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## Green jobs, labour market transitions and social protection: Longitudinal analysis for Viet Nam

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**Abstract.** *This article examines labour market transitions towards green employment in Viet Nam and their relationship to social protection. Using a task-based approach and longitudinal labour force survey data, we find that green jobs remain limited, accounting for only 15 per cent of total employment. Transition rates vary significantly by demographic characteristics: younger workers and women face greater difficulties in accessing green employment. Educational attainment is a key determinant, such that individuals with tertiary education are more likely to move into green occupations. Social insurance coverage is positively associated with transitions from brown or neutral jobs to green jobs among those with tertiary education, and negatively linked to the likelihood of moving from green to brown occupations. In contrast, it does not appear to facilitate transitions to green occupations for workers with lower levels of education. These findings highlight the need for integrated policy frameworks that combine social protection and education to promote inclusive green transitions in developing countries.*

**Keywords:** *green jobs, labour market, social protection, education and training, Viet Nam, economic and social development, just transition, longitudinal analysis.*

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## 1. Introduction

The green transition, which involves shifting from fossil fuel-based energy systems to renewable energy sources, is crucial for mitigating climate change and promoting sustainable development. Green jobs, characterized by their focus on preserving or restoring the environment, play a pivotal role in reducing the human footprint on the environment and adapting to its adverse effects.<sup>1</sup> As the world grapples with the need for a rapid and comprehensive response to climate change, transitions to green occupations emerge as a key strategy for strengthening ecological resilience and ensuring a sustainable future. According to the ILO, the transition to a green economy could generate 24 million new jobs globally by 2030, particularly in sectors such as renewable energy, energy efficiency and sustainable agriculture (ILO 2018). Nonetheless, this transition has significant implications for labour markets, as the creation of new jobs in some firms and sectors (e.g. renewable energy) is likely to coincide with the displacement of workers in others (e.g. traditional fossil fuel industries).

Throughout the transition, steps towards achieving green growth will have extensive but uneven impacts. As polluting jobs disappear, green occupations will emerge – for example, through the decarbonization of high-carbon industries and rising labour demand in activities aimed at protecting and restoring ecosystems. New labour market entrants may find their first jobs in expanding occupations, while others may face job losses, leading to prolonged unemployment or even their exit from the labour force. The ability to move to green jobs is not distributed equally, and workers with relevant qualifications are expected to be better prepared for the transition. Demographic characteristics, such as age and sex, also affect overall labour market transition rates and can influence moves from non-green to green jobs. Other factors, such as skills and location, may also have an impact. For instance, high-skilled employees and those living in urban areas tend to work in occupations that have higher green job intensity, suggesting that their shift to the green economy could be smoother than that of less-skilled and rural workers (Bluedorn et al. 2022). Therefore, policies that support education and training programmes, as well as social protection measures, could be essential in ensuring a just transition that benefits all workers. In this regard, occupational “task-based” approaches to define green jobs – such as the one used in this article and explained in section 3 – have been considered particularly useful to inform labour market and skills policy design (OECD 2023).<sup>2</sup>

Our article has three objectives. First, it estimates the share of green jobs in the context of a developing country – Viet Nam. Although the literature offers various measurements of the “greenness” of an occupation, we adopt a task-based approach, which is well suited to understanding the role of skills and qualifications. Moreover, the classification is based on the current version of the International Standard Classification of Occupations (ISCO-08), enabling us to make comparisons with other developing and developed economies. Using this approach, we find that green jobs are scarce in Viet Nam, which may also reflect the situation in other developing countries.

Our second goal is to examine the transition of workers into and out of green jobs in Viet Nam over time. In addition to overall transition rates, we consider age, sex and education as factors influencing the ability to move to a green job for different types of workers. We show that younger workers, women and those with lower education levels are at a disadvantage when moving into green occupations in Viet Nam. These findings suggest that targeted policies to assist these groups of workers could facilitate the green transition.

Our final objective is to highlight the role of social protection in the transition to green occupations in Viet Nam. The literature provides evidence on the role of social protection schemes such as unemployment benefits in facilitating job reallocations during structural

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<sup>1</sup> See ILO, “What is a green job?”, <https://www.ilo.org/topics-and-sectors/just-transition-towards-environmentally-sustainable-economies-and-societies/what-green-job> (accessed 18 November 2025).

<sup>2</sup> Various approaches have been used in the literature to define green jobs. One such approach identifies entire sectors or industries as green and classifies all employment within them accordingly (OECD 2023).

transitions. However, there is little research on this topic specifically in relation to transitions to the green economy – especially in developing countries. Our study seeks to help fill this gap. We argue that social protection mechanisms in Viet Nam play a crucial role in facilitating labour market transitions towards green jobs for highly educated workers. In comparison with other workers, these workers may derive greater advantages on account of their skill adaptability and ability to use labour market policies effectively. Our findings support this hypothesis: we show a positive association between social protection and moving from brown jobs to green jobs in Viet Nam – an effect that is significant for those with high levels of educational attainment. The relationship is reversed for movements from green to brown jobs, which confirms that social protection can facilitate the green transition.

The rest of this article is organized as follows. Section 2 presents a brief overview of the existing literature on the impact of the green transition on labour markets and the role of social protection. Section 3 presents the task-based approach and our empirical methodology to examine transitions across different labour market states. Section 4 first discusses the transitions in the Vietnamese labour market and draws comparisons across socio-demographic characteristics such as sex, age and educational level. It then analyses the effect of social insurance on the likelihood of switching to a green job. Section 5 offers some concluding remarks.

## **2. The effects of the green transition on labour markets and the role of social protection**

So far, a relatively large body of research has highlighted the possible impacts of the green transition on labour markets through ex ante analysis or broad simulations of the effects of greening the economy. For example, the ILO has estimated that efforts to keep the increase in the global temperature below 2°C could lead to a net increase of approximately 18 million jobs, resulting from nearly 6 million job losses and the creation of some 24 million jobs (ILO 2018). More recently, the European Union estimated that the number of jobs likely to be lost in high-emission activities, where workers are unlikely to be reabsorbed by other sectors, is relatively small. However, job creation and losses are likely to be unequally distributed, as green jobs tend to require higher skill levels than the brown jobs that are disappearing (Vandeplas et al. 2022).

Available evidence based on more disaggregated and micro data indeed suggests that greening the economy has heterogeneous effects across segments of the labour market. In particular, workers' skills and educational attainment levels influence the labour market risks and opportunities created by the green transition. For instance, studies from selected countries across the world have shown that new green occupations tend to emerge at higher skill levels (ILO 2019). Similarly, a study by the Organisation for Economic Co-operation and Development (OECD) (OECD 2023) finds that, in OECD countries, employees in jobs involving green tasks tend to be better educated and have higher skill levels than those in non-green roles. It also finds that the impact of the green transition on labour markets has an important gender dimension, with women under-represented in green jobs.

