



European  
Commission

## SCIENCE FOR POLICY BRIEF



# The contribution of Third Country Nationals to the twin transition in the EU

### HIGHLIGHTS

- The overall share of Third Country Nationals (TCNs) among the employed EU workforce is relatively low (4.4%), but their participation increases in occupations that face persistent labour shortages (7.1%).
- TCNs participation in occupations related to the twin transition is lower than in others. It is important for the EU to create supportive policies and programmes to fully harness the potential of TCNs in the twin transition, as well as to guarantee that this happens in ways that are fair and just, avoiding brain drain and creating opportunities for brain circulation.
- The number of TCNs employed in digital occupations more than quadrupled over the last decade (2011-2021). Moreover, nearly 60% of TCNs in digital occupations have migrated to the EU following a job offer or for the purpose of education and training. Thus, digital occupations appear to already attract talent directly from abroad.
- While the vast majority (75%) of TCNs in digital occupations is highly educated, in green occupations the education levels of TCNs are diverse. Talent should hence be defined including all education and skill levels as long as they are relevant to the needs of the labour market.
- The four largest EU economies (Germany, Italy, Spain and France) host the bulk of TCNs (6.6M or 79% of all TCNs employed in the EU27). The Netherlands, Sweden and Ireland are also popular destinations for TCN in digital occupations. The development of adequate policies for talent attraction requires a detailed understanding of labour market and migration factors underpinning these national differences.

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## QUICK GUIDE – DEFINITION OF GREEN AND DIGITAL OCCUPATIONS

For this brief, we adopted a task-based approach to define green and digital occupations, i.e., we assume that an occupation is a bundle of tasks necessary for its performance.

Our definition of **digital occupations** is based on Bisello et al. (2021) database of task indices grounded on a comprehensive taxonomy of tasks contents, methods and tools.<sup>2</sup> The authors calculate the concentration of basic ICT tools used across occupations (at ISCO 2-digit level)<sup>3</sup> in an index varying from zero to one. We defined digital occupations as those scoring at least 0.8 (or 80%) in the use of basic ICT tools in their tasks, totalling 8 occupations:

ISCO 2-digit	ISCO title	Basic ICT tools score
12	Administrative and commercial managers	0.893
24	Business and administration professionals	0.883
25	Information and communications, technology professionals	0.882
21	Science and engineering professionals	0.856
13	Production and specialised services managers	0.849
33	Business and administration associate professionals	0.824
11	Chief executives, senior officials and legislators	0.824
35	Information and communications technicians	0.812

Our definition of green occupations is based on the occupational greenness score from Gilli et al. (2020) and Vona (2021). The score, varying from zero to one, measures the share of green tasks within an occupation (at ISCO 3-digit level). Based on their calculations, we defined green occupations as those with a minimum of 0.1 (or 10%) concentration of environmental-related activities, totalling 13 occupations:

ISCO 3-digit	ISCO title	Greenness score
961	Refuse Workers	0.692
314	Life Science Technicians and Related Associate Professionals	0.268
932	Manufacturing Labourers	0.231
711	Building Frame and Related Trades Workers	0.230
122	Sales, Marketing and Development Managers	0.202
214	Engineering Professionals (excluding Electrotechnology)	0.198
132	Manufacturing, Mining, Construction and Distribution Managers	0.168
332	Sales and Purchasing Agents and Brokers	0.166
211	Physical and Earth Science Professionals	0.142
215	Electrotechnology Engineers	0.136
213	Life Science Professionals	0.135
142	Retail and Wholesale Trade Managers	0.118
311	Physical and Engineering Science Technicians	0.107

Note: In our classification, an occupation must be classified as digital, green, or other, but not both (e.g., green and digital), in order to be able to compare characteristics and trends between the types of occupations. Given the complementarity of the green and digital transition, we found that some green occupations have a significant digital score. In this brief, these specific occupations are accounted for as green.

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1 For the original taxonomy, see Fernández-Macías & Bisello (2020).

2 For more information on the International Standard Classification of Occupations (ISCO), see <https://ilostat.ilo.org/resources/concepts-and-definitions/classification-occupation>.

