employment of affected sectors across all regions where this sector is present. It is not yet able to include targeted interventions at regional level.

Apart from quantitively assessing the effects of the GDIP and related labour policies, the first policy study also included an overview of what a holistic labour policy that would address the barriers workers face to switch jobs could look like.

SEER Methodology

In the present research, the model exploration consisted of three steps. The first step is a baseline analysis, which looks at what is likely to happen to regional employment, unemployment and labour shortage in the period 2025-2035 if coal mining is phased out by 2040, but no additional industrial policies are adopted.

The second step explores the potential effects of the GDIP on all regions, based on low, medium, and high outcome scenarios that were included in the policy impact assessments by the European Commission of the NZIA and the CRMA as shown in Table 1.1. For each scenario, employment, unemployment and labour shortage figures are included.

The final step assesses the effects of complementing the GDIP high scenario with four labour policies, as shown in Table 1.2. These are supporting within region labour mobility, either by facilitating job switching between sectors within the same region or to a different sector in the same region, easing relocation, expanding re- and upskilling, and a fourth policy that combines supporting within region

Table 1.1. GDIP labour market changes input into the SEER model

Industry/scenario name	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	+25%	+35%	+50%
C26 Manufacture of computer, electronic and optical products	+0%	+1%	+3%
C27 Manufacture of electrical equipment	+10%	+20%	+24%
E38 Waste collection treatment and disposal activities and materials recovery	+20%	+40%	+60%
E39 Remediation activities and other waste management	+20%	+40%	+60%

labour mobility and expanding re- and upskilling. For each of these policies, we study the effects on employment, unemployment, labour shortage and people in reskilling indicators.

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, as shown in Table 1.2. With P1, both values related to within-region labour mobility are at the maximum of 100%. At P2, the value for relocation is set at 25%, as is the value for reskilling for the reskilling policy P3. Lastly, to check the complementing effects of reskilling and promoting within region labour mobility, we include P4, which combines the values of P1 and P3. These values are based on expert consultations.

The results are presented at eight levels: baseline; the effects of the GDIP for a low, medium and high-impact scenario; and the impact of the four labour market policies for the high-impact GDIP 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.

Table 1.2. Labour market policies.

Policy name/policy lever	Same sectoring	Re-sectoring	Relocation	Re- and upskilling
P0 Baseline	50%	50%	10%	5%
P1 Improve within-region labour mobility	100%	100%	10%	5%
P2 Support relocation	50%	50%	25%	5%
P3 Re- and upskilling	50%	25%	10%	25%
P4: P1 + P3	100%	100%	10%	25%

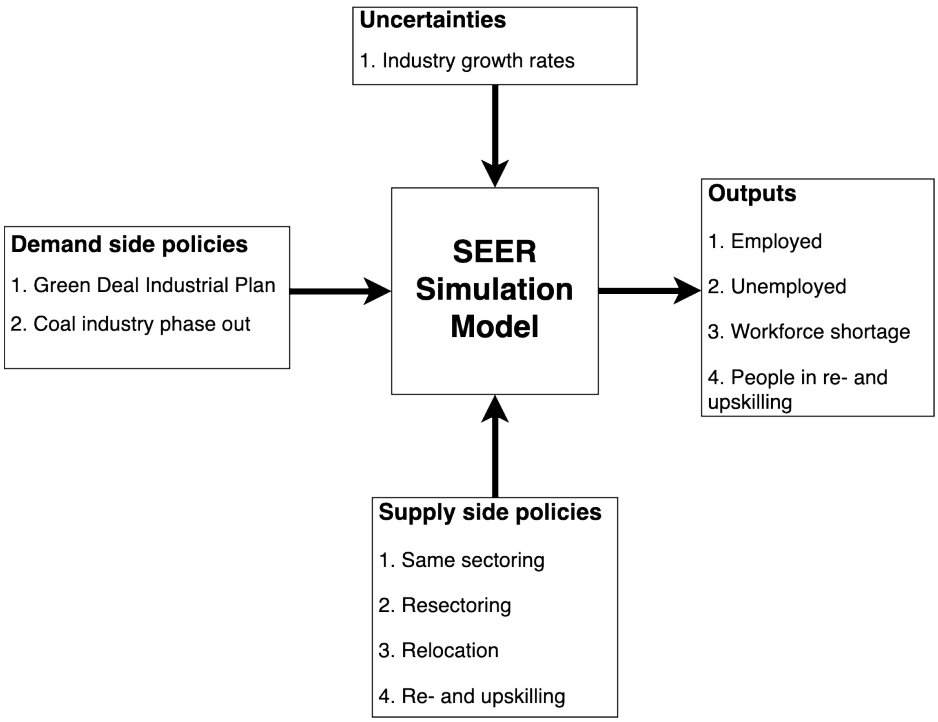
The SEER Model

The SEER setup allows exploration of the underlying labour market dynamics that can influence the effectiveness of the considered policies. Specifically, it intends to identify the trade-offs that exist between various policies, and under which conditions these are relevant. By taking a regional approach, the model is also able to acknowledge if some policies benefit some regions at the expense of others, and how such negative effects might be minimised.

The systems dynamics model, shown simplified in Figure 1.1, is based on Eurostat and European Jobs Monitor data at the regional level (NUTS2), sectoral level (NACE2), job category (ISCO2) and skill level (ISCED).[2] 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 and within a region; resectoring, which includes switching jobs to a different sector within a region; relocation, involving moving to a different region; and re- and upskilling, which allows for those unemployed to increase or decrease their education level within two years, after which they re-enter the labour market at their new skill-level. 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.

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

Figure 1.1. SEER model diagram.

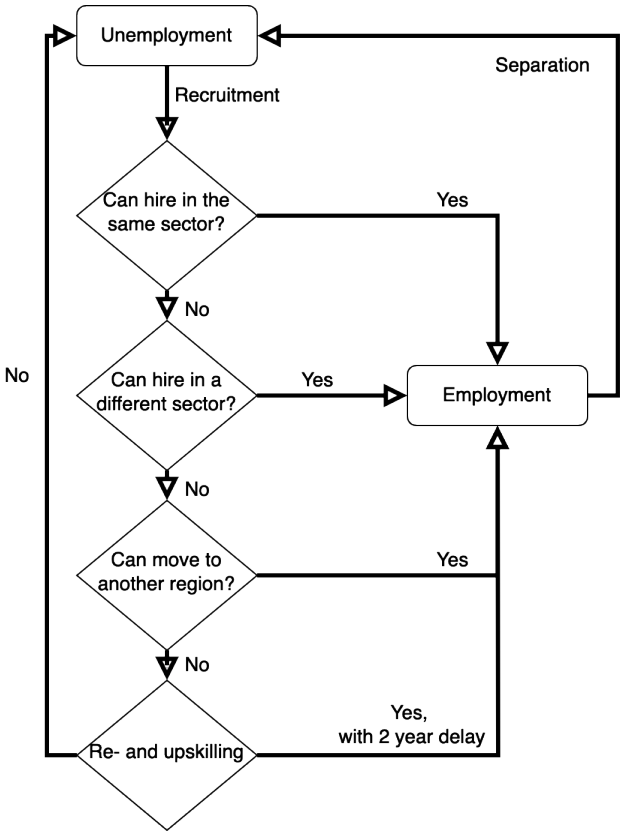


an agent in the model will consider switching to a different sector within the same region. Relocating to another region comes third, and only after this re- and upskilling is considered. This priority order was based on the transaction costs of moving jobs, with the least disruption experienced as the highest priority and vice versa.

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

Three constraints should be noted that could influence the accuracy of the model. Firstly, the model is based on extrapolating past trends and is not integrated with population models. Given current population trends, this could lead to an underestimation of the number of retirements and an overestimation of graduations. Additionally, the model does not account for the effects of emerging technologies that might impact the labour market in the future. Secondly, the model does not constrain the growth rate of worker demand, regardless of the number of vacancies. Most sectors will struggle to expand without sufficient workers, which could result in lower vacancies and weaker employment growth than indicated by the model. Finally, due to data harmonisation challenges, not all regions were included in the analysis. The excluded regions are all Greek regions, the French overseas territories, Valle d'Aosta in Italy, Åland in Finland, and Ceuta and Melilla in Spain.

Figure 1.2. Priority scheme for the model.



2. EUROPEAN MANUFACTURING EMPLOYMENT TRENDS 2025-2035

2. EUROPEAN MANUFACTURING EMPLOYMENT TRENDS 2025-2035

Europe

"Ageing will be the biggest trend affecting the European labour market for manufacturing."

The results in Figures 2-4 show that, in the European Union over the next ten years, it is likely that employment is set to decrease, as is unemployment, while the number of vacancies is expected to increase for manufacturing industries excluding construction. It should be noted however that the 5% decrease in employment is in line with European population projections, which also expect a 5% decrease in the total working age population between 2025-2035.[3] This implies that ageing will be the biggest trend affecting the European labour market for manufacturing. As a result, even with the decrease in manufacturing employment, it will be likely that, at the continental level, there will be more vacancies than unemployed people with the relevant skills for the manufacturing sectors by 2035.

Figure 2. The change in number of employed people in manufacturing industries excluding construction in the European Union under baseline, 2025-2035.

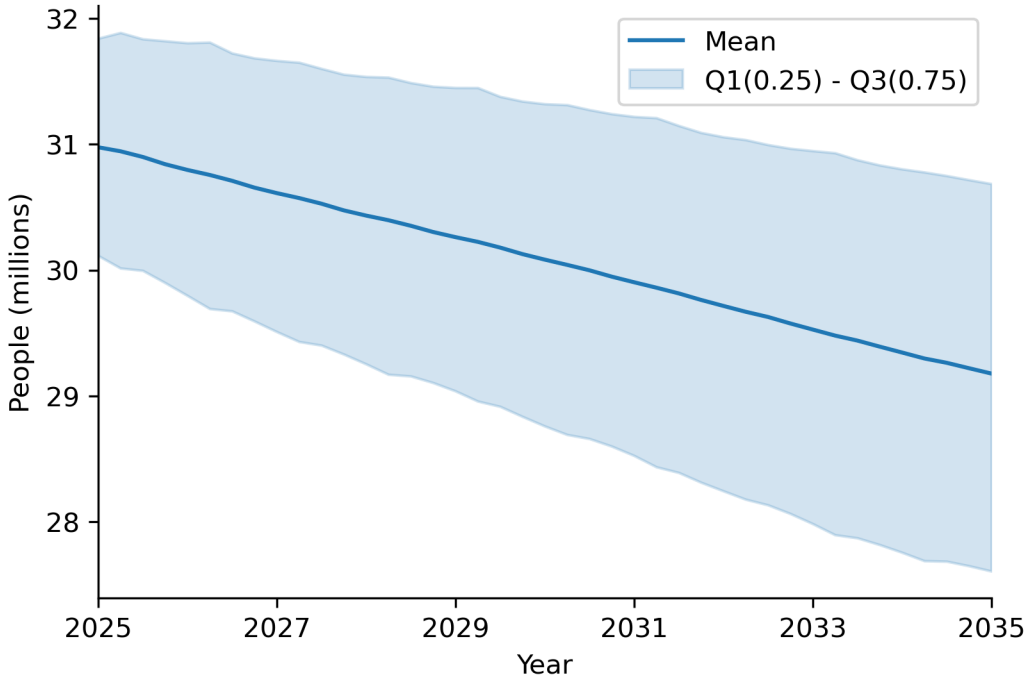


Figure 3. The change in number of unemployed people in manufacturing industries excluding construction in the European Union under baseline, 2025-2035.

