

INTERNATIONAL SCIENTIFIC CONFERENCE



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SECURITY CHALLENGES OF
THE NEW WORLD

**THE CONCEPT OF HUMAN SECURITY AND
ITS IMPACT ON MIGRATION**

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and Its Impact on Migration**

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The Concept of Human Security and Its Impact on Migration

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5.

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GREEN TRANSITION AND LABOUR MIGRATION: DRIVERS, IMPACTS AND POLICY RESPONSES⁴

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Abstract

The green transition, driven by decarbonization initiatives, is fundamentally transforming economic structures and labour markets worldwide. These changes have significant implications for human mobility, altering both the determinants and patterns of migration. This paper investigates the interplay between green transition processes and migration dynamics, focusing on underlying causes and broader socio-economic effects. As economic activity shifts from carbon-intensive industries to sectors emphasizing sustainability, renewable energy, and low-carbon technologies, employment requirements are substantially redefined. The geographic distribution of new economic opportunities often does not align with regions experiencing employment declines in traditional industries, resulting in marked regional disparities. As a result, the green transition prompts substantial outmigration from areas negatively affected and encourages in-migration to regions benefiting from investments in renewable energy and sustainable industries, thereby facilitating the redistribution of human capital. This process intensifies internal migration flows and may also increase cross-border mobility as workers respond to evolving labour market demands and seek emerging opportunities. By synthesizing existing literature and examining key transmission mechanisms, this study demonstrates the dual role of migration as both a response to and a catalyst for the green transition. The findings underscore the need to develop inclusive and balanced policies to mitigate adverse effects and support a just transition.

Keywords: *migration, climate change, green transition, employment, human capital*

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Introduction

The shift towards a low-carbon economy has become an urgent and fundamental issue. Avoiding severe and irreversible climate impacts requires a swift and significant decrease in greenhouse gas emissions over a relatively short period. In accordance with the objectives set out in the 2015 Paris Agreement, limiting global temperature rise to 1.5°C requires achieving net-zero emissions by the mid-21st century, alongside significant interim reductions. The phase-down of coal-based power generation must occur at a rate significantly exceeding that of past energy transitions. Its success depends on a range of interrelated factors, including the availability of financial resources, access to critical raw materials, and the resilience of global supply chains (Lobanov et al., 2025).

The green transition alters labour market demand by creating new economic opportunities in certain regions while leading to job losses in others. The pace of global decarbonization depends on a robust and skilled labour force, whose importance is often underestimated. Recent findings from the Center for Global Development identify a shortage of human capital as a primary barrier to the implementation of sustainable technologies (Huckstep & Dempster, 2024). Moreover, evidence from ten diverse economies demonstrates that internal labour markets are unable to meet the increasing demand for specialized roles. Therefore, a twofold approach that integrates international labour mobility with financial support for skill enhancement is required to address structural bottlenecks and support effective green transformation.

By synthesizing existing literature and examining key transmission mechanisms, this paper investigates the dual role of migration as both a response to and a catalyst for the green transition. The structure of this paper is as follows. Section 1 examines the primary drivers of migration within the context of climate change and the green transition, focusing on labour market transformations, environmental pressures, and climate-related mobility. Section 2 discusses the socio-economic implications of migration, including its effects on employment, regional disparities, and the redistribution of human capital. Section 3 analyses policy responses and the challenges associated with ensuring a just and inclusive green transition. The conclusion summarizes the main findings and underscores the importance of coordinated policies that integrate migration governance, labour mobility, and sustainable development objectives.

1. Drivers of Labour Migration in the Context of Climate Change and Green Transition

The influence of climate change and the green transition on migration dynamics is receiving growing scholarly attention (ILO, 2026; Lobanov et al., 2024; Petrović & Lobanov, 2022). In the context of gradual environmental changes, climatic pressures often interact with other structural drivers, such as limited access to quality employment,

institutional weaknesses, and social instability, thereby amplifying existing vulnerabilities (Zvezdanović Lobanova & Lobanov, 2025; Lobanov et al., 2022). Notably, many sectors that employ a large share of the population (such as agriculture, energy, and certain industrial activities) are also among the most exposed to climate-related risks.

Due to the deteriorating environmental conditions and increasingly uncertain livelihoods, individuals and households may be forced to relocate in search of more stable living and working conditions. This trend is becoming more pronounced over time, particularly among younger populations, who tend to be more mobile and responsive to changing economic and environmental circumstances. Consequently, migration emerges not only as a coping mechanism but also as a structural response to the combined pressures of climate change and socio-economic constraints. Transitioning to a more environmentally sustainable economy necessitates reallocating labour from high-pollution sectors to environmentally sustainable occupations.