**‘WITH THE GREEN AND DIGITAL TRANSFORMATION OF OUR ECONOMIES, MANY COMPANIES IN EUROPE STRUGGLE TO FIND SKILLED WORKFORCE SUCH AS SOFTWARE DEVELOPERS OR CIVIL ENGINEERS. WE HAVE COME A LONG WAY IN UPSKILLING AND RESKILLING WORKERS IN THE EU SINGLE MARKET. IN PARALLEL, WE NEED TO CONTINUE ATTRACTING SKILLS AND TALENT FROM ALL AROUND THE WORLD.’**

THIERRY BRETON, COMMISSIONER FOR INTERNAL MARKET<sup>3</sup>

## CONTEXT

The European Green Deal<sup>4</sup> and the EU’s Digital Decade<sup>5</sup> have firmly placed the green and digital transformations among the political priorities of the European Commission (EC). The aim of this brief is to outline to what extent third country nationals (TCNs) contribute to the EU twin transition via their employment in related occupations, and what their profiles are in terms of educational achievements, age, reasons for migrating, and regions of origin. We define TCNs as those individuals who have a non-EU27 citizenship. The analysis relies on Eurostat’s Labour Force Survey (EU-LFS) microdata for the period 2011–2021. The population considered in the analysis is the EU-wide workforce in employment. The results of the analysis are relevant for existing and future mobility schemes, for integration measures, as well as for broader policies on green and digital labour markets.

The green and digital (‘twin’) transitions can boost one another in many areas, even though they are not always aligned.<sup>6</sup> Both transitions have implications for the European labour market, mostly in the form of employment gains and related skills needs. Different macroeconomic simulations of the labour market

forecast an increase in green jobs between 800.000 and 2.5 million by 2030.<sup>7</sup> The digital transition is forecasted to require an additional 11 million workers over the same period (see box n.1). Without adequate policy measures in place, and given the current labour shortages in many sectors, these jobs may prove difficult to fill.

### Box 1: A closer view to the Digital Decade

The Digital Decade aims at 20 million ICT professionals employed by 2030 in the EU. Here the EC used a broad definition of ICT professionals, based on the ISCO-08 classification, including systems analysts, software developers, applications programmers, and web and multimedia developers. Over half of these profiles are employed in the ICT sector, while other relevant sectors are manufacturing, professional-scientific-technical activities, arts and entertainment, and financial and insurance activities. Over 80% of the ICT professionals have attained tertiary education levels and this is not expected to change in the period up to 2035. <https://www.cedefop.europa.eu/en/data-insights/ict-professionals-skills-opportunities-and-challenges-2023-update>

According to the European Commission, there are 14 occupations that have been persistently in shortage since 2016, and two of these are green or digital. Looking at the labour needs up to 2035, the Commission foresees 22 broad categories of shortage occupations, of which eight have a high green or digital task content. To address these labour shortages, the EC launched a number of initiatives, the majority of which fall under the European Skills Agenda<sup>8</sup> and the Pact for Skills.<sup>9</sup> Targeting the

<sup>3</sup> Press Release, published on 15 November, 2023, [https://ec.europa.eu/commission/presscorner/detail/en/ip\\_23\\_5740](https://ec.europa.eu/commission/presscorner/detail/en/ip_23_5740)

<sup>4</sup> *European Council conclusions, 12 December 2019*

<sup>5</sup> Decision (EU) 2022/2481 of the European Parliament and of the Council of 14 December 2022

<sup>6</sup> For example, digital technologies can have substantial environmental footprints that go against the targets of the green transition. Moreover, the digital transition is driven mainly by the private sector due to its economic potential, whereas greening efforts require important state intervention, cf. *JRC “Science for Policy report: Towards a green and digital future. Key requirements for successful twin transitions in the European Union”* (Muench et al., June 2022)

<sup>7</sup> EC (2023), *Employment and Social Developments in Europe: addressing labour shortages and skills gaps in the EU*. European Commission, Directorate-General for Employment, Social Affairs and Inclusion. European Union, doi: 10.2767/089698 KE-BD-23-002-EN-N.

<sup>8</sup> EC (2020), *Communication, European Skills Agenda for sustainable competitiveness, social fairness and resilience*, <https://ec.europa.eu/social/BlobServlet?docId=22832&langId=en>

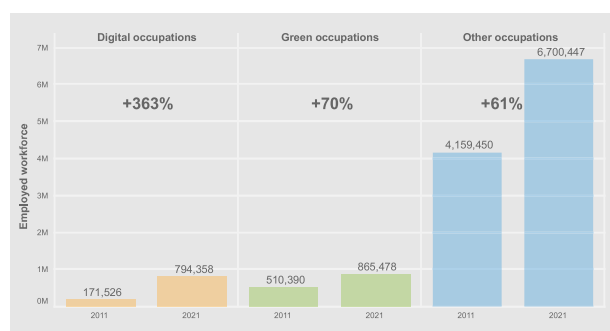
<sup>9</sup> EC (2020), *Pact for Skills*, <https://pact-for-skills.ec.europa.eu>

European labour force, these include upskilling and reskilling, improved alignment of labour supply and demand as well as enhancing work incentives, reforming tax and benefit systems, and improving working conditions. Complementary to these initiatives and in consideration of an ageing European population, the Commission is also reforming its migration system to make it attractive for talents coming from non-EU countries. Recent and ongoing efforts comprise the legislative realm (with the recast of the Single Permit directive on which a political agreement was found in December 2023, the recast of Long-Term Residents directive, and the 2021 revised Blue Card Directive) and operational proposals enshrined in the 2022 Communication on attracting skills and talent to the EU<sup>10</sup> as well as the 2023 Communication on skills and talent mobility in the EU.<sup>11</sup> These include improved labour migration cooperation with partner countries through Talent Partnerships, strengthening learning opportunities and mobility, greater and easier recognition of qualifications earned outside the EU, and the establishment of the Talent Pool as an EU-wide labour platform and matching tool.