In recent years, a growing number of studies have highlighted the effects of the green transition from a cross-sectional perspective. However, research examining actual labour market flows and empirical analysis of the individual trajectories linked to the greening of the economy remain rare. The few existing empirical studies point to heterogeneity in labour market transitions across groups of workers. A study based on a sample of countries from Europe and North America revealed that workers in more pollution-intensive jobs are less likely to transition to greener jobs, and that higher skills ease the match with green jobs (Bluedorn et al. 2022). This is consistent with previous studies drawing on US labour market data, which show that, since green jobs generally require higher levels of cognitive and analytical skills, transitions into these roles are more feasible for workers with higher levels of education and prior experience in technical fields (Consoli et al. 2016). Partly confirming these findings, a study based on microdata from OECD countries and focusing on transitions

into and out of jobs found that education is the most critical driver of individual transitions from non-employment to green jobs (Causa et al. 2024). However, the authors also highlight that other socio-demographic characteristics are associated with specific labour market trajectories in the green transition. In particular, women also appear to be significantly less likely than men to move from non-employment into green jobs. Furthermore, while workers in highly polluting occupations face a higher risk of displacement, this does not translate into a higher risk of long-term unemployment. For their part, based on a large micro dataset, Curtis, O’Kane and Park (2024) show that older workers and those without tertiary education appear less likely to make transitions to green jobs in the United States. They also find that individuals’ persistence in carbon-intensive industries varies greatly across labour markets, and that the availability of alternative jobs in the local area plays a key role in shaping their trajectories.

However, empirical analyses of the labour market effects of the green transition in countries outside Europe and the OECD – particularly in developing countries – are much rarer. A recent study focusing on Argentina estimates that 23 to 25 per cent of workers are employed in jobs with high green potential but only 11 to 12 per cent are found in green formal employment. The authors also show that the groups more likely to be in green jobs are men, older individuals, those with advanced qualifications and workers in sectors such as construction, transportation, mining and manufacturing (de la Vega, Porto and Cerimelo 2024). Research has also been carried out in Asia, with a recent study in India finding that individuals holding either green or carbon-intensive jobs tend to be male, younger and slightly more educated (Ham, Vázquez and Yanez-Pagans 2025). In Indonesia, male and educated workers are also over-represented in green occupations (Granata and Posadas 2024). Lastly, in relation to Viet Nam specifically, a 2024 study investigates the labour markets of France and Viet Nam, concluding that education has a considerable influence on transitions from non-green to green occupations (Duman and Ananian 2024). This appears to be in line with a World Bank study that also uses data from the 2021 Vietnamese labour force survey to distinguish green jobs by occupational category and emphasize their greater skill requirements (Doan et al. 2023).

The role of policies and institutions in facilitating labour market transitions and supporting workers during the greening of the economy has also received limited attention in the literature. Specifically, social protection – particularly schemes addressing job loss and unemployment – is a critical institution that can shape individuals’ labour market experience. Social protection programmes are designed to mitigate risks throughout the life cycle and provide support during labour market disruptions such as unemployment.<sup>3</sup> In this latter case, income support and unemployment benefits provided through social protection can be complemented by active labour market policies designed to improve outcomes for those who are not in employment, including through job search assistance, training programmes and subsidized jobs (Crépon and Van den Berg 2016).

In Viet Nam, social insurance covers risks related to old age, health, maternity, occupational accidents and diseases, family responsibilities and unemployment. Unemployment benefits target citizens employed in the public and private sectors, including those with seasonal, job-specific, fixed-term or permanent contracts, as well as certain military personnel, cooperative employees and household businesses. In most cases, eligibility requires at least 12 months of contributions within the previous 24 months. Benefits amount to 60 per cent of reference earnings but cannot exceed five times the applicable minimum wage. Furthermore, they are not provided for the first 15 days after registration as unemployed, and the maximum benefit period is three months. Lastly, unemployment benefits include provisions for job placement support and vocational training, linking

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<sup>3</sup> See ILO, “Social Protection”, <https://www.ilo.org/projects-and-partnerships/projects/partnership-improving-prospects-forcibly-displaced-persons-and-host/themes/social-protection> (accessed 18 November 2025).

insurance allowance and active labour market policies for some beneficiaries (ISSA 2022).<sup>4</sup> However, only a limited number of unemployment benefit recipients access vocational training (ILO and ILSSA 2022).<sup>5</sup>

A number of analyses have stressed the key role of social protection and unemployment benefits in supporting workers through disruptions caused by the green transition, including by ensuring income security and business continuity (ILO 2024). However, relatively few studies examine the impact of such schemes on labour market transitions and job reallocations as economies become greener. Still, previous research does shed light on how unemployment benefits can promote job reallocations in the context of structural transformation. For example, Boeri and Macis (2010), analysing job creation and job destruction across a large sample of countries, find a positive and statistically significant effect for introducing unemployment benefits on job reallocation, although this effect disappears over time. This finding seems to be consistent with theoretical predictions, including those which suggest that unemployment benefits may incentivize workers to leave their firms. Similarly, a recent study of US and European labour markets shows that job reallocations towards productive sectors in the aftermath of a sector-specific productivity shock are particularly high when policies extending unemployment benefits are implemented (García-Cabo, Lipińska and Navarro 2023).

These studies mainly focus on average effects, and studies considering the impact of unemployment insurance on job reallocations by population group are conspicuously lacking, especially across skills or educational levels. However, on the effect of unemployment benefits on job separation specifically, a thin body of literature has highlighted differential effects across groups, particularly for prime-age and senior workers (Le Barbanchon, Schmieder and Weber 2024).

In the context of the green transition, most studies focus on developed countries and few indicate a possible positive impact of unemployment benefits. A recent study by the OECD (2024) points to the higher costs of job loss for workers in high-emitting industries and calls for policies that support incomes and facilitate labour market transitions. Furthermore, findings by Causa et al. (2024), based on European data, suggest that unemployment benefits could indeed promote transitions towards green occupations. The authors find that this policy is associated – although with weak statistical significance – with an increased likelihood of transitioning from non-employment to green employment.

Lastly, a substantial body of literature has focused on the effects of active labour market policies, particularly over the past decade (Le Barbanchon, Schmieder and Weber 2024). These policies often complement unemployment benefits, including through job placement support and training. Evaluations of the impact of job placement support on employment type are relatively scarce, although some studies suggest that counselling services have a positive impact on earnings (McConnell et al. 2021; Michaelides and Mueser 2020). On the other hand, training programmes aim to reduce skill mismatches in the labour market and enable workers to access better jobs. They could therefore facilitate transitions towards green jobs, particularly when green occupations are associated with improved outcomes for workers. In this regard, the existing literature finds that job training programmes have a positive – though sometimes modest or temporary – impact on the quality of employment (Hirshleifer et al. 2014; Grunau and Lang 2020; Doerr and Novella 2024). Consoli et al. (2016), for their part, show that skill-related factors significantly influence the green transition, extending beyond the scope of educational policies. They emphasize the importance of policies that support skills development, such as learning by doing, to facilitate labour mobility into green occupations. Skill-related policy efforts could be particularly relevant for workers with low and medium qualifications, who appear to encounter greater difficulties in accessing training or transitioning to new jobs than workers with high qualifications (Vandeplas et al. 2022).

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<sup>4</sup> As of 1 January 2022. The social protection system was amended by law in 2024, which is after the period covered by the microdata used in this article (Viet Nam, Ministry of Finance 2025).