Well-managed migration can be a powerful driver of sustainable development, whereas poorly managed migration may exacerbate inequality and environmental degradation. For instance, Mason et al. (2022) indicate that human mobility can be an important mechanism for addressing workforce flexibility and skill gaps in the green transition, especially in the context of climate change adaptation and other environmental challenges. On the other hand, migration is often misperceived as a threat, although it can generate significant economic, social, and environmental benefits for both migrants and host communities.

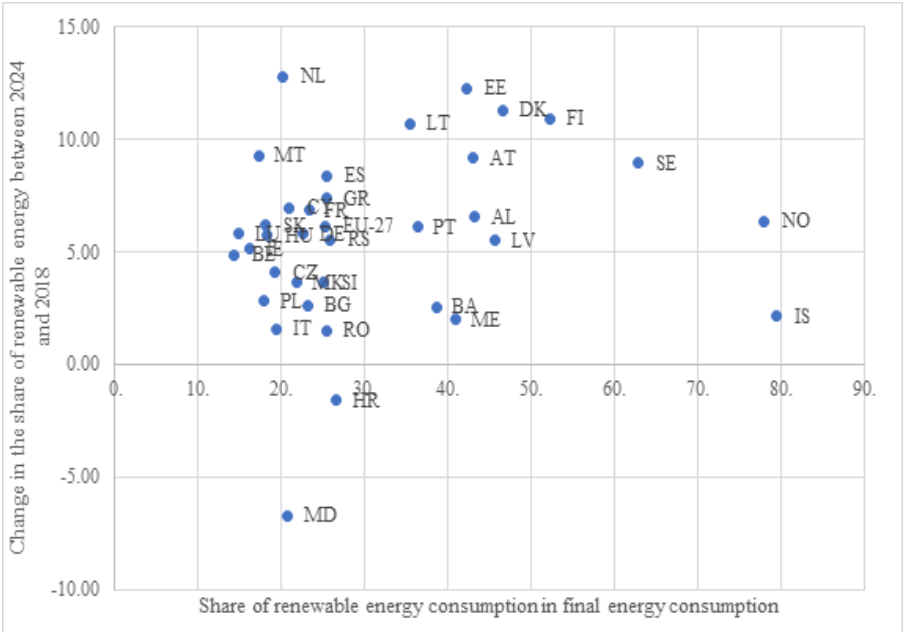
Within the European Union (EU), the European Green Deal was adopted as a comprehensive new growth strategy to achieve climate neutrality by 2050 in response to the escalating climate crisis. In order to “transform the EU into a modern, resource-efficient and competitive economy” (European Commission, 2026), the EU focuses on three main strategies: improving energy efficiency, increasing the adoption of renewable energy sources, and reducing greenhouse gas emissions (Zvezdanović Lobanova & Lobanov, 2023). In 2023, the European Union updated the Renewable Energy Directive by establishing a binding target of at least 42.5% renewable energy in gross final energy consumption by 2030, alongside a broader ambition to achieve 45% (European Commission, 2026). In 2024, Nordic countries such as Norway, Sweden, Finland and Iceland recorded the highest shares of renewable energy in final energy consumption. At the same time, several countries with relatively lower initial shares, including the Netherlands, Estonia and Lithuania, achieved the largest increases between 2018 and 2024. Most European countries recorded moderate but positive growth in the share of renewables, indicating continued progress in the green energy transition, while only a few countries, such as Moldova and Croatia, experienced stagnation or decline (see Figure 1).

In line with the objectives of the European Green Deal and the expansion of renewable energy policies, the Fit for 55 package was introduced on 14 July 2021, com-

prising a series of legislative reforms to reduce greenhouse gas emissions by at least 55% by 2030. Simultaneously, the rapid implementation of climate and energy policies has broader socio-economic consequences, including effects on migration and labour mobility. Climate-related migration poses a serious test for the European Union's legal and political framework, particularly by exposing the contradictions in its green transition. The EU recognizes climate change and environmental degradation as significant factors contributing to migration and displacement (European Commission, 2025). On the other hand, it stresses that migration can be seen as an investment in both the economy and society, helping to drive the EU's shift towards green and digital innovation, while also fostering greater social cohesion and resilience across Europe (European Commission, 2022).