## OVERALL WORKFORCE TRENDS AND SPECIFIC DEVELOPMENTS IN THE GREEN AND DIGITAL OCCUPATIONS

Between 2011 and 2021, the EU27 workforce grew by approximately 48 million workers. The vast majority of the workforce is composed of native workers, followed by EU mobile workers (EU citizens working outside their country of citizenship). TCNs account for 4.4% of the EU27 workforce. However, their number increased by 3.5 million, which represents a 73% growth since 2011.<sup>12</sup> Looking at the distribution of TCNs across digital, green and other occupations in 2021, TCNs make up the smallest share (2.7%) of workers in digital occupations. In green occupations TCNs make up 4% while in other occupations<sup>13</sup> they account for 4.9% of employed workers.

**Figure 1 – Growth of TCNs employed in digital, green and other occupations, 2011-2021**



Source: Eurostat LFS 2011-2021, JRC elaboration.

However, if we focus on occupations that have been persistently in shortage of workers since 2016 (i.e. shortage occupations), the share of TCNs in the EU27 workforce is higher (7.1%). This important contribution persists also in green and digital occupations in shortage, where TCNs represent 7.7% and 6.8% of the employed workforce, respectively.

Interestingly, between 2011 and 2021, the number of TCNs employed in digital occupations increased by a staggering 363% (cf. Figure 1) – higher than the growth observed for natives (approximately 62%) or EU mobile workers (approximately 156%). In green occupations, the overall growth in jobs has been lower, with EU mobile workers showing the highest growth rate (87%), followed by TCNs (70%) and native workers (27%).

The analysis shows that TCNs have been increasingly contributing to the twin transition in the EU and are filling important gaps across different sectors. With adequate policies, participation rates can further increase, benefitting migrants' integration and the EU economy.

## ORIGIN AND DESTINATION OF TCNS EMPLOYED IN EU27 IN 2021

**The largest group of TCNs employed in EU27 is from non-EU European countries**

As figure 2 shows, the largest share of TCNs employed in the EU27 originates from non-EU

<sup>10</sup> Available at: [eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52022DC0657](https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52022DC0657)

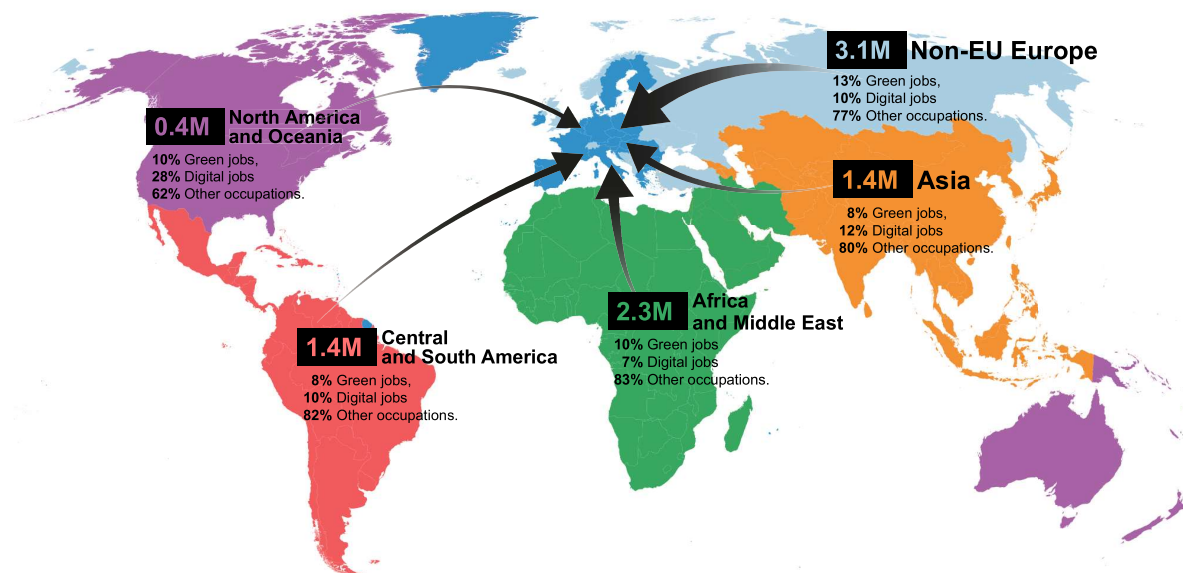
<sup>11</sup> Available at: [https://commission.europa.eu/publications/communication-skills-and-talent-mobility\\_en](https://commission.europa.eu/publications/communication-skills-and-talent-mobility_en)

<sup>12</sup> EU Labour Force Survey based statistics report 8.3 million TCN in 2021 and 4.8 million in 2011. Overall migrants (TCN and EU mobile) were 15 million migrants in 2021 and 8 million in 2011.