<sup>5</sup> In 2020, 30,900 people received vocational training under the unemployment insurance, whereas over 1 million received unemployment benefits (ILO and ILSSA 2022).

In the following sections, we expand on the existing literature by showing how transitions into green employment are shaped by age, sex and education in the context of Viet Nam as a developing country. We also examine the role of social protection in Viet Nam's green transition and argue that social insurance significantly supports transitions into green jobs, especially for the highly educated.

### 3. Data and methodology

#### 3.1. Definition of green, brown and neutral jobs

There is no universally accepted definition of green jobs, although the literature consistently highlights the importance of skills, particularly in the context of labour market transitions (for more details, see Duman and Ananian 2024). One common approach defines the "greenness" of occupations based on their tasks, drawing on the O\*NET database developed by the US Department of Labor. Tasks are classified according to their contribution to environmental sustainability and emissions reduction. Dierdorff et al. (2009) categorize green jobs into three groups: "green new and emerging" jobs, "green enhanced skills" jobs and "green increased demand" jobs. Building on this, Vona et al. (2018) developed a continuous measure of occupational greenness based on the share of green tasks within each occupation at the eight-digit Standard Occupational Classification (SOC) level.<sup>6</sup> Occupations with no green tasks score zero. These scores are then averaged at the six-digit level to align with available employment data. Brown occupations, by contrast, are defined by their over-representation in pollution-intensive industries. An occupation is classified as brown if it is at least seven times more likely than average to appear in such industries (Vona et al. 2018). Occupations that are neither green nor brown are considered neutral.

This methodology has been adopted by several researchers, who have mapped the occupations to ISCO-08 (Scholl, Turban and Gal 2023; Bluedorn et al. 2022; Elliott et al. 2021; Valero et al. 2021). The green task intensity and brown scores of occupations at the eight-digit SOC level are translated into ISCO-08 with different weighting strategies and at various levels of aggregation. For some occupations, owing to the crosswalk with employment weights, both green and brown intensity scores can be positive under ISCO-08, while some occupations contain neither green tasks nor brown scores. Based on their occupation, each worker is assigned a green and brown intensity score. This allows various labour market and economy-wide outcomes to be analysed, such as the share of green jobs over time, innovation, the role of green and brown intensity in transitions between different types of employment status, and the relationship between "greenness" of employment and productivity.

The definition of green and brown occupations in this article follows the measure obtained through the SOC-to-ISCO crosswalk outlined in Scholl, Turban and Gal (2023). As mentioned above, several other studies implement a similar approach. However, Scholl Turban and Gal provide the most detailed green and brown scores for occupations at the four-digit ISCO-08 level. Categorizing each occupation as either green, brown or neutral serves our aim of examining the trajectories of workers to and from green occupations and considering whether social protection can have an impact on the transitions to green occupations. We therefore classify each of the 433 occupations at the ISCO-08 four-digit level based on the "greenness" and "brownness" scores in Scholl, Turban and Gal (2023). Occupations with a positive green task intensity and a brown score of zero are labelled green, while those with a positive brown score and a green intensity of zero are categorized as brown. Most remaining occupations involve tasks without significant green or brown characteristics, and these are classified as neutral. In cases where occupations exhibit non-zero intensities for green tasks and brown scores, classification is based on relative magnitude: if one clearly exceeds the other, the occupation is assigned to the corresponding category (green or brown). However, when the green intensity and brown scores are of

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<sup>6</sup> The SOC system is a federal statistical standard used in the United States to classify workers into occupational categories.

comparable magnitude, rendering a clear distinction impractical, the occupation is also assigned to the neutral category. This classification results in 83 green, 50 brown and 300 neutral occupations at the four-digit level.

This methodology has the advantage of standardization across countries, as the ISCO classification is widely used. Nonetheless, identifying green occupations by task intensity has a few disadvantages. First, tasks evolve over time, whereas O\*NET measures are typically static and do not reflect changes within occupations. Second, the SOC-to-ISCO crosswalk requires aggregating many occupations because SOC provides more detailed occupational groupings. Third, classifications derived from O\*NET assume that technology is the same as in the United States. To partially address these issues, the World Bank has recently developed a dictionary of green terms to identify green tasks and occupations through text analysis (Granata and Posadas 2024). These terms are classified into two categories: “green terms”, which are clearly and directly linked to green tasks, and “green potential terms”, referring to tasks that could be considered green depending on the technology or context in which they are performed. This classification leads to 36 green occupations and 108 occupations with green potential. Future research could apply a similar methodology in Viet Nam and compare the findings with those presented in this article. As the methodology proposed by the World Bank is still recent, few studies have undertaken such comparisons for other countries. Nevertheless, Ham, Vázquez and Yáñez-Pagán (2025) estimate the proportion of green jobs in India to be 14 per cent using O\*NET-based methodologies and 9 per cent using the World Bank approach.

### 3.2. Panel construction and econometric technique

Our empirical analysis draws on data from the Viet Nam labour force survey (LFS), made available through the ILO Harmonized Microdata collection.<sup>7</sup> In Viet Nam, the LFS adopted a rotating structure in 2019. Individuals are tracked over two consecutive quarters, exit the rotation for the next two quarters and rejoin for two quarters of the following year. This provides access to the same respondents over six non-consecutive periods, but not all the variables required to identify individuals are consistently available in the LFS data. Accordingly, we are able to construct a panel over two waves, from the first quarter of 2021 to the third quarter of 2022. Table 1 presents the number of respondents and attrition rates for each wave.<sup>8</sup> Both waves include roughly the same number of individuals, with similar attrition rates. It is worth noting that the observation period spans 15 months, or five quarters. Furthermore, some seasonality may affect our findings, as individuals’ initial labour market state is observed only in specific quarters (Q1 and Q3).

**Table 1. Description of panel data construction for Viet Nam**

	Total number of respondents	Respondents over 5 quarters	Attrition rate (per cent)
2021Q1–2022Q1	328 954	83 761	74.5
2021Q3–2022Q3	325 149	83 774	74.2

Source: Our own calculations based on 2021–22 Viet Nam LFS data.

One challenge in estimating transition probabilities from rotating panels is non-random attribution bias. We use two weighting strategies to account for the possibility of such bias. First, we weight the transitions and regressions using sampling weights provided by the National Statistics Office of Viet Nam, which represent the frequency of each observation in

<sup>7</sup> See ILO, “Data collection and production”, <https://ilostat.ilo.org/about/data-collection-and-production/> (accessed 18 November 2025).

<sup>8</sup> The period of available data for Viet Nam includes the COVID-19 pandemic. When more recent longitudinal data become available, it will also be possible to examine the impact of the pandemic on labour market transitions in Viet Nam.

the national population. Second, we estimate the attrition probability for each sample group and reweight each observation using inverse probability of treatment. A similar approach has been adopted by other researchers (see Samaniego and Viegelahn 2021; Fallick and Fleischman 2001). We begin by computing the probability of matching the same individual across two periods for each wave, based on age, sex, education, marital status and location. These probabilities are then used to reweight observations through an inverse probability of treatment weighting procedure.<sup>9</sup> All transition probabilities in the next section are presented using attrition-adjusted weights.