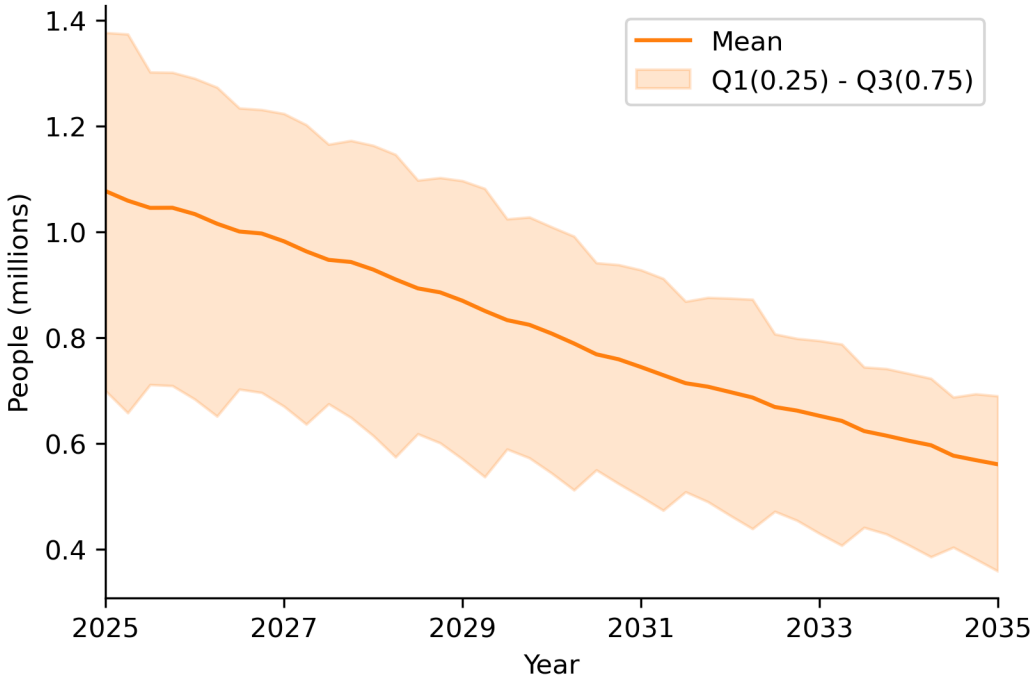
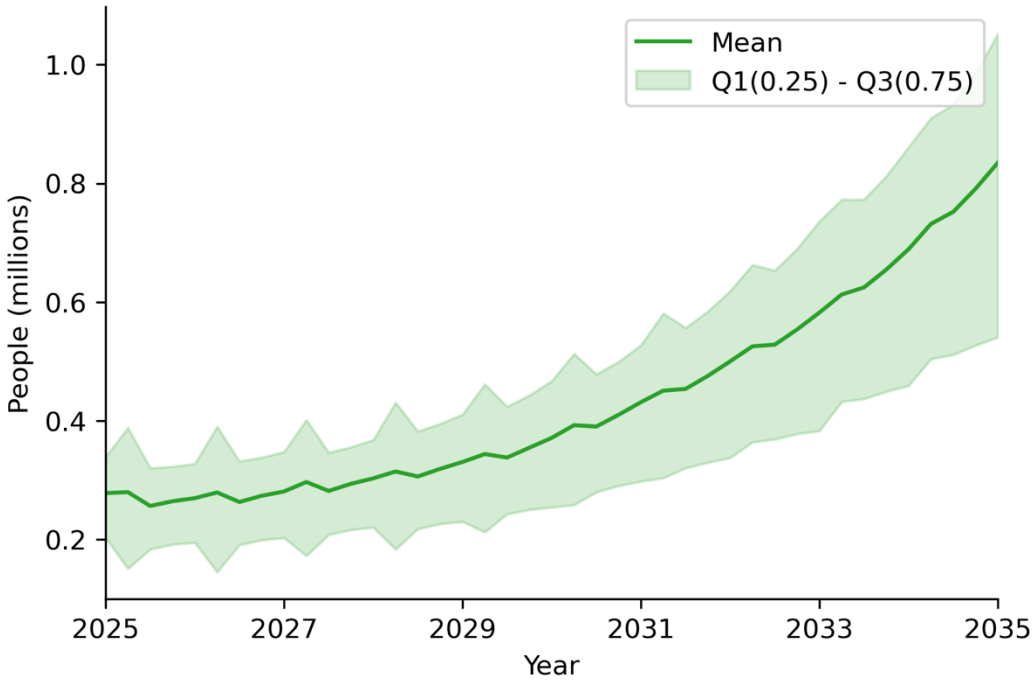


Figure 4. The change in number of vacancies in manufacturing industries excluding construction in the European Union under baseline, 2025-2035.



National

What these long-term trends mean can be best observed when breaking down the results by member state and region. As Figure 5 shows, the absolute number of workers in manufacturing is likely to decrease in most, but not all, member states, between 2025-35. Approximately a quarter of member states are expected to increase their manufacturing employment, or see slight decreases, while another quarter is likely to see a reduction of more than 15% over the same period, and the rest is somewhere in between.

Despite divergent changes in the number of employed, the unemployment rate is expected to decrease for all member states as shown in Figure 6. There seems to be no direct correlation between the type of change in employment, and the extent of reduction in the unemployment rate. Malta, for example, has the smallest decrease in unemployment rate, and the largest relative increase in number of employed. Latvia on the other hand will see both one of the largest relative decreases in number of employed in manufacturing, and the largest drop in its unemployment rate.

A potential explanation can be found in combining the results with the respective vacancy rates in Figure 7, which shows that countries with small changes in the unemployment rate, but increases in number of employed, experience the highest vacancy rates. Countries with existing higher unemployment rates seem to have a larger pool of recruits for businesses looking for new workers in a shrinking labour force, keeping the vacancy rate low and decreasing the unemployment rate. This can be seen in Spain and Latvia, for example. On the other end of the spectrum, countries with already strong labour markets have few unemployed workers available, leading to an increase in vacancy rate, such as in Malta and Hungary. The fact that these economies are able to grow their respective labour forces despite tight labour markets is likely to be the result of migration, both from within and outside the EU.

Figure 5. % change in number of employed people in manufacturing industries excluding construction per member state under baseline, 2025-2035.

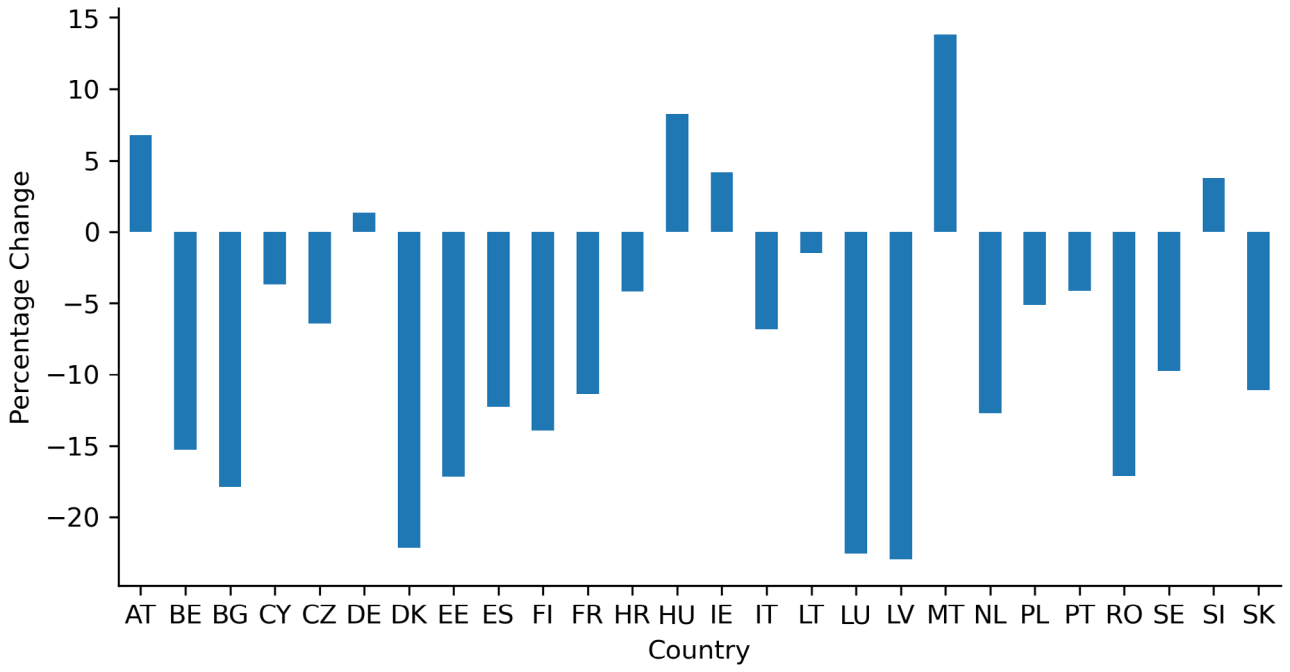
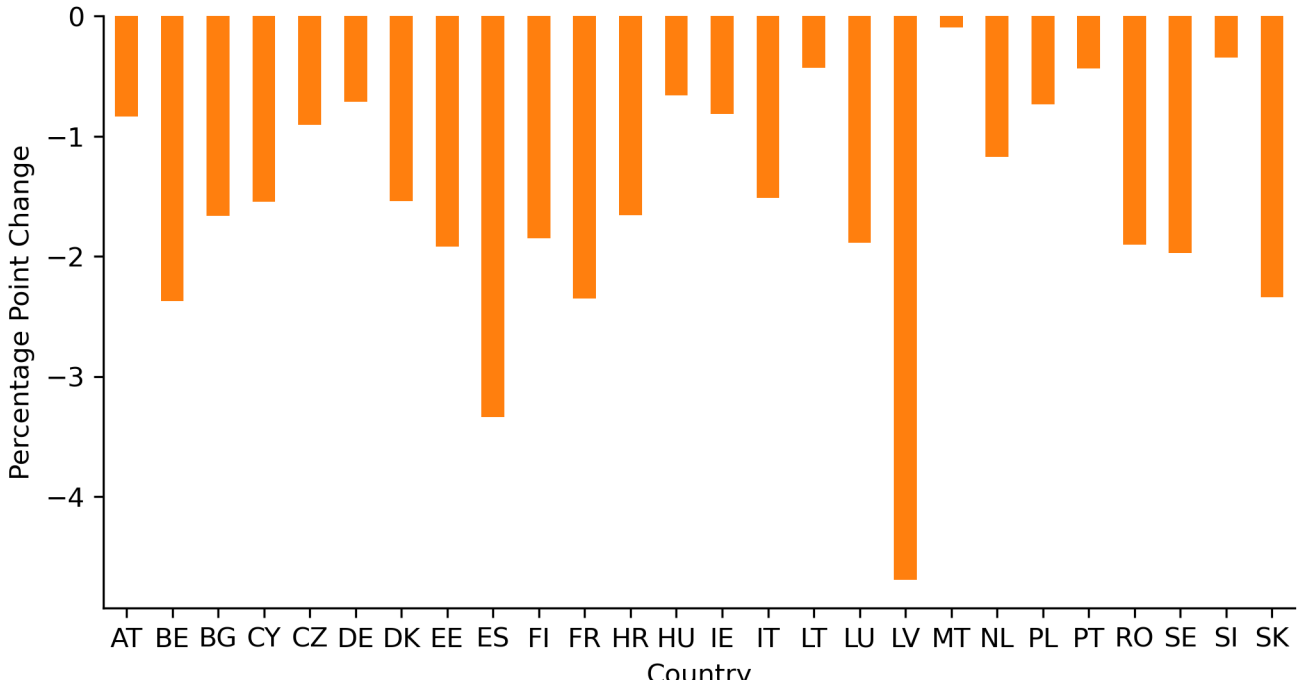