However, Baraggia (2026) points out that, although the EU promotes the green transition and the fight against climate change as key priorities, the issue of climate migrants remains insufficiently recognized and legally unregulated, which indicates the limitations of the existing approach that is focused primarily on energy and technological transformation, and less on the social and humanitarian consequences of climate change. At the same time, instead of developing new protection mechanisms, EU migration policies increasingly acquire a securitized character through strengthening border control and deterring migration, thus treating climate migration primarily as a security, rather than a humanitarian and climate problem.

Figure 1. *Share of renewables in energy consumption in 2024 and change (2018-2024)*



Source: Own work based on the Eurostat (2026)

The phase-out and decline of the coal industry, especially in monolithic economies, can lead to a significant labour market gap (Wong et al., 2022). The transition from fossil fuels to renewable and other clean energy sources requires significant changes in the economy, investment patterns, and the labour market. There is a justified concern that, due to the emergence of labour market rigidities, workers will be reallocated between sectors and occupations, thereby generating skills gaps and labour shortages in emerging green industries (Andersson, 2023). Although the green transition has the potential to generate new employment opportunities and stimulate economic development, workers displaced from sectors such as coal, oil, and gas often struggle to secure comparable positions in emerging industries (IEA, 2021). Early retirement is widely used as a key mechanism for managing labour market shocks caused by the decline of the coal industry (Wong et al., 2022). Since former coal regions often lacked adequate transport and educational infrastructure, retraining workers and attracting new businesses proved difficult, especially in rural areas. Although these measures helped reduce poverty and unemployment, they were generally unsuccessful in redirecting workers toward secure long-term employment.

The changes in the labour market associated with the green transition are expected to increase demand for both high- and low-skilled workers. The gradual phase-out of fossil fuel industries may increase demand for highly skilled occupations, particularly in engineering and technology sectors, while labour-intensive sectors such as construction are also expected to expand. Since a significant proportion of migrant workers are employed in sectors relevant to the green transition, migrants may play an important role in addressing emerging labour shortages (Andersson, 2023).

Causa et al. (2024) indicate that the green transition profoundly changes the labour market, with effects unequally distributed across social groups and regions. A key role in adaptation is played by education and skills, especially in STEM (Science, Technology, Engineering and Mathematics) fields, which significantly increase the chances of employment in green sectors. Young and highly educated workers are in a more favourable position, while there are marked gender and socioeconomic inequalities, partly due to the lower representation of women in STEM disciplines. At the same time, workers in polluting industries face a greater risk of job loss and long-term negative consequences of the transition. Nevertheless, the results indicate that adequate public policies – such as retraining, investment in education, employment support and inclusive labour market measures – can mitigate these effects, with a combination of general and targeted, regionally adapted policies necessary for a successful transition.

Mechanisms of Influence of Green Transition on Migration Flows

The World Economic Forum's expert estimates indicate that the green transition will affect about 14.4 million jobs worldwide by 2030 (World Economic Forum, 2025). According to the same source, about 2.4 million jobs will be eliminated, while the overall effect is expected to be positive, i.e., a net increase of approximately 9.6 million new jobs. The findings from the EIB Climate Survey (EIB, 2022), which was, among other things, conducted to investigate the economic and social effects of the green transition, indicate that a majority of Europeans expect the green transition to have a positive impact on employment and quality of life, with 56% believing that climate policies will create more jobs than they remove.

There is no doubt that the green transition will affect green, brown, and white-collar jobs differently, and its effects will also be visible in changes to labour migration flows. The impact on the "brown" sectors (exploitation of coal and lignite, highly polluting industries such as manufacturing and agriculture) is particularly highlighted, with job losses at the regional level. As a consequence, there would be migration of workers from mining and industrial regions to urban and "green" economic centers, depopulation of certain local communities and further growth of regional inequalities (Vandeplas et al., 2022). Migration may be driven by skill mismatches, as workers from the aforementioned sectors may lack the knowledge and skills required to perform green jobs. Such a mismatch can encourage professional labour migration, the cross-border migration of highly qualified experts, and the outflow of qualified personnel from less-developed regions and countries to countries that develop a green economy more quickly. At the same time, the growth in demand for technical and highly skilled occupations further increases competition for skilled labour and deepens regional inequalities.