To estimate how social protection coverage influences the likelihood of transitioning to green jobs over the specified period, we use the following logistic regression model:

$$\text{logit}(P(G_i = 1)) = \alpha + \beta_1 SP_i + X_i' \beta + \delta_t + \varepsilon_i \quad (1)$$

where  $G_i$  is a binary variable that equals 1 if individual  $i$  transitions from a brown or neutral occupation (depending on the analysed transition) to a green one between  $t_0$  and  $t_1$  ( $= t_0 + 15$  months) and 0 otherwise.  $\alpha$  is a constant,  $SP_i$  is a binary variable that equals 1 if  $i$  is covered by social protection at  $t_0$  and 0 otherwise, and  $X_i$  represents a set of control variables observed at  $t_0$ : age, sex, marital status, location (rural/urban), aggregate sector of activity,<sup>10</sup> informality of the individual's unit of production, working time arrangement, as well as the logarithm of monthly earnings. We also include wave fixed effects ( $\delta_t$ ). Similar models are implemented to analyse the effect of social protection on the likelihood of transitioning from a green occupation at  $t_0$  to a brown or neutral occupation at  $t_1$ .

The introduction of socio-demographic and location characteristics in the specification allows us to take into account the confounding factors linked to specific groups. Such controls are also used in similar studies on labour market transitions (see, for instance, Bluedorn et al. 2022; Causa et al. 2024). In addition, the inclusion of variables reflecting workers' quality of employment enables us to disentangle the effect of social protection from other possible favourable working conditions, such as higher wages or employment in the formal sector.

Lastly, as noted earlier, social protection can have different effects on workers with low and high levels of education. We therefore split our sample accordingly and estimate the relationship between social insurance and transitions in and out of green jobs separately for workers with less than tertiary education and those with tertiary education.

## 4. Green jobs, labour market transitions and social protection in Viet Nam

### 4.1. Green jobs and transitions

Before turning to the analysis of transitions to green jobs, table 2 presents the number of green jobs and their share among Vietnamese workers tracked over the study period. Among the 432,759 employed individuals surveyed, 62,676 – nearly 15 per cent – work in occupations classified as green. Additionally, 5.6 per cent of jobs are identified as polluting, while the remaining 79.5 per cent fall into occupations that are neither green nor polluting. While there are no comparable statistics for Viet Nam in the literature, demand for green skills is reportedly growing and the share of job postings requiring a worker to have at least one green skill rose to 22 per cent in 2023. Moreover, green jobs in Viet Nam are increasing across all sectors, extending beyond traditional green sectors, such as renewable energy and

<sup>9</sup> Inverse probability of treatment weighting balances the characteristics of respondents who leave the panel with those of respondents who remain at the end of the analysis period.

<sup>10</sup> Agriculture; manufacturing; construction; mining and quarrying, electricity, gas and water supply; market services; and non-market services. Market services include trade, transportation, accommodation and food, and business and administration services, while non-market services include public administration, community, social and other services and activities, and non-classifiable activities.

environmental protection (Vietnam Investment Review 2023). In contrast, a recent World Bank study using a green task intensity approach estimated that green jobs account for just 3.6 per cent of total employment in Viet Nam (Doan et al. 2023). However, this share rises significantly – to 41 per cent – when occupations with the potential to become green are included. This variation underscores how estimates of green employment in Viet Nam largely depend on the methodology used.

**Table 2. Number and share of polluting, neutral and green jobs among Vietnamese workers**

	Frequency	Percentage
Green	62 676	14.9
Brown	20 854	5.6
Neutral	349 229	79.5

Note: Shares are estimated using frequency weights.  
Source: Our own calculations based on 2021–22 Viet Nam LFS data.

In table 3, we present the key characteristics of workers in green, brown and neutral jobs. The age distribution indicates that prime-age workers account for the largest share in green jobs (83.31 per cent), with a similar share for brown jobs (80.48 per cent). While prime-age workers also dominate neutral jobs, this category has a noticeably higher proportion of older workers, at 16.28 per cent, compared with 10.88 per cent in green and 7.31 per cent in brown jobs. Young people represent only 5.81 per cent of workers in green jobs. Gender composition varies significantly across job types. Green jobs are the most male-dominated, with men making up 77.17 per cent of the workforce. Male workers also form the majority in brown jobs (65.03 per cent), while neutral jobs stand out for having a female majority (53.87 per cent). Educational attainment is generally low across all three groups, with most workers having less than tertiary education. Brown jobs have the highest share of workers without tertiary education (93.02 per cent), followed by neutral jobs (85.87 per cent). The highest levels of education are found in green jobs, with 25.97 per cent of workers having attained tertiary education or higher. Marital status shows less variation: in all job categories, most workers are married. In terms of location, green jobs are more urban based, with 51.11 per cent of workers living in urban areas. Brown and neutral jobs, by contrast, are predominantly rural, with 60.36 and 61.05 per cent of workers residing in rural locations, respectively.

There is no single indicator for job quality, but we use informality, part-time work and earnings as proxies. We adopt the ILO’s definition of the informal sector, based on enterprise characteristics, which does not necessarily reflect workers’ individual status regarding informality (ILO 2023). Under this definition, the informal sector consists of unincorporated production units, emphasizing the nature of the workplace. As a result, there is no systematic alignment between a worker’s access to social protection and the legal status of the enterprise. It is therefore possible for workers in informal enterprises to be covered by protection,<sup>11</sup> while workers in formally registered enterprises may lack such coverage. All job types exhibit high levels of informality. Employment in the informal sector is most prevalent in brown jobs (76.6 per cent), followed closely by neutral (75.05 per cent) and green (74 per cent) jobs. Green jobs have the highest share of full-time workers (85.26 per cent), closely followed by brown jobs (83.70 per cent). Neutral jobs have a significantly larger proportion of part-time workers (31.69 per cent), possibly indicating more flexible or

<sup>11</sup> This is mainly due to the voluntary social insurance system, intended to provide coverage for individuals who fall outside the scope of the compulsory social insurance framework. This category typically includes self-employed persons, freelancers, agricultural workers and others not engaged in formal employment contracts. Under the Vietnamese Law on Social Insurance 2014, the scheme covers old age and survivorship but has a limited number of recipients – 1.1 million in 2020 compared with 15 million recipients for the compulsory scheme, according to ILO and ILSSA (2022).