Figure 6. % point change in unemployment rate in manufacturing industries excluding construction per member state under baseline, 2025-2035.



"A distinction can be made between three types of economies."

The results show that, while ageing is likely to affect most countries, deindustrialisation is only expected for some. It seems that a distinction can be made between three types of economies:

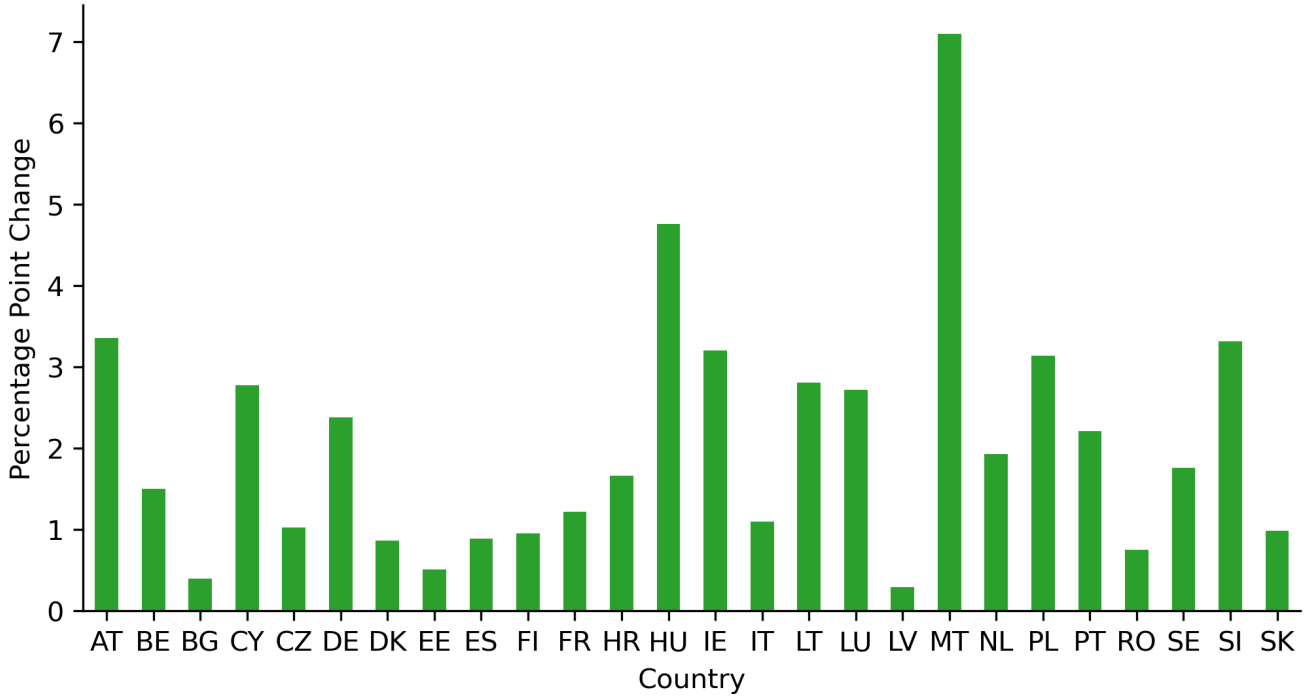
1. Growth-stretched – where growth or stabilisation of the manufacturing workforce is combined with low existing unemployment rates and an increase in the vacancy rate. This includes Austria, Cyprus, Germany, Hungary, Ireland, Lithuania, Malta, Poland, Portugal and Slovenia.

2. Stable-flow – where all three indicators are close to the average, this includes Czechia, Croatia, Italy and the Netherlands.

3. Transition-phase – where larger declines in employment rates coincide with the highest decreases in unemployment rates, reflecting the potential of the labour market to absorb the effects of ageing. This includes Belgium, Bulgaria, Denmark, Estonia, Spain, Finland, France, Latvia, Romania, Sweden and Slovakia.

Three key observations emerge from the analysis. First, whilst growth-stretched regions tend to be located in the centre or at the European periphery, there is no clear distinction between northern, southern, eastern, and western member states. Second, population size also appears insignificant, though the varying importance of manufacturing sectors across countries may limit our understanding of labour market changes. Third, Luxembourg stands out as an outlier, showing one of the largest workforce declines alongside decreased unemployment and increased vacancy rates. This

Figure 7. % point change in vacancy rate in manufacturing industries excluding construction per member state under baseline, 2025-2035.



unusual pattern could either reflect Luxembourg's unique economy—where labour demand exceeds supply despite having fewer workers and higher initial unemployment—or indicate that countries comprising single NUTS 2 regions experience more extreme statistical fluctuations in their indicators. The latter might explain why the smallest member states show some of the most dramatic shifts in their workforce and employment metrics.

Regional

Regional analysis reveals similar patterns to those observed at the national level, with the same three categories of economies present. However, examining the data at regional level (Figures 8-10) provides better insight into geographical distributions. Manufacturing employment growth in absolute terms is concentrated in a belt stretching from Hungary to southern Germany, with additional growth clusters across Germany, Poland, and other scattered locations throughout Europe. Meanwhile, regions experiencing manufacturing workforce decline are evenly distributed outside central Europe.

It should be emphasised that these results might not always reflect current expectations for any single region and should also not be interpreted as such. For example, northern Sweden is expected to double its existing labour force, instead of the shrinkage indicated here.[4]

The changes in unemployment and vacancy rates shown in Figure 9 and 10 confirm the categorisations at national level. The regions with the highest growth rates also have the lowest reductions in unemployment, and the highest increases in workforce shortage. Specifically, it seems that a small number of regions in central Europe are expected to face the biggest challenges regarding skill shortage, while a much larger number of regions across the continent will see little to no change in their unemployment rate.

Figure 8. % change in number of employed people in manufacturing industries excluding construction per region under baseline, 2025-2035.

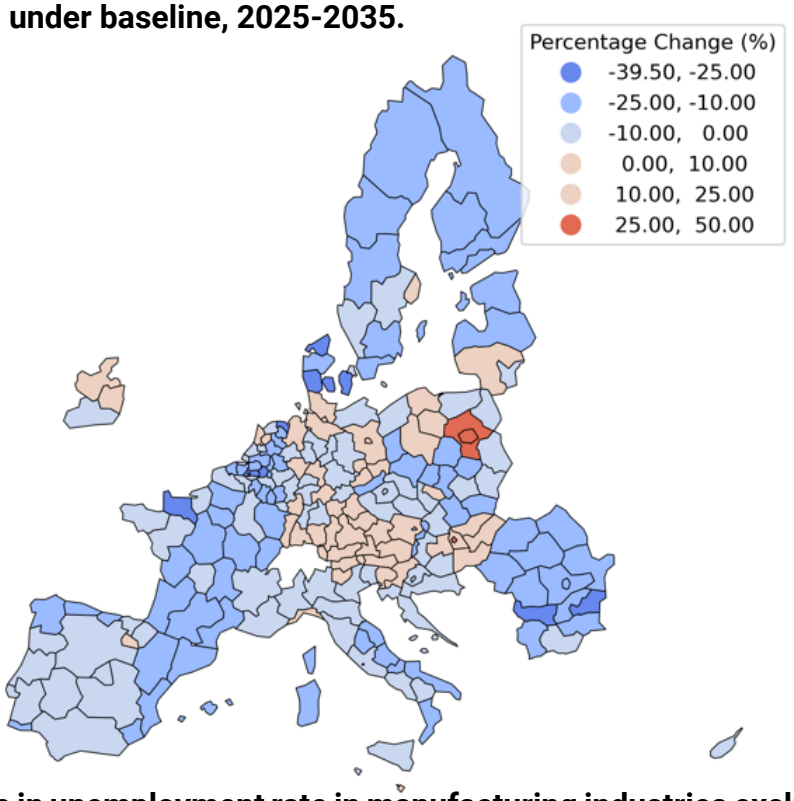


Figure 9. % point change in unemployment rate in manufacturing industries excluding construction per region under baseline, 2025-2035.