"White" jobs (the so-called neutral-carbon jobs), which have a relatively limited environmental impact, will generally not disappear but will adjust their tasks and adopt more sustainable work practices. Although changes in this segment of the labour market will be more moderate, certain professions could see increased employment due to the development of environmental policies and new labour market needs. On the other hand, "green" jobs, which include activities aimed at protecting the environment and developing sustainable technologies, are likely to see increased labour demand, especially for highly qualified and technically trained workers. This can encourage the migration of experts to regions and countries that are developing sustainable economies more intensively.

The green transition raises the issue of fair transformation of the labour market and the position of migrant workers in the decarbonization process. Developed countries, which develop the green economy more intensively, can attract qualified labour from less developed countries, thereby increasing the risk of "brain drain" and deepening development inequalities. Migration can support sustainability transitions, including the green transition, but it can also create localized pressures, especially in areas receiving

large numbers of displaced people. Therefore, the effectiveness of the green transition process depends on governments' capacity to address social vulnerabilities and ensure inclusive adaptation to new conditions. At the same time, ensuring that the green transition is implemented in a fair and inclusive manner remains a critical challenge, particularly for sectors and regions highly reliant on fossil fuels. In the contemporary global context, the transition efforts to secure access to clean, reliable, and sustainable energy sources should go hand in hand with policies that facilitate labour mobility and promote social inclusion, ensuring that no individual or community is left behind.

Table 1 presents a SWOT analysis of the impact of the green transition on labour market migration flows. Two key questions inevitably arise from this analysis. First, how can we effectively leverage the attraction of international experts and foreign direct investment (FDI) to fill skill gaps in the Information and Communication Technology (ICT) sector and in renewable energy through just transition policies? And secondly, how can the high costs of retraining, together with the risk of brain drain, lead to the depopulation of former mining regions if the state fails to respond in a timely manner?

Table 1. *Swot analysis of green transition effects on labour migration*

STRENGTHS	WEAKNESSES
Potential for sustainable economic growth and regional modernization	Skills mismatch between workers from “brown” sectors and the requirements of emerging green industries
Stimulation of innovation and technological advancement through green transformation	Labour market rigidities that hinder worker reallocation across sectors and regions
Increased green investments and expansion of sustainable industries	High costs of reskilling and upskilling programmes
Growing demand for highly skilled workers, fostering human capital development	Uneven regional impacts, particularly in fossil-fuel-dependent regions
Improved employment opportunities and labour market attractiveness in regions investing in green industries	Risk of unemployment and social exclusion for displaced workers
Promotion of green entrepreneurship and the development of new business models	Dependence on migrant labour in key sectors may create integration challenges
Creation of new jobs in renewable energy, sustainable transport, and other green sectors	Limited institutional and infrastructural capacity in less developed regions

OPPORTUNITIES	THREATS
Development of “just transition” policies that combine climate, labour, and migration strategies	Brain drain from less developed regions and countries toward advanced green economies
Expansion of international cooperation on green skills and labour mobility	Deepening regional inequalities and depopulation of industrial and mining regions
Increased investments in education, reskilling, and lifelong learning	Long-term unemployment among workers displaced from fossil-fuel industries
Strengthening labour mobility to meet green labour demand	Social tensions caused by the unequal distribution of green transition benefits
Potential for attracting FDI to green industries	Insufficient availability of qualified labour for green industries
Better integration of migrants into green labour markets	Securitization of migration policies and stricter border controls
Enhancement of social resilience and sustainable regional development	Slow policy adaptation and weak institutional coordination
Possibility of reducing global environmental degradation through coordinated transition policies	Economic instability in regions highly dependent on carbon-intensive industries

Source: *Compiled by authors*

Coal phase-out and just transitions require adequate support for workers, economic sectors, and local communities, especially those currently reliant on coal-intensive activities, to ensure an equitable distribution of both the costs and benefits of the transition. Without timely intervention, the accelerated green transition and labour shortages in certain sectors lead to an increased reliance on migrant labour, with issues of justice and equal access often being marginalized. In this regard, Osso (2026) points out that the sustainability of the green transition depends not only on environmental goals, but also on the ability of institutional frameworks to recognize migrant workers as active actors with rights, and not as passive instruments of the labour market. Moreover, the impacts of the green transition will not be evenly distributed and may disproportionately affect vulnerable population groups, increasing their exposure to risks. Moreover, addressing these inequalities is hindered by the challenge of monitoring labour market trends and skills needs in the green transition. Data quality varies across

regions, and many conventional data sources lack granularity in jobs, tasks, and skills. In the past, finding data to adequately measure and interpret labour market change brought about by greening was often a struggle (Cedefop, 2024).