**Table 3. Key characteristics of workers in green, brown and neutral occupations**

	Green	Brown	Neutral
<i>Age (%)</i>			
Youth (15–24)	5.81	12.21	9.93
Prime (25–54)	83.31	80.48	73.79
Older (55–64)	10.88	7.31	16.28
<i>Sex (%)</i>			
Male	77.17	65.03	46.13
Female	22.83	34.97	53.87
<i>Education (%)</i>			
Less than tertiary	74.03	93.02	85.87
Tertiary	25.97	6.98	14.13
<i>Marital status (%)</i>			
Not married	19.72	23.49	21.69
Married	80.28	76.51	78.31
<i>Location (%)</i>			
Rural	48.89	60.36	61.05
Urban	51.11	39.64	38.95
<i>Work arrangement (%)</i>			
Full-time	85.26	83.70	68.31
Part-time	14.74	16.30	31.69
<i>Informality (%)</i>			
Formal	26.00	23.40	24.95
Informal	74.00	76.60	75.05
<i>Social security (%)</i>			
No	69.51	51.50	73.61
Yes	30.49	48.50	26.39
<i>Earnings (mean VND)</i>	8 242 366	7 195 409	6 490 824

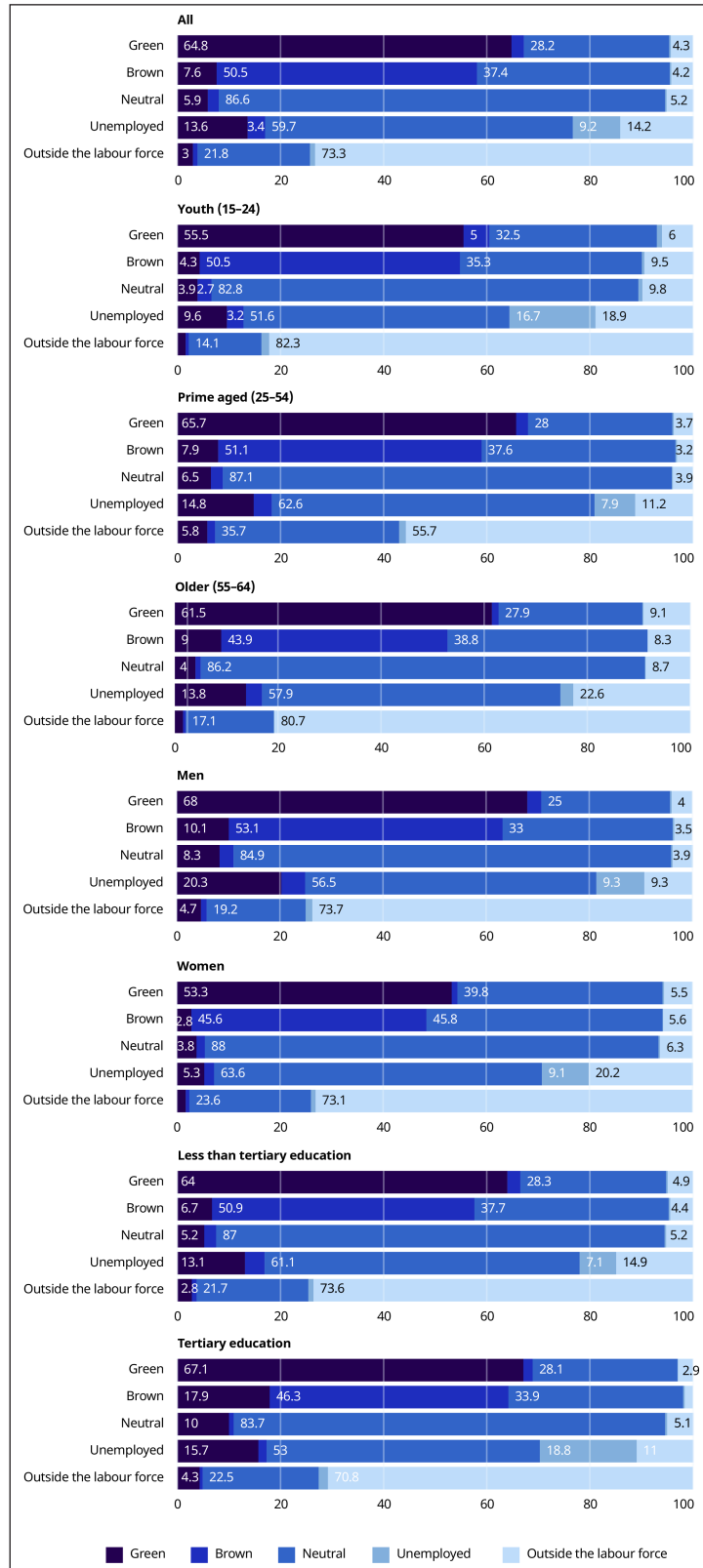
Notes: Shares are estimated using sampling weights. VND = Vietnamese Dong.  
Source: Our own calculations based on 2021–22 Viet Nam LFS data.

less secure employment patterns. Social protection coverage is similarly limited, particularly in neutral jobs, where 73.61 per cent of workers lack coverage. Green jobs fare only slightly better, with 69.51 per cent uncovered. Brown jobs have the highest share of workers with social protection at 48.50 per cent. Earnings also vary across categories. Green jobs offer the highest average income per month, with mean earnings of 8,242,366 Vietnamese dong (approximately US\$317). Brown jobs follow at 7,195,409 Vietnamese dong (almost US\$277), while neutral jobs have the lowest mean income at 6,490,824 Vietnamese dong (a little less than US\$250).

In summary, green jobs are concentrated in urban areas, dominated by men and typically held by prime-age adults working full-time with, on average, higher levels of education. They offer the highest average earnings but remain largely in the informal sector and lack widespread social protection coverage. Brown jobs are slightly more rural and inclusive of younger workers, with marginally better access to social protection. Neutral jobs, on the other hand, feature a greater share of older, part-time and female workers, with lower levels of educational attainment, limited social protection entitlement and the lowest earnings among the three categories.

As can be seen from figure 1, green job holders are relatively more likely to transition on the labour market. However, transitions from green to brown jobs are quite limited, at only 2.4 per cent. By contrast, 28.2 per cent of green job holders move to neutral jobs, while another 4.6 per cent either exit the labour force (4.3 per cent) or become unemployed (0.3 per cent) over the course of five non-consecutive quarters. Nearly 65 per cent of the

**Figure 1. Distribution of individuals across labour market states at the end of each wave, according to their state at the beginning of each wave (percentages)**



Note: Shares are estimated using sampling weights.

Source: Our own calculations based on 2021–22 Viet Nam LFS data.

workers in green occupations remain in the same state. The high rate of transitions to non-green jobs could reflect the large share of neutral occupations in the country (79.5 per cent, see table 2). Brown jobs, however, have higher churn. While 50.5 per cent of brown job holders are still in a brown occupation after 15 months, a notable 37.4 per cent transition to neutral employment, suggesting a shift away from environmentally harmful occupations. Neutral jobs are the most stable category overall, with 86.6 per cent of workers remaining in such jobs over the period.

The transition rate to unemployment is relatively low for workers, regardless of whether they hold a green, brown or neutral job. This reflects Viet Nam's low unemployment rate, estimated at 2.8 per cent on average during the period from 2021 to 2022.<sup>12</sup> By contrast, unemployed individuals exhibit high mobility: only 9.2 per cent remain unemployed, while most transition into employment or exit the labour force. Individuals outside the labour force tend to remain there, with a retention rate of 73.3 per cent.

Analysis by age group shows that green job retention among young people (aged 15–24) drops to 55.5 per cent, reflecting less stability in early careers. The transition rate from brown to green jobs is also lower for young workers (4.3 per cent) than for prime-age and older workers (7.9 and 9 per cent, respectively). Youth unemployment persistence is relatively high at 16.7 per cent, indicating structural barriers to labour market entry. Moreover, 15 months after withdrawing from the labour force, 82.3 per cent of young people are still outside it, suggesting difficulties in entering the workforce. Older individuals (aged 55 and above) show high stability in neutral jobs (86.2 per cent) but also a high rate of transition from employment to inactivity. Among older unemployed individuals, only 2.5 per cent are still unemployed in the next period, while 22.6 per cent exit the labour market altogether, likely reflecting retirement or health-related barriers.