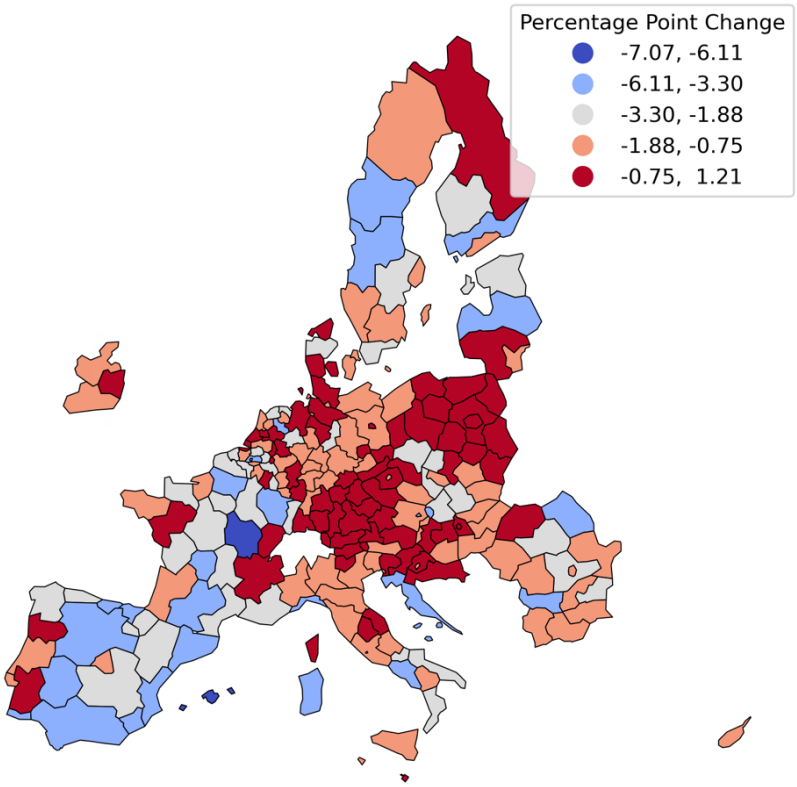
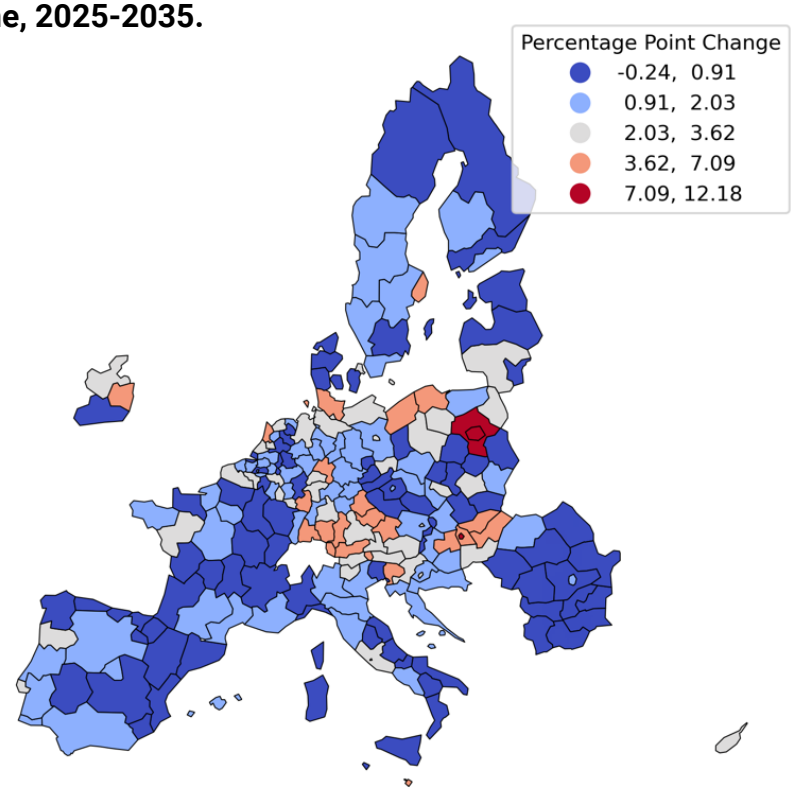


Figure 10. % point change in vacancy rate in manufacturing industries excluding construction per region under baseline, 2025-2035.



3. EXPLORING THE LABOUR MARKET EFFECTS OF THE GREEN DEAL INDUSTRIAL PLAN

3. EXPLORING THE LABOUR MARKET EFFECTS OF THE GREEN DEAL INDUSTRIAL PLAN

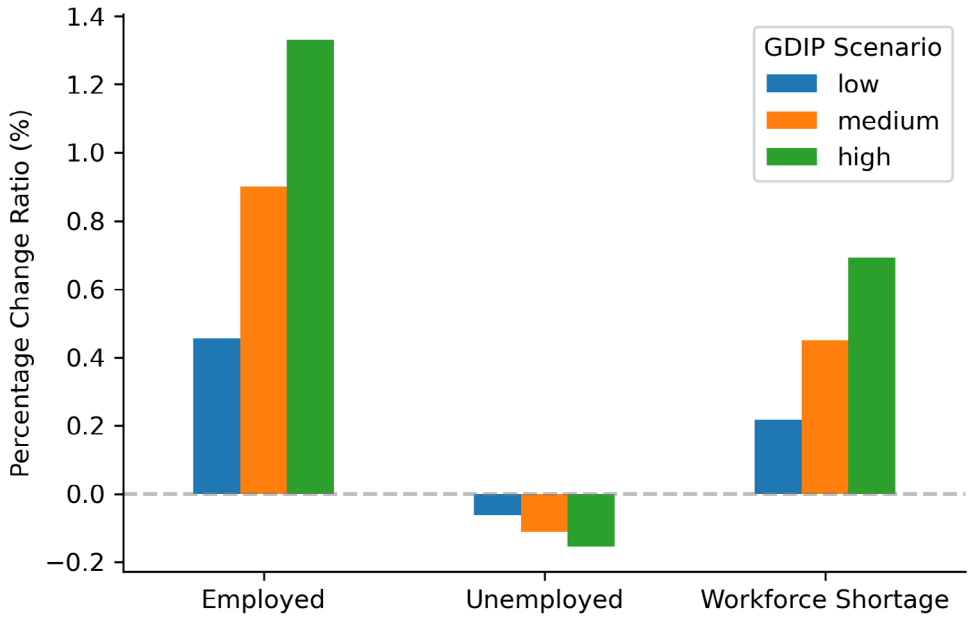
Europe

The GDIP is expected to have a positive impact on the European manufacturing labour force by 2035, as illustrated in Figure 11. The employment rate could increase by 0.5-1.2% of the manufacturing labour force compared to the baseline, or approximately 150-400,000 jobs. This aligns with the lower bound of the more optimistic scenarios outlined in the European Commission's impact assessment, which estimates the creation of 500,000 to 1.2 million jobs.[5]

The reason these expectations are unlikely to be met is the tight labour market conditions that constrain European firms' ability to hire the workers they need. The smaller drop in unemployment rate indicates that few of the remaining job-seekers are likely to live in areas that would see expanding industrial activities or have the required skills.

"The lack of skilled workers could therefore constrain the effectiveness of the policies to expand Europe's manufacturing industry."

Figure 11. % change in share of labour force for selected indicators in manufacturing industries excluding construction for the European Union under all GDIP scenarios vs baseline 2035.



Despite the expectation that workers will shift to manufacturing, there is a difference between the drop in unemployment and the larger increase in employment, which can be explained by a visible mismatch in the vacancy rate. Approximately half a vacancy appears for each job, regardless of the scenario. The lack of skilled workers could therefore constrain the effectiveness of the policies to expand Europe's manufacturing industry.

It is important to acknowledge that the anticipated changes in the labour market fall within the range of uncertainty, with a potential 5% change in either direction. Consequently, the effects of the GDIP at the European level are not expected to have a significant impact on a continental scale.

National

The national-level analysis clarifies where and how GDIP could be effective. As shown in Figure 12, countries in the "transition-phase" group - characterized by high initial unemployment and large expected decreases in manufacturing employment - are likely to benefit most from policies like the GDIP. This suggests that, despite significant drops in unemployment under business-as-usual scenarios, there remains a pool of unemployed workers with the necessary skills to work in the relevant sectors.

On the other hand, as shown in Figure 13, member states that were previously "growth-constrained" are expected to experience an even higher increase in their vacancy rate, indicating that the GDIP will likely further intensify pressure on those labour markets. It can therefore be concluded that the effectiveness of the GDIP will largely depend on the labour market conditions of the respective member states, with existing labour market slack serving as a reliable indicator of the potential to benefit from industrial policies.

Spain and Germany, as two of Europe's largest and most populous countries, form a notable contrast in these graphs. Where the Spanish unemployment rate shows the second largest drop, Germany's

Figure 12. % change in unemployment rate for manufacturing industries excluding construction per member state, for all GDIP scenarios vs baseline 2025-2035.

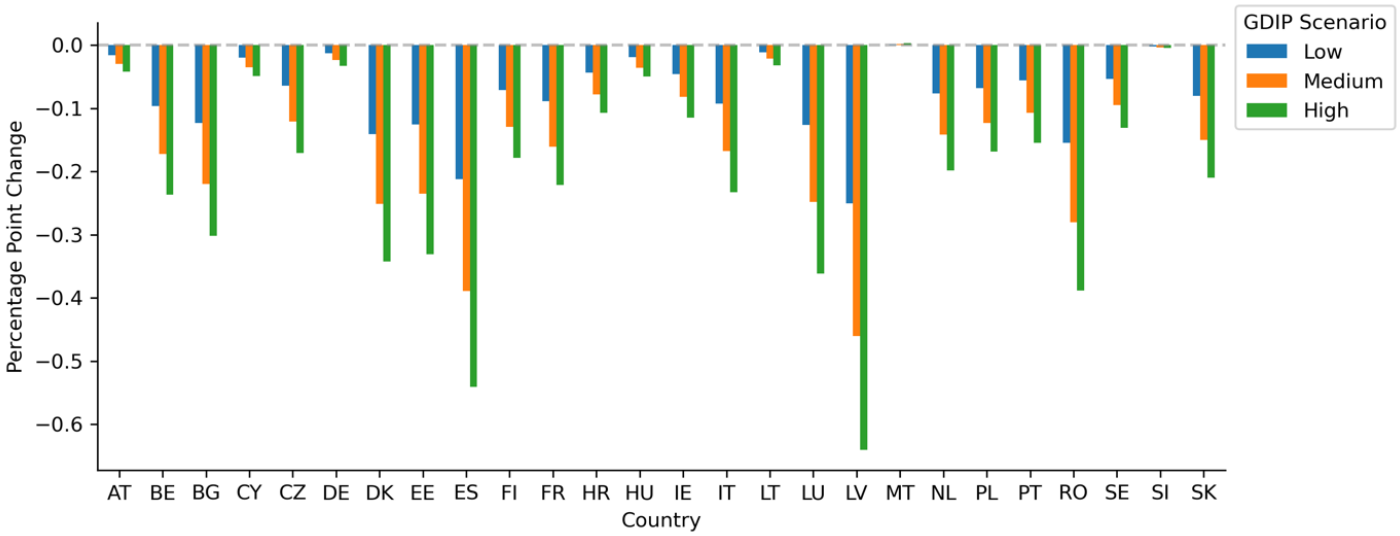
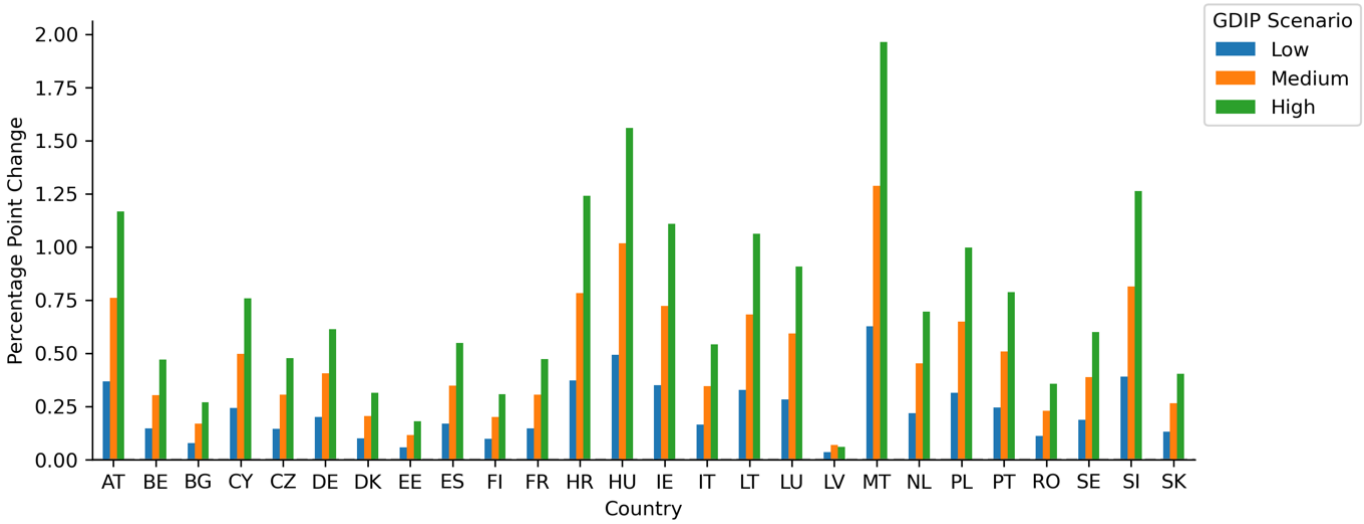