3. Policy Responses and the Challenge of a Just Transition

The effects of the green transition will be particularly pronounced at the local level, especially in regions dependent on fossil fuels, which is why a successful transition requires the implementation of "just transition" policies, investment in retraining and upskilling of workers, as well as coordination of climate, social and migration policies in order to prevent long-term unemployment and forced migration. To mitigate migration pressures resulting from the green transition, it is necessary to address how the domestic labour market can adapt to forthcoming structural changes. In this context, labour mobility and skills development become essential components of a successful green transition. Ensuring the workforce has the necessary skills for the transition involves strong cooperation among regional authorities, educational institutions, and industry to ensure training aligns with changing market needs (Cedefop, 2024). Furthermore, the complexity of the transition process demands such a coordinated approach to effectively address diverse social and economic challenges, promote fairness, and ensure that no group is left behind during the shift to a greener economy.

Strategic workforce management that enhances the employability of the domestic population and minimizes reliance on external migration flows is crucial for achieving a fair and inclusive green transition as well as sustainable development. Therefore, timely adaptation of both formal and informal education systems is essential to equip the domestic workforce with the knowledge and skills required, thereby reducing reliance on migration in response to labour market transformations.

The development and improvement of regular labour migration channels can help mitigate the imbalance between supply and demand in the labour market resulting from the green transition. By matching the qualifications of the migrant workforce to labour market needs and enabling safe, legal internal and international mobility, labour markets can respond more effectively to new demands and changes arising from green occupations and sustainable economic activities. In this way, labour mobility can become an important mechanism for supporting sustainable transformation in both countries of origin and countries receiving migrants (IOM, 2023).

The International Organization of Employers (IOE, 2024) advocates for migration systems that support legal avenues for workers skilled in green technologies, facilitating their movement to where they are most needed for the low-carbon transition. By updating existing frameworks to better recognize and validate foreign qualifications, businesses can more easily recruit talent essential for implementing climate policies.

The "Hire-Train-Move" model is highlighted as an effective solution that enables migrants to develop green skills in their destination countries and transition into vital roles, while ensuring fair recruitment and regulatory oversight. Governments are encouraged to create specialized migration pathways for green talent, enforce fair hiring practices, and align policies across sectors to ensure a consistent and ethical approach to meeting climate-related workforce needs. Effective transition policies require anticipating future labour market needs, investing in reskilling and upskilling programmes, and facilitating safe and regular labour mobility (Gençsü et al., 2020).

Migration can also have positive effects on countries of origin, as migrants and the diaspora, through remittances, investments, knowledge transfer, and skills development, can strengthen the resilience of local communities and promote sustainable development. At the same time, the sectors most affected by the decarbonization process, such as agriculture and certain service industries, often employ large numbers of migrant workers, which is why there is a need for policies on retraining, protection of labour rights, and social integration. In this context, the concept of "just transition" implies implementing policies that enable ecological transformation without deepening social and economic inequalities and that contribute to inclusive and sustainable development (IOM, 2023). Labour migration programmes should be adaptable, tailored to specific requirements, and support the movement of migrant workers across the skill levels needed for the green transition (Andersson, 2023).

Conclusion

The green transition has the potential to significantly improve environmental quality and public health outcomes. Nevertheless, it also requires profound structural changes across key sectors, including industry, energy, transport, and the broader economy. In this regard, providing adequate support to workers, economic sectors, and local communities, especially those currently reliant on coal-intensive activities, is essential for ensuring an equitable distribution of both the costs and benefits of the transition. Although this transformation is already underway, achieving these ambitious goals remains highly demanding.

Taken as a whole, the process of decarbonization and economic restructuring can lead to the redistribution of labour between sectors and regions, increasing workers' mobility and migration, especially in cases of skills mismatch and the regional concentration of polluting industries. Therefore, a combined strategy of promoting international labour mobility and investing substantially in vocational training is necessary to address these structural challenges and enable a successful ecological transition.

We argue that migration should be viewed not only as a consequence of the green transition but also as a mechanism to facilitate adaptation to emerging labour mar-

ket demands and to support sustainable development. Migration of workers, both within and across borders, can help address labour market imbalances arising from decarbonization. Therefore, the success of the green transition will depend not only on technological progress and climate policies but also on governments' ability to implement inclusive labour market measures, strengthen reskilling and upskilling systems, and ensure coordinated migration and social policies. A just and sustainable transition requires balancing environmental objectives with social cohesion in order to prevent the deepening of regional inequalities, long-term unemployment, and forced migration.

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