When comparing men and women, women are less likely to stay in green jobs (53.3 per cent compared with 68.0 per cent of men). This may have various explanations, including the attrition of women in male-dominated occupations, driven, for instance, by the structural and workplace factors that they endure in these jobs (Torre and Jacobs 2021). Women are also more likely to exit the labour force from any employment category, a pattern that reflects gender-specific constraints and persistent challenges in balancing labour market participation. Men in brown jobs have a higher likelihood of remaining in the same sector (53.1 per cent) compared with women (45.6 per cent). However, the transition rates from brown and neutral jobs to green jobs are also higher for men (10.1 and 8.3 per cent, respectively) than for women (2.8 and 3.8 per cent).

The data also reveal important differences according to educational attainment. Individuals with less than tertiary education follow trends similar to the overall rates, particularly in terms of stability in neutral employment. By contrast, those with tertiary education show distinctive patterns. They are more likely to transition from brown to green jobs (17.9 per cent), suggesting that education may facilitate environmentally sustainable career shifts. They are also slightly more likely to remain in green occupations (67.1 per cent of workers with tertiary education still hold a green job after 15 months, compared with 64 per cent of those with lower educational attainment). However, unemployed individuals with high levels of education face greater persistence in unemployment (18.8 per cent) than their less educated counterparts (7.1 per cent), possibly reflecting a mismatch between qualifications and available opportunities or more selective job-seeking behaviour. Tertiary-educated individuals also exhibit a slightly higher labour force entry rate, with lower retention in inactivity compared with those with lower levels of educational attainment (29.2 per cent compared with 26.4 per cent), suggesting greater labour force dynamism among the educated.

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<sup>12</sup> Data retrieved from Government of Viet Nam, National Statistics Office, "Unemployment rate of labour force at working age by region and by residence", accessed on 31 May 2025, <https://www.nso.gov.vn/en/px-web/?pxid=E0259&theme=Population%20and%20Employment>.

## 4.2. Green transitions and social protection in Viet Nam

The Viet Nam LFS includes a question regarding whether the respondent is covered by social insurance. Given that only individuals who hold a job in each period answer the question, it is not possible to examine the relationship between social protection and movements from non-employment into green or brown jobs. While there are data on individuals who are in green, brown or neutral employment with social protection and who move into unemployment or outside the labour force, the number of observations is too small to draw any inferences. The above descriptions also indicate that there are substantial differences between the green, brown and neutral job categories, especially in terms of work arrangements. Green jobs, in particular, are associated with higher earnings than brown and neutral jobs. Furthermore, brown jobs – such as those in fossil fuel extraction and other high-emission industries – are increasingly associated with declining demand due to tightening environmental regulations. In contrast, green jobs in areas such as renewable energy, sustainable agriculture and waste management are expanding, driven by supportive national policies and international climate investments (Vandeplass et al. 2022).<sup>13</sup> Overall, in some key working conditions, such as job security and remuneration, green employment might appear, on average, to be relatively advantageous. In this context, social protection, and particularly the unemployment benefits scheme, could facilitate reallocations to such occupations.

As highlighted previously, social protection can have differential effects depending on the level of educational attainment. Education may play a critical moderating role in shaping how social protection affects employment mobility. Workers with high levels of education, possessing broader skill sets, higher levels of adaptability and greater access to information, are more likely to leverage social protection mechanisms. Even in developed economies with high social protection coverage, a potential link has been found between the underutilization of unemployment insurance among eligible individuals and a lack of awareness of the procedures for using this scheme (Hentzgen et al. 2022). Hence, we disaggregate the relationship between social benefits and movements in and out of green jobs by educational attainment. We conduct this analysis by estimating logistic regressions following the specification given in equation (1).

Table 4 shows the average marginal effects (AMEs) of social protection for workers with and without tertiary education on transitions between employment types in Viet Nam.<sup>14</sup> For individuals with less than tertiary education, the estimated relationship between social

**Table 4. Marginal effect of social protection by level of educational attainment on the likelihood of transitioning between employment types within 15 months**

	Less than tertiary education	Tertiary education
Brown to green	0.006	0.11**
Neutral to green	-0.01***	0.017**
Green to brown	-0.0002	-0.04**
Green to neutral	-0.012	-0.08***

\*, \*\* and \*\*\* indicate statistical significance at the 10, 5 and 1 per cent levels, respectively.

Notes: AMEs are estimated for the social protection dummy, based on the specifications presented in tables SA1 and SA2 in the supplementary online appendix. The AMEs correspond to the increase or decrease in the likelihood of a brown to green transition (respectively, the neutral to green, green to brown and green to neutral transitions) associated with social protection coverage. All models include controls for age, sex, marital status, geographic location, part-time employment status, informality, log monthly earnings and industry and wave fixed effects.

Source: Our own calculations based on 2021–22 Viet Nam LFS data.

<sup>13</sup> In Viet Nam specifically, the National Green Growth Strategy for the 2021–30 period aims to reduce greenhouse gas emissions, boost the greening of economic sectors and lifestyles, and promote sustainable consumption (Doan et al. 2023).

<sup>14</sup> All the estimated coefficients for each model can be seen in tables SA1 and SA2 in the supplementary online appendix.

protection and transitions from brown to green employment is small and statistically insignificant. By contrast, among tertiary-educated individuals, it is larger and statistically significant. This finding suggests that social protection plays a more substantial role in facilitating transitions into green employment for those with higher levels of education. A similar pattern emerges in the transition from neutral to green employment. Among individuals with lower educational attainment, social protection has a very small, statistically significant adverse effect. For highly educated individuals, the association is small, positive and statistically significant, further supporting the interpretation that the benefits of social protection in promoting access to green employment are amplified by higher education. One possible factor contributing to the difference in outcomes between workers with and without tertiary education may be the heterogeneous nature of the green employment opportunities available to these two groups, which may vary along dimensions such as job quality and career progression. These findings are robust across different specifications.

A particularly salient divergence is observed in transitions from green to brown employment. For tertiary-educated individuals, social protection is negatively and significantly associated with the likelihood of making this transition. In contrast, no such relationship is evident among those with lower levels of education. This suggests that social protection is more effective in helping highly educated workers maintain green employment than it is for other workers. This pattern is repeated with respect to transitions from green to neutral employment.

On the whole, the evidence suggests that social protection mechanisms function differently across educational strata in Viet Nam. Among highly educated individuals, social protection is positively associated with increased mobility into green employment and a corresponding decline in transitions from green jobs to brown or neutral jobs. This pattern suggests that social protection may play a facilitating role in enabling job reallocations linked to the greening of the economy. In contrast, for those with lower levels of education, social protection does not seem to have a meaningful effect on transitions between brown and green occupations. For this population group, transitions from neutral to green jobs appear to be the only ones significantly impacted by social protection, reducing the likelihood of such mobility. However, the effect is small in magnitude (1 percentage point).