Figure 13. % change in vacancy rate for manufacturing industries excluding construction per member state for all GDIP scenarios vs baseline 2035.



seems to barely budge, as would be expected of their respective group associations, transition-phase and growth-constrained. But as for the vacancy rate, Germany sees a smaller increase compared to peers such as Austria and Hungary, while Spain's seems to qualify it more as a stable-flow country such as Czechia or the Netherlands.

Regional

The regional maps shown in Figures 14 and 15 could explain some of this national divergence from the trends. While the Spanish and other Mediterranean coastal areas expected to see the biggest drop in the unemployment rate in the most optimistic GDIP scenario, most of the rest of Europe is expected to see little effect. Vacancy rates on the other hand are expected to increase most in metropolitan areas.

"The effects of the GDIP on regional and sectoral level are too small to be significant."

Despite some regions seeing clear positive effects, these are still within the 5% uncertainty bounds. This confirms the conclusions of the previous policy study that indicated that the effects of the GDIP on regional and sectoral level are too small to be significant, even though in some municipalities they are likely to be transformational.

When looking at the changes in the vacancy rate under the GDIP, a new pattern starts to emerge in addition to the regional categorisation described above. While the central European belt still sees a larger change in the vacancy rate compared to the rest of the EU, the GDIP seems to have most impact on metropolitan areas with already tight labour markets. This could indicate that while manufacturing tends to be more geographically spread, with a prevalence in central Europe, the industries targeted by the GDIP are located more in metropolitan areas.

"A few regions account for the highest differences in impact, while most see little change."

As with unemployment, the distribution of the effects is highly uneven, and increasingly so depending on the scenario analysed. A few regions account for the highest differences in impact, while most see little change. Again, the vacancy rate is still within the 5% bounds of uncertainty for even the most impacted regions.

Figure 14. % point change in unemployment rate in manufacturing industries excluding construction at regional level, at GDIP high level vs baseline.

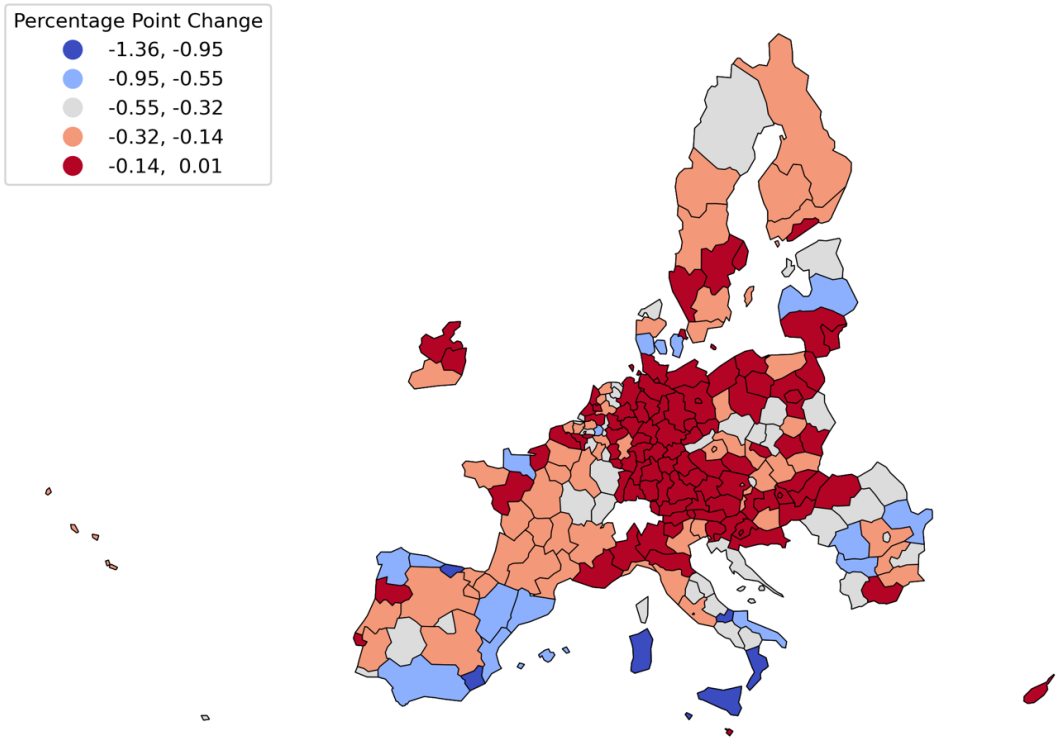
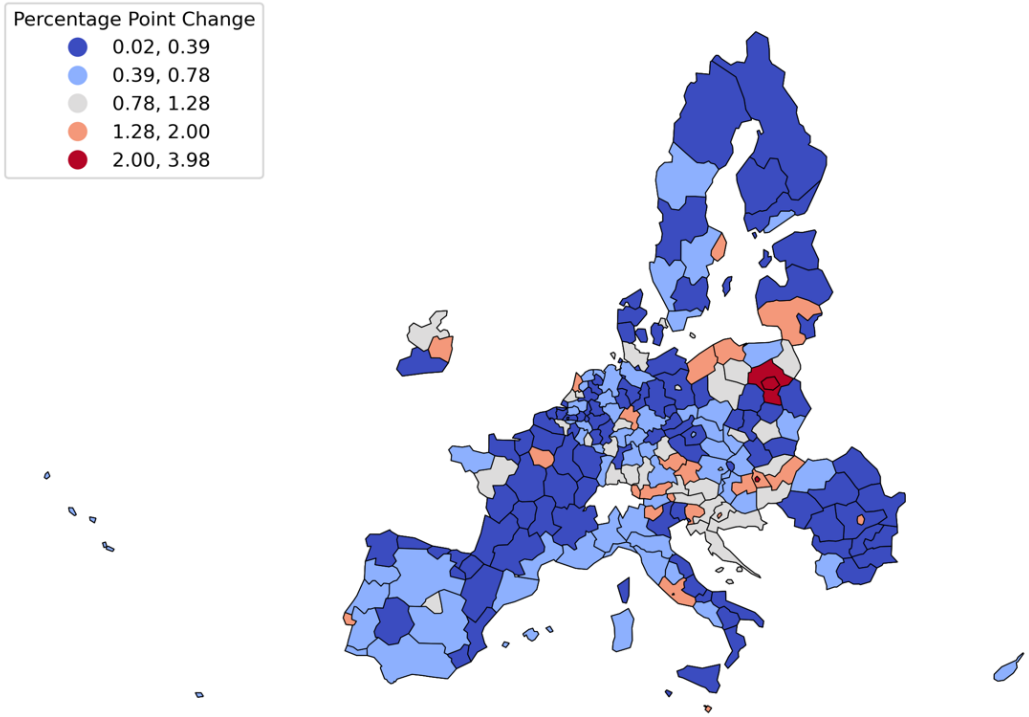


Figure 15. % point change in vacancy rate in manufacturing industries excluding construction at regional level, at GDIP high level vs baseline.



4. THE POTENTIAL OF COMPLEMENTARY LABOUR POLICIES FOR THE GREEN DEAL INDUSTRIAL PLAN

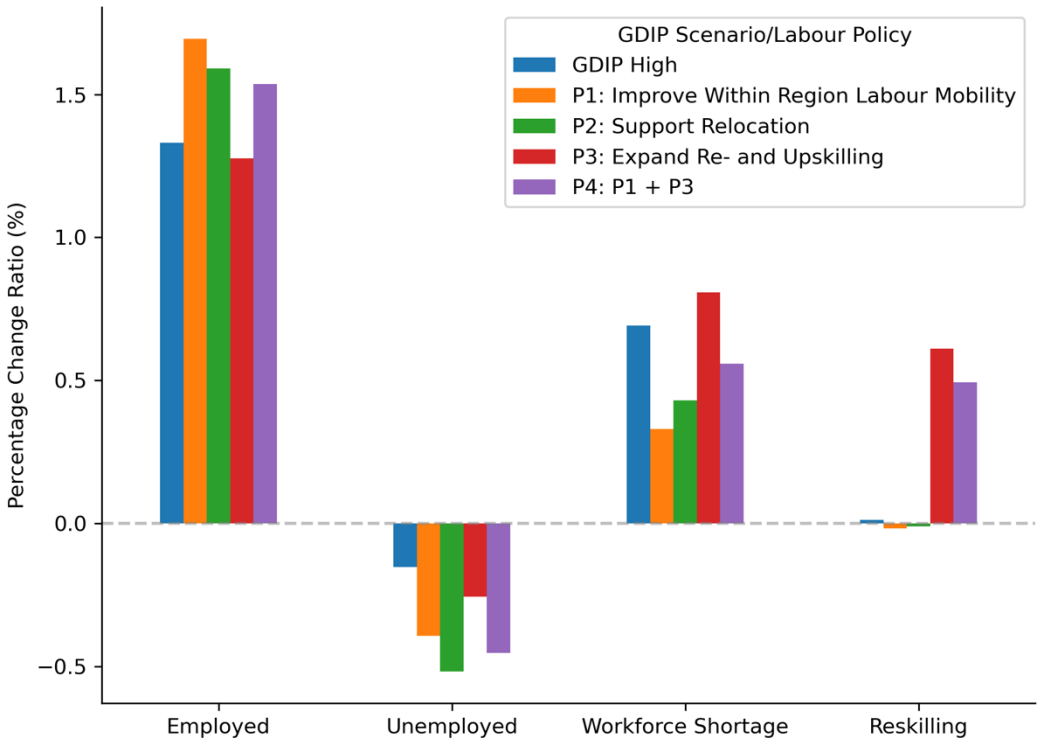
4. THE POTENTIAL OF COMPLEMENTARY LABOUR POLICIES FOR THE GREEN DEAL INDUSTRIAL PLAN

Europe

Complementing the GDIP with labour policies seems to have positive impacts - for almost all policy options and for almost all indicators at European level - compared with the most optimistic GDIP scenario. As shown in Figure 16, employment levels increase further and unemployment levels fall almost twice as far, with the expected increase in vacancy rate possibly halving. This is the case with P1, which simulates the effects of improving within region labour mobility, for example by improving local job matching services, P2, which simulates the reduction in barriers to moving to another region, and P4, which combines P1 with stimulating re- and upskilling.

The reskilling policy P3 seems to be an outlier in terms of effectiveness, underperforming all other policy options for all indicators bar one, which is the result of how it is modelled. Reskilling in the model is simulated as requiring the need to leave the labour force for 2 years to acquire the necessary skills. Furthermore, the model classifies workers in education as being unemployed. This explains why if 0.5% of the labour force at any time is in education, it

Figure 16. % change in share of labour force for selected indicators in manufacturing industries excluding construction for the European Union under all labour policies and GDIP high scenario vs baseline 2035.



reduces the number of workers available to work, as shown in the lower employment and higher vacancy rate, while keeping the unemployment rate higher than it should be.

"Combining various policies could amplify their positive effects and minimise their costs."

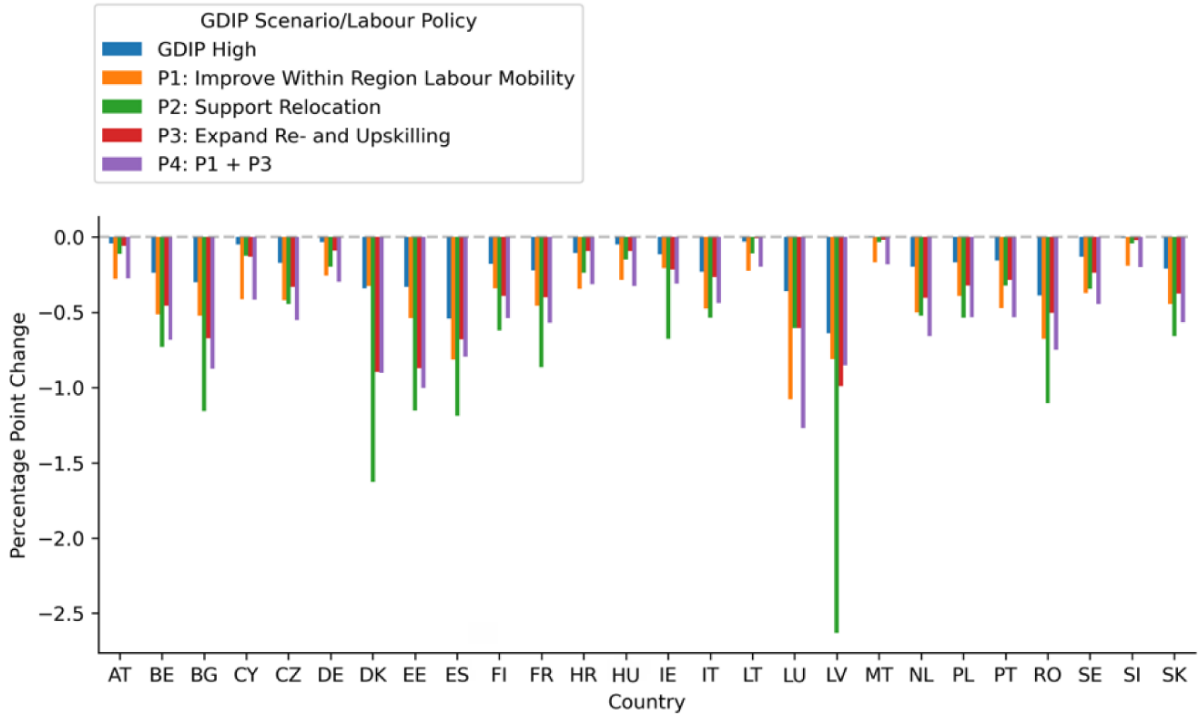
Despite the expected higher costs of investing in education, and the opportunity cost of not working, the negative impacts on employment and vacancies from reskilling seem to be neutralised when combined with improving within regional labour mobility in P4. This indicates that combining various policies could amplify their positive effects and minimise their costs, allowing Europe to reap the benefits of increasing the human capital of its workforce, enhancing its flexibility to capitalise on shifts in technologies, and provide it with the skilled workers needed to remain globally competitive.

At European level, one trade-off seems to emerge between P1 and P2, with the former being slightly more effective in increasing the number of employed people, and decreasing workforce shortage, while the latter is more effective in reducing the number of unemployed. All of these effects however fall within the 5% uncertainty bounds, and so should therefore be interpreted with care.

National

At national level, the divergence between the three categories of countries is best observed when looking at the respective effects of P1 and P2. As can be seen in Figure 17, the transition-phase countries with higher unemployment rates would see this decrease most by supporting relocation, while the growth-constrained countries, with higher vacancy rates, would see the biggest positive impact on unemployment by improving within region labour mobility. The stable flow countries in the middle, such as the Netherlands, see almost no difference between both policies. It should be emphasised again that this data only looks at those working in

Figure 17. % point change in unemployment rate for manufacturing industries excluding construction per member state under all labour policy scenarios and GDIP high scenario vs baseline 2035.



manufacturing, excluding construction, and could therefore look different to expected effects for the whole labour force.

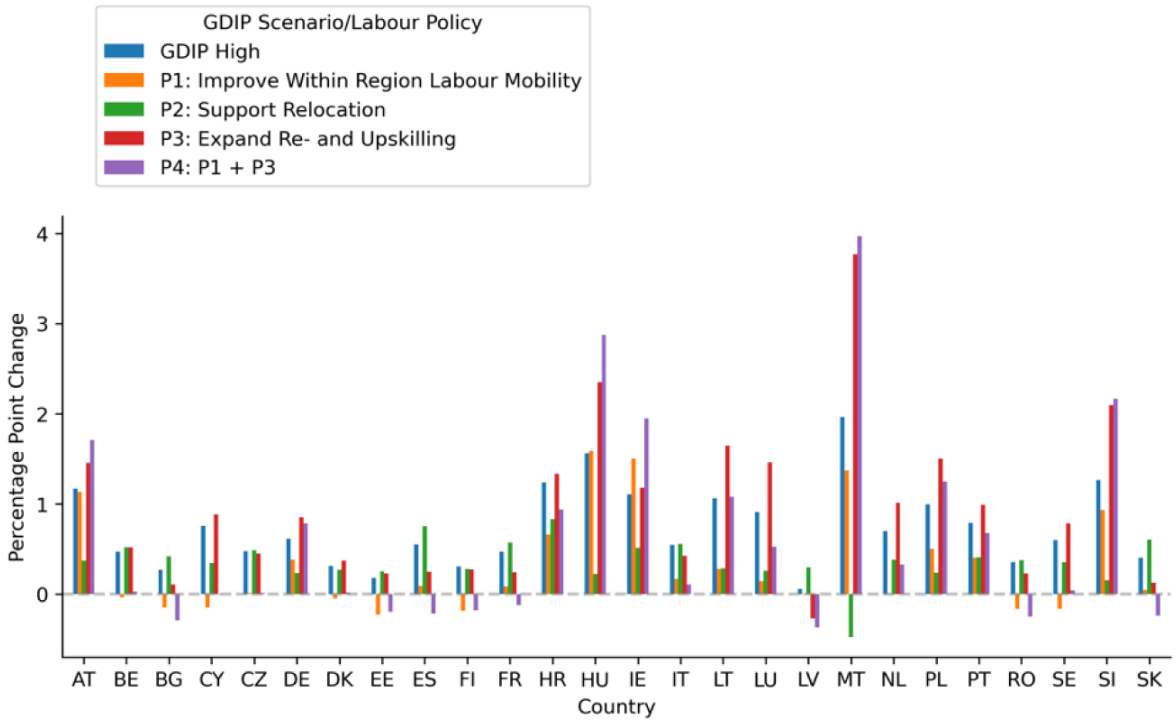
The trade-off of these policies becomes clear when comparing the results of Figure 17 to Figure 18, showing the vacancy rate change of the various member states. Here the effects are the other way around, with vacancy rates falling furthest in growth-constrained countries under P2, while the transition-phase group see lower vacancy rates under P1.

Supporting relocation (P2) is therefore expected to benefit businesses in growing areas, and unemployed workers in transition areas. Conversely, investing in local job matching services (P1) would primarily benefit companies in slower-growth areas by helping them find local talent, while also helping unemployed people in high-growth regions connect with nearby opportunities.

Even though the absolute numbers involved are still between 0.5-1.5% of the total labour force in each country, this would still present a trade-off to policymakers at all geographic levels, as supporting businesses could come at the cost of helping those in unemployment in the same region, and vice versa. Which policy would lead to which effect would in turn depend on the outlook for the manufacturing sector in the respective member state.

Lastly, when combining reskilling with promoting within regional labour mobility, it seems that the effects are a beneficial middle ground between P1 and P2. This means that P4 would reduce unemployment and workforce shortage more than the least effective option, but less than the most effective option. The added benefit of P4 would be improving the human capital of each respective country's labour force and increasing their ability to adapt to emerging technologies.

Figure 18. % point change in vacancy rate for manufacturing industries excluding construction per member state for all labour policy scenarios and GDIP high scenario vs baseline 2035.



Regional

At regional level, the divergence in effects can be most clearly observed, and the regions that will be most heavily impacted can be identified. From the distribution of the impacts on the unemployment rate as shown in Figure 19, it becomes clear that all policies outperform the GDIP high scenario in terms of reducing unemployment. As these labour policies are modelled as complementing this GDIP scenario, it means that each of them has a positive effect of reducing unemployment even further, for almost all regions. The height of the bar indicates the number of regions, while the breadth indicates the range of outcomes of regions in this subset, showing that the distributional effects of the various labour policies are different.