Table 5 examines the link between staying in the same type of employment and social protection across educational levels.<sup>15</sup> For people with tertiary education, social insurance appears to have, on average, a positive impact on the probability of maintaining green employment. This relationship becomes statistically insignificant for workers with low levels of education. Thus, for highly educated individuals in Viet Nam, social protection appears to facilitate both transitions into green jobs and staying in those jobs. For workers with

**Table 5. Marginal effect of social protection by level of educational attainment on the likelihood of being in the same type of occupation (brown, neutral and green) after 15 months**

	Less than tertiary education	Tertiary education
Brown	0.1***	-0.005
Neutral	0.03***	0.03**
Green	0.02	0.14***

\*, \*\* and \*\*\* indicate statistical significance at the 10, 5 and 1 per cent levels, respectively.

Notes: AMEs are estimated for the social protection dummy, based on the specifications presented in tables SA3 and SA4 in the supplementary online appendix. All models include controls for age, sex, marital status, geographic location, part-time employment status, informality, log monthly earnings and industry and wave fixed effects. The AMEs correspond to the increase or decrease in the likelihood of remaining in a brown (neutral or green) occupation associated with social protection coverage.

Source: Our own calculations based on 2021–22 Viet Nam LFS data.

<sup>15</sup> All the estimated coefficients for each model can be seen in tables SA3 and SA4 in the supplementary online appendix.

less than tertiary education in brown jobs, social protection is positively and significantly associated with the probability of staying in the same category. By contrast, for individuals with tertiary education, the marginal effect is statistically insignificant, suggesting no meaningful relationship between social protection and remaining in a brown job. Among individuals in neutral jobs, social protection shows a positive and statistically significant effect on keeping the same type of employment for both levels of educational attainment. In short, where social protection has a significant impact on employment stability, the effect is consistently positive, implying that access to social protection tends to reduce employment transitions more broadly and might reflect a form of “job lock”.

Taken together, these findings suggest that education plays a pivotal role in both transitions to and stability in green jobs for Vietnamese workers. Individuals with higher levels of education are more likely to enter green jobs and remain in them over time, highlighting the significance of educational attainment in mitigating risks associated with the green transition. Moreover, our results indicate that social protection tends to be more effective in supporting individuals with tertiary education. These individuals may have greater awareness of available benefits, better access to formal employment sectors where such protections are provided, or stronger administrative capacity to navigate the system, thereby enhancing the impact of social insurance on maintaining employment within the green economy. Nevertheless, other factors may also account for the limited impact of social insurance on job reallocations among those with less than tertiary education. For instance, employment with social insurance provisions beyond unemployment benefits may be considered highly valuable by this group, reducing the incentive to search for another job. Specifically, since social insurance in Viet Nam protects against health risks, less-educated workers may be particularly keen to maintain such coverage, especially as they may be more exposed to health issues than other workers. Similar “job-lock” mechanisms have been described by Madrian (1994), among others. These findings underscore the importance of integrating social protection policies with complementary schemes – in particular, education and skills development initiatives – to ensure more equitable access to green employment opportunities across educational groups.

## 5. Concluding remarks

The transition to green occupations is considered a key strategy in responding to climate change and promoting ecological resilience. However, the transition to a green economy entails both the creation and destruction of jobs, impacting labour markets worldwide. In this light, this article first defines green, brown and neutral jobs, including through the use of tasks as a basis for estimating the “greenness” of occupations. It then examines the transition rates to green occupations in Viet Nam, both on average and for different worker groups. The findings reveal that only a minority of Vietnamese workers are employed in green jobs. Compared with the prime-age group, the proportion of young workers moving from non-green to green occupations is lower, and women tend to face greater challenges in moving to green jobs than men. Education also plays a substantial role, with individuals with higher levels of education more likely to move to a green job than the rest of the population.

This article also examines the role that social protection and unemployment benefits play in supporting and promoting green transition policies. Workers with social insurance in Viet Nam experience different patterns of movements from non-green to green jobs, depending on their educational level. Having a job with social protection increases the likelihood of moving into a green job for workers with tertiary education, suggesting that unemployment benefits and social policies play a supporting role in assisting individuals to seek better jobs. By contrast, social protection is negatively associated with green transitions for Vietnamese workers with less than tertiary education in neutral jobs. This may partly reflect the stronger incentives among this group of employees to keep their jobs and associated social benefits. Our findings also suggest that social protection helps highly educated workers remain in green employment.

There are several avenues for future research. Given that the notion of decent work should be embedded in the definition of green jobs, further research could analyse working conditions in green occupations. In particular, it could examine whether transitions from non-green to green jobs are associated with improvements in wages, working hours and job stability. In addition, the use of complementary microdata could help fine-tune our findings. For instance, longitudinal social security data, including detailed information on each individual's social protection scheme, employment status and occupation, as well as the duration of each job and labour market state, would enable analysis of labour market trajectories beyond the horizon usually provided by LFSs. Such data would also enable researchers to link each of these trajectories to the precise nature of the social protection received. Lastly, extending research to countries with different social protection systems would allow further examination of the role of social protection in accelerating and facilitating just transitions.

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## Competing interests

The authors declare that they have no competing interests.

## References

- Bluedorn, John, Niels-Jacob Hansen, Daa Noureldin, Ipei Shibata, and Marina M. Tavares. 2022. "Transitioning to a Greener Labour Market: Cross-Country Evidence from Microdata". IMF Working Paper No. 22/146. Washington, DC: International Monetary Fund.
- Boeri, Tito, and Mario Macis. 2010. "Do Unemployment Benefits Promote or Hinder Job Reallocation?" *Journal of Development Economics* 93 (1): 109–125. <https://doi.org/10.1016/j.jdeveco.2009.04.002>.
- Causa, Orsetta, Emilia Soldani, Maxime Nguyen, and Tomomi Tanaka. 2024. "Labour Markets Transitions in the Greening Economy: Structural Drivers and the Role of Policies". OECD Economics Department Working Papers, No. 1803. Paris: Organisation for Economic Co-operation and Development.
- Consoli, Davide, Giovanni Marin, Alberto Marzucchi, and Francesco Vona. 2016. "Do Green Jobs Differ from Non-Green Jobs in Terms of Skills and Human Capital?" *Research Policy* 45 (5): 1046–1060. <https://doi.org/10.1016/j.respol.2016.02.007>.
- Crépon, Bruno, and Gerard J. van den Berg. 2016. "Active Labour Market Policies". *Annual Review of Economics* 8: 521–546. <https://doi.org/10.1146/annurev-economics-080614-115738>.
- Curtis, E. Mark, Layla O’Kane, and R. Jisung Park. 2024. "Workers and the Green-Energy Transition: Evidence from 300 Million Job Transitions". *Environmental and Energy Policy and the Economy* 5: 127–161. <https://doi.org/10.1086/727880>.
- de la Vega, Pablo, Natalia Porto, and Manuela Cerimelo. 2024. "Going Green: Estimating the Potential of Green Jobs in Argentina". *Journal for Labour Market Research* 58: Article No. 1. <https://doi.org/10.1186/s12651-023-00359-2>.