Improving within region labour mobility (P1) amplifies the unemployment reduction effects of the GDIP, as Figure 20 demonstrates. Combining P1 with reskilling policies likely produces comparable but enhanced positive outcomes. In contrast, relocation support (P2) creates more uneven effects: while some regions see significantly higher benefits than under other policy scenarios, many regions experience minimal to no improvement compared to the GDIP alone.

This distribution is closely linked to the growth-constrained and transition-phase regions as already observed at national level. Where the expected reduction in unemployment under P2 will be highest for regions with initial high unemployment rates, other regions are expected to see a higher reduction in unemployment rate through the other policies, with the combined policy option P4 being the most effective for most regions.

"Not only will there be a trade-off between different stakeholders within a region, but there could also be implications for EU cohesion."

The trade-off of the various labour policies can again be observed when looking at regional changes in the vacancy rate under P2 compared to the baseline as shown in Figure 20. Here broadly the same shape shows as in Figure 8, with a strong performance in the industrial heartlands of central Europe, while the south benefits less. This shows that, depending on the policy implemented, not only will there be a trade-off between different stakeholders within a region, but there could also be implications for EU cohesion.

Figure 19. Distribution of regions per % point change in unemployment rate in manufacturing industries excluding construction under all policy scenarios and GDIP high vs. baseline 2035.

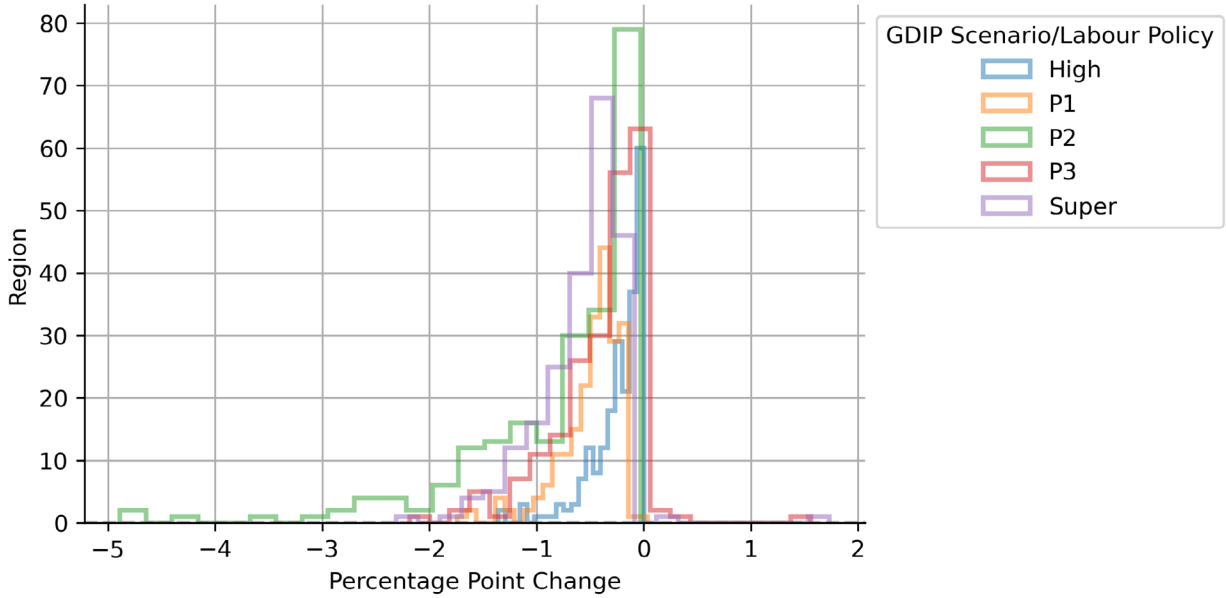
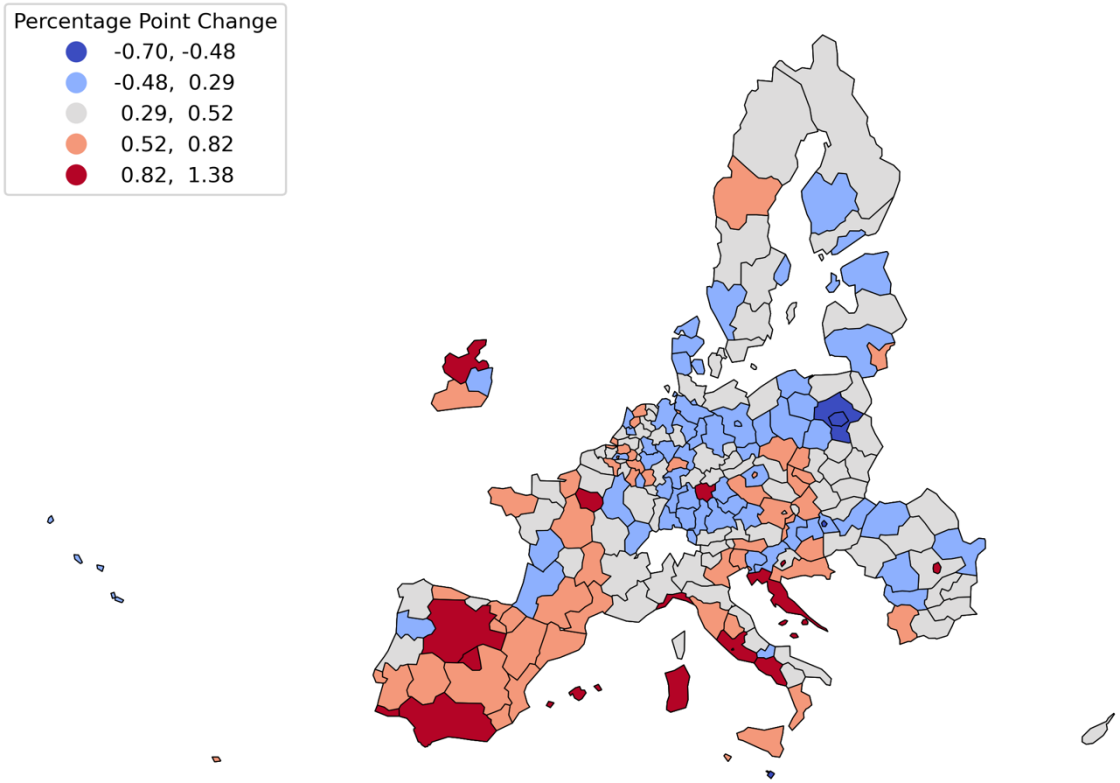


Figure 20. % point change in vacancy rate in manufacturing industries excluding construction under supporting relocation policies vs. baseline 2035.



5. DISCUSSION OF THE RESULTS

5. DISCUSSION OF THE RESULTS

The model results explore several potential future scenarios for the European manufacturing workforce. **In the baseline scenario, total manufacturing employment is expected to decline in line with population trends**, with the number of workers likely to decrease faster than the number of jobs due to ageing. This leads to lower unemployment and higher vacancy rates.

Simulations of various GDIP scenarios indicate that the manufacturing workforce could experience higher employment and lower unemployment rates compared to the baseline. However, given the already tight labour market, unemployment is unlikely to drop much further, while vacancy rates are expected to increase by approximately 0.5 for every position filled.

"The geographical distribution of the GDIP's effects varies significantly."

The geographical distribution of the GDIP's effects varies significantly, with some regions potentially experiencing more substantial impacts than others. The model indicates that the highest drops in unemployment are likely to occur in the Spanish coastal regions and the Mediterranean more broadly, while metropolitan areas across the EU are set to see the biggest increases in vacancy rates. This finding suggests that the industries targeted by the GDIP may be more geographically concentrated than European manufacturing as a whole, emphasizing the **importance of considering regional diversity when designing and implementing policies**.

The model results highlight the **distinct characteristics and potential future scenarios for three identified types of economies**. While the divergence is visible at national level, the significant differences are at regional level. Nevertheless, we identify the economies here at country level, to give an indication of the diversity of economies in each category.

Growth-stretched economies (Austria, Cyprus, Germany, Hungary, Ireland, Lithuania, Malta, Poland, Portugal and Slovenia): These economies are characterized by a growing or stable manufacturing workforce, low existing unemployment rates, and an increasing vacancy rate. In the GDIP scenario, these regions are likely to experience a further increase in vacancy rates, as the targeted industries may struggle to find sufficient workers to meet the growing demand.

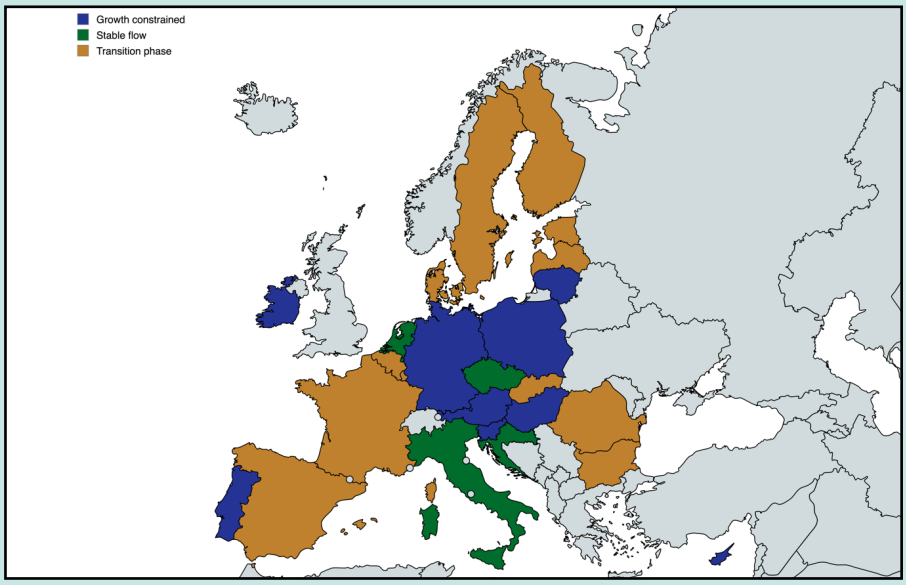
Complementing labour policies would have different effects on different indicators, with improving within regional labour mobility leading to lower unemployment relative to other scenarios, while supporting relocation would lead to lower vacancy rates. Combining re- and upskilling with improving within regional labour mobility would lead to better results on all indicators for some regions, but not the same drop in the vacancy rate as under supporting relocation.

Stable-flow economies (Czechia, Croatia, Italy and the Netherlands): These economies exhibit indicators close to the average across all three dimensions: employment, unemployment, and vacancy rates. They may experience more balanced outcomes under the GDIP scenario, with relatively smaller changes in employment, unemployment, and vacancy rates compared to the other economy types. No trade-offs between various complementing labour policies are visible, with all yielding broadly the same results. Combined policies do outperform individual policies.

Transition-phase economies (Belgium, Bulgaria, Denmark, Estonia, Spain, Finland, France, Latvia, Romania, Sweden and Slovakia): These economies are characterized by larger declines in manufacturing employment, coinciding with the highest decreases in unemployment rates. This suggests that they have the potential to absorb the expected increase in the vacancy rate associated with ageing through their labour markets. In the GDIP scenario, transition-phase economies could benefit the most from such policies, experiencing significant drops in unemployment without substantial changes in vacancy rates.

The patterns observed in this group are the inverse of growth-constrained economies, with the supporting relocation policy leading to lower unemployment rates and higher vacancy rates, while improving within regional labour mobility leads to lower vacancy rates but relatively higher unemployment rates compared to the other scenario. Adding re- and upskilling to the latter policy does improve the effects on all indicators, reducing unemployment rates to, or beyond, the level of supporting relocation for all but a few outliers.

Figure 21. The three types of manufacturing labour markets in Europe.



The model results indicate that **complementing the GDIP with labour market policies could lead to more beneficial outcomes across all economy types**, with nearly every policy scenario tested having higher employment, lower unemployment rates, and lower vacancy rates compared to the GDIP alone, but within bounds of uncertainty. The effectiveness of these policies furthermore varies depending on the geographical context and the specific needs of each economy type.

At the EU level, there is an opportunity to coordinate labour market policies to achieve collectively beneficial outcomes. The model results suggest that **combining policies**, such as reskilling and improving within-region labour mobility with the GDIP **could outperform supporting relocation alone**, even though the latter policy might benefit a smaller group of regions more. Furthermore, **re- and upskilling are shown to have short-term opportunity costs, by reducing the pool of available workers, but can improve long-term labour market outcomes**. Therefore, policies might be warranted that can minimise the concentrated negative effects of policies that are collectively beneficial.

The model results should be interpreted with caution due to several limitations. The study relies on total employment indicators, which may not fully capture the impacts of targeted industrial policies like the GDIP, as these policies often focus on specific sectors that represent a small share of the overall workforce. The model also faces constraints in terms of its accuracy and predictive power, as it does not account for potential tipping points, such as the disruptive effects of digitalisation on the labour market, nor does it consider all variables that might influence labour market dynamics.

Moreover, the model extrapolates past trends without fully integrating population dynamics, which could lead to an underestimation of the number of retirements and an overestimation of new labour market entrants. It also does not constrain worker demand growth based on the number of vacancies, which could result in an overestimation of employment growth in some regions. Lastly, due to data harmonisation challenges, the model does not include all EU regions, which could affect the generalisability of the results.

Future research should focus on incorporating more granular, sector-specific data to better capture the impacts of targeted industrial policies, integrating qualitative insights to identify potential tipping points and disruptive trends, and conducting in-depth analyses of the factors driving regional differences in policy effectiveness.

6. IMPLICATIONS FOR POLICYMAKERS

6. IMPLICATIONS FOR POLICYMAKERS

To conclude, the EU needs to mobilise resources at European level in a coordinated fashion if it wants to address the key interlinked challenges of the 21st century — a triple planetary crisis, ageing societies, digitalisation, rising inequality and decreasing competitiveness.[6] The findings of this study shows that functioning labour markets are crucial not only for a fair and just transition, but also for the success of industrial policies like the GDIP.

To design effective industrial policies and improve the functioning of the European labour markets, European policymakers must address **three policy optimisation challenges that are common across EU decision-making:**

- **First, the subsidiarity principle needs to be aligned with the collective benefits of a coordinated approach**. The model results clearly show the diversity of European labour markets at regional and possibly local levels, but also that certain harmonized policies offer collective advantages for Europe. However, these broader policies may not be optimal for every region.

- Success requires **mechanisms to coordinate policies between regions**, potentially through some form of rebalancing mechanism, such as was adopted with the Just Transition Mechanism. Furthermore, a better understanding of the distinct types of labour markets, such as the three identified in this study, can guide policymaking at all levels.

- **Second, long-term investment needs should be weighed against fiscal constraints**. While many labour policies, such as re- and upskilling, require upfront investment and carry opportunity costs, **failing to act carries substantial risks**; labour shortages constrain growth of productive firms, while low labour force participation and unemployment represent lost economic potential and increasing social expenditure. If the EU 2030 social targets of at least 60% of adults in training every year, and at least 78% in employment are to be reached, allocated investment should reflect this level of ambition.[7]

- **Third, the complexity and cost of combining policies must be factored in when designing integrated policy pathways**. Although combining multiple policies and coordinating them across jurisdictions yields more robust benefits, implementing such integrated policies demands more resources, time and expertise. While some labour market shocks require immediate responses, most significant trends—such as ageing, digitalisation, and the effects of industrial policies like the GDIP—evolve over years or decades. **This longer timeline provides an opportunity for cost-effective policy integration, provided action begins in a timely manner**. Studies exploring the benefits of combined policy approaches, like this one, offer cost-effective ways to evaluate potential integration strategies before committing significant resources.

If policymakers are able to overcome these challenges, they can navigate the twin transition in an ageing continent. Additional guidance is however requested.[8] Therefore, **the final policy brief of this series will explore such policy pathways in more detail**, specifying the various challenges policymakers need to overcome for all the key stakeholders, and identifying which policies could help overcome them.

ENDNOTES

1 Petit, M., M, Sirenko, M. Obersteiner, and K. le Merle. (2024). *Expected Labour Market Effects of the Green Deal Industrial Plan.* FEPS. Retrieved from https://feps-europe.eu/publication/the-eus-green-industrial-plan/

2 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.

3 EUROPOP2023 (Eurostat).

4 Petit, M., M, Sirenko, M. Obersteiner, and K. le Merle. (2024) *Expected Labour Market Effects of the Green Deal Industrial Plan*.

5 Petit, M., M, Sirenko, M. Obersteiner, and K. le Merle. (2024) *Expected Labour Market Effects of the Green Deal Industrial Plan*.

6 Petit, M., T, Fröhlich. (2024) Cohesion for Competitiveness. FEPS. Retrieved from https://feps-europe.eu/wp-content/uploads/2024/10/PB-Cohesion-Policy-DIGITAL-v3.pdf

7 European Commission. (2021) 'The European Pillar of Social Rights Action Plan' (Communication) COM (2021) 102 final.

8 Kirton-Darling, J. (2024) *A Good Jobs Compass for the Internal Market: Creating Its Human Face for the Mid-21st Century*. FEPS. Retrieved from https://feps-europe.eu/a-good-jobs-compass-for-the-internal-market-creating-its-human-face-for-the-mid-21st-century/

AUTHORS, ABOUT FEPS & PARTNERS

About the authors

MILAN PETIT

Milan is co-founder and lead of Project SEER and a member of the Systems Transformation Hub. His work connects scientific research with European policymaking using a systems approach, including industrial, labour market, climate and regional policies. He co-authored multiple reports and academic articles on the European Green Deal, green industrial policy, just transition, plastic pollution and circular economy. He is co-founder of the Sustainable Storytelling Academy Europe, and is 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.

ERIK PRUYT

Erik is a complex systems modeller and co-founder of the PEAS Center. His focus in on solving complex dynamic issues for governments, European institutions, and NGOs, by means of data-rich multi-scale systems modelling and simulation under deep uncertainty. His work includes simulation models for complex issues such as the world energy system, geopolitics, public health, migration, and asylum systems, he co-developed methods for dealing with large amounts of data, Deep Uncertainty, multi-scale complexity, taught System Dynamics modelling, and developed books and materials to teach complex systems modelling and simulation to all anyone.

MICHAEL OBERSTEINER

Michael 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.

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 77 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
@FEPS_Europe

ABOUT FRIEDRICH-EBERT-STIFTUNG CLIMATE AND SOCIAL JUSTICE

In 2021 the Friedrich-Ebert-Stiftung launched its competence center for Climate and Social Justice, based in Brussels. Climate and social policies must be two sides of the same European coin in the future. We need to develop climate-neutral energy systems and industries.

FES Just Climate acts as a think tank about current and coming trends, and a policy advisor in ongoing debates. We support FES offices and their partners in shaping the industrial revolution of our times. We focus on energy, industrial, structural and labor policies, and the European Green Deal. Simultaneously, we need to safeguard and strengthen the welfare state, local participation and workers' rights.

Friedrich Ebert Stiftung

Cours Saint Michel 30e, 1040 Brussels (Belgium)
https://justclimate.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

ABOUT THE SYSTEMS TRANSFORMATION HUB

The Systems Transformation Hub is a pioneering partnership of organisations that helps bring systems thinking and acting to European policymaking The Hub provides strategic and systematic guidance, supporting European institutions and Member States in policy analysis, development, policy learning, and agile decision support. The Hub's focus is on European policy, yet also on Europe's relationship with the rest of the world.

Place du Congrés, 1, 1000 Brussels (Belgium)
www.systemstransformationhub.org

ABOUT PEAS

The PEAS Center (Center for Policy Exploration Analysis and Simulation) provides policy advice based on data analysis, data-rich multi-scale system dynamics modelling, simulation under deep uncertainty, and python scripting. Sustainability is at its core, with modelling focussing on the dynamics of labour markets, transitions of energy and food systems, asset replacement, climate adaption, and ecosystems.

Pisuissestraat 449, 2353 BP The Hague (The Netherlands)
www.peas.center

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.

OUCE, South Parks Road, Oxford, OX1 3QY (United Kingdom)
www.eci.ox.ac.uk
@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
@IIASAVienna

As Europe advances ambitious green industrial policies like the Green Deal Industrial Plan, understanding their impact on manufacturing employment becomes crucial for effective implementation. This study employs modelling approaches to examine how these policies might affect different regional economies across Europe, each facing unique labour market dynamics and transformation challenges.

The analysis reveals distinct patterns in how regions may respond to industrial policies, shaped by their current manufacturing employment trends, vacancy rates, and capacity for workforce adaptation. The findings suggest that while the Green Deal Industrial Plan could positively influence manufacturing employment, its effectiveness largely depends on complementary labour market policies and regional contexts.

The study identifies critical policy considerations for optimising outcomes across Europe's diverse regional economies. It explores various policy combinations, from enhancing regional labour mobility to supporting re- and upskilling, revealing both opportunities and limitations in addressing unemployment and vacancy challenges. The results underscore the importance of coordinated action at both regional and EU-wide levels, pointing to key recommendations for policymakers navigating the green industrial transition.

POLICY STUDY PUBLISHED IN FEBRUARY 2025 BY:

ISBN: 978-2-39076-015-3
KBR Legal Deposit Number: D/2025/15396./10