- Dierdorff, Erich C., Jennifer J. Norton, Donald W. Drewes, Christina M. Kroustalis, David Rivkin, and Phil Lewis. 2009. "Greening of the World of Work: Implications for O\* NET®-SOC and New and Emerging Occupations". Raleigh, NC: National Center for O\*NET Development.
- Doan, Dung, Trang Luu, Nga Thi Nguyen, and Abba Safir. 2023. *Green Jobs: Upskilling and Reskilling Vietnam's Workforce for a Greener Economy*. Washington, DC: World Bank.
- Doerr, Annabelle, and Rafael Novella. 2024. "The Long-Term Effects of Job Training on Labor Market and Skills Outcomes in Chile". *Labour Economics* 91 (December): Article No. 102619. <https://doi.org/10.1016/j.labeco.2024.102619>.
- Duman, Anil, and Sévane Ananian. 2024. "Labour Market Trajectories, Social Protection and the Green Transition in France and Viet Nam". ILO Working Paper No. 133. Geneva.
- Elliott, Robert J.R., Wenjing Kuai, David Maddison, and Ceren Ozgen. 2021. "Eco-Innovation and Employment: A Task-Based Analysis". IZA Discussion Paper No. 14028. Bonn: Institute of Labor Economics.
- Fallick, Bruce C., and Charles A. Fleischman. 2001. "The Importance of Employer-to-Employer Flows in the U.S. Labor Market". Finance and Economics Discussion Series, No. 2001-18. Washington, DC: Board of Governors of the Federal Reserve System.
- García-Cabo, Joaquín, Anna Lipińska, and Gastón Navarro. 2023. "Sectoral Shocks, Reallocation, and Labor Market Policies". BIS Working Papers, No. 1095. Basel: Bank for International Settlements.
- Granata, Julia, and Josefina Posadas. 2024. "Why Look at Tasks When Designing Skills Policy for the Green Transition? A Methodological Note on How to Identify Green Occupations and the Skills They Require". Policy Research Working Paper No. 10753. Washington, DC: World Bank.
- Grunau, Philipp, and Julia Lang. 2020. "Retraining for the Unemployed and the Quality of the Job Match". *Applied Economics* 52 (47): 5098–5114. <https://doi.org/10.1080/00036846.2020.1753879>.
- Ham, Andrés, Emmanuel Vázquez, and Monica Yanez-Pagans. 2025. "Characterizing Green and Carbon-Intensive Employment in India". *Ecological Economics* 236 (October): Article No. 108695. <https://doi.org/10.1016/j.ecolecon.2025.108695>.
- Hentzgen, Carole, Chloé Pariset, Kévin Savary, and Émeline Limon. 2022. "Quantifier le Non-Recours à l'assurance chômage". Document d'études No. 263. Paris: Dares.
- Hirshleifer, Sarojini, David McKenzie, Rita Almeida, and Cristobal Ridao-Cano. 2014. "The Impact of Vocational Training for the Unemployed: Experimental Evidence from Turkey". IZA Discussion Paper No. 8059. Bonn: Institute for the Study of Labor.
- ILO. 2018. *World Employment Social Outlook 2018: Greening with Jobs*. Geneva.
- . 2019. *Skills for a Greener Future: A Global View – Based on 32 Country Studies*. Geneva.
- . 2023. *Women and Men in the Informal Economy: A Statistical Update*. Geneva.
- . 2024. *World Social Protection Report 2024–26: Universal Social Protection for Climate Action and a Just Transition*. Geneva.
- ILO and ILSSA (Institute of Labour Science and Social Affairs). 2022. *Labour and Social Trends in Viet Nam 2021, Outlook to 2030*. Geneva.
- ISSA (International Social Security Association). 2022. *ISSA Country Profiles: Viet Nam*. Geneva.
- Le Barbanchon, Thomas, Johannes Schmieder, and Andrea Weber. 2024. "Job Search, Unemployment Insurance, and Active Labor Market Policies". In *Handbook of Labor Economics*, Vol. 5, edited by Christian Dustmann and Thomas Lemieux, 435–580. Amsterdam: North-Holland.

- Madrian, Brigitte C. 1994. "Employment-Based Health Insurance and Job Mobility: Is there Evidence of Job-Lock?" *Quarterly Journal of Economics* 109 (1): 27–54. <https://doi.org/10.2307/2118427>.
- McConnell, Sheena, Peter Z. Schochet, Dana Rotz, Ken Fortson, Paul Burkander, and Annalisa Mastri. 2021. "The Effects of Employment Counseling on Labor Market Outcomes for Adults and Dislocated Workers: Evidence from a Nationally Representative Experiment". *Journal of Policy Analysis and Management* 40 (4): 1249–1287. <https://doi.org/10.1002/pam.22305>.
- Michaelides, Marios, and Peter Mueser. 2020. "The Labor Market Effects of US Reemployment Policy: Lessons from an Analysis of Four Programs during the Great Recession". *Journal of Labor Economics* 38 (4): 1099–1140. <https://doi.org/10.1086/706485>.
- OECD (Organisation for Economic Cooperation and Development). 2023. *Job Creation and Local Development 2023: Bridging the Great Green Divide*. Paris.
- . 2024. *OECD Employment Outlook 2024: The Net-Zero Transition and the Labour Market*. Paris. <https://doi.org/10.1787/ac8b3538-en>.
- Samaniego, Brenda, and Christian Viegela. 2021. "Estimating Labour Market Transitions from Labour Force Surveys: The Case of Viet Nam". ILO Working Paper No. 35. Geneva.
- Scholl, Nathalie, Sébastien Turban, and Peter Gal. 2023. "The Green Side of Productivity: An International Classification of Green and Brown Occupations". OECD Productivity Working Papers, No. 33. Paris.
- Torre, Margarita, and Jerry A. Jacobs. 2021. "The Gender Mobility Paradox: Gender Segregation and Women's Mobility across Gender-Type Boundaries, 1970–2018". *Gender and Society* 35 (6): 853–883. <https://doi.org/10.1177/08912432211046328>.
- Valero, Anna, Jiaqi Li, Sabrina Muller, Capucine Riom, Viet Nguyen-Tien, and Mirko Draca. 2021. *Are 'Green' Jobs Good Jobs? How Lessons from the Experience to-Date Can Inform Labour Market Transitions of the Future*. London: Grantham Research Institute on Climate Change and the Environment and Centre for Economic Performance, London School of Economics and Political Science.
- Vandeplass, Anneleen, Istvan Vanyolos, Mauro Vigani, and Lukas Vogel. 2022. "The Possible Implications of the Green Transition for the EU Labour Market". Discussion Paper No. 176. Luxembourg: Publications Office of the European Union.
- Vietnam Investment Review. 2023. "Green Transition Placing Pressure on Labour Market". 31 August 2023. <https://netzero.vn/en/green-transition-placing-pressure-on-labour-market/>.
- Viet Nam, Ministry of Finance. 2025. "VSS Makes Notable Mark on Social, Health Insurance Policy Development". 7 February 2025. <https://vss.gov.vn/english/news/Pages/vietnam-social-security.aspx?ItemID=12446&CateID=198> (accessed 18 November 2025).
- Vona, Francesco, Giovanni Marin, Davide Consoli, and David Popp. 2018. "Environmental Regulation and Green Skills: An Empirical Exploration". *Journal of the Association of Environmental and Resource Economists* 5 (4): 713–753. <https://doi.org/10.1086/698859>.