<sup>13</sup> The most common "other" occupations where TCNs are employed in are: domestic, hotel and office cleaners and helpers, shop salespersons, care workers in health services, agricultural, forestry and fisheries labourers, and transport and storage labourers.



**Figure 2 – Regions of origin and type of occupations of TCN employed in the EU, 2021**



Source: Eurostat, LFS 2021, JRC elaboration.

European countries (almost 38%), followed by Africa and the Middle East (27%). Non-EU Europeans also comprise the largest numbers of TCNs employed across digital, green and other occupations. This suggests that proximity might play a role in determining migration patterns, as well as visa regimes and cultural similitudes.

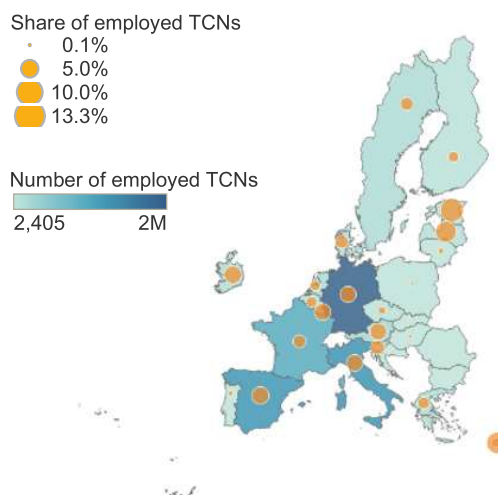
Some 13% of non-EU European workers and 10% of workers from Africa and the Middle East are active in green occupations in the EU27, and slightly fewer are employed in digital occupations. In contrast, more Asians work in digital occupations (close to 12%) than in green occupations (8%).

In absolute figures, the smallest group of TCNs in employment in the EU27 comes from North America and Oceania, with less than 50 thousand workers; despite the small figure, 28% of them work in digital occupations, making these foreign citizens the group with the highest share of workers in the digital occupation category. This seems to suggest a relatively high level of attractiveness of the digital sector in the EU27, even for workers from distant regions. Moreover, it can be noted that India, China, Japan, South Korea, USA, Canada and Australia are among the countries with the highest number of ICT professionals, suggesting that labour supply may also play a role.

**In 2021 the majority of TCNs work in the four most populous Member States**

Germany, Italy, Spain and France - the four countries with the largest populations in the EU - also employ the largest number of TCNs in EU27, totalling approximately 6.6 million people, equivalent to 79% of all TCNs employed in the EU27. Germany alone absorbs about a third of TCNs in EU27 into its workforce (around 2.4 million workers).

**Figure 3 – Employment of TCNs across the EU’s 27 Member States, in absolute numbers (shading) and relative shares (circle size), 2021**



Source: Eurostat, LFS 2021, JRC elaboration.

One of the factors explaining this absorption capacity could be the rate of population ageing, as Germany, Italy and Spain are among the fastest ageing countries in the EU. On the contrary, the presence of TCNs seems not to be linked to the talent attractiveness of individual EU countries. According to the OECD, only one EU Member States (Sweden) scores among the five most attractive countries for highly qualified workers in 2023, but its share of TCNs is not especially high. Moreover, Germany remains a popular destination only for international students.<sup>14</sup>

Looking at the share of TCNs in the workforce of each EU Member States in 2021, the highest rates are found in Estonia (13.3%), Latvia (10.8%) and Cyprus (11.1%), while Malta, Bulgaria and Romania presented the lowest rates (below 0.2%).

Considering specifically the twin transition, the four largest Member States employ the largest numbers of TCNs in green and digital occupations, with Germany leading with 28% of all TCNs working in green occupations in EU27 and about a third of those in digital occupations. However, in the case of digital occupations, the Netherlands, Ireland and Sweden also attract significant numbers of TCNs, possibly related to the importance of the digital sectors in these economies.<sup>15</sup>

Considering TCNs employed in digital occupations, Ireland, Luxembourg and Cyprus display the highest shares (11.3%, 8.9% and 7.7%), whereas Slovakia, Bulgaria and Romania display the lowest (below 0.2%). Considering TCNs employed in green occupations, Latvia, Estonia and Cyprus show the highest shares (13.2%, 11.5% and 10.8%), whilst Romania, Slovakia and Hungary the lowest (below 0.3%).<sup>16</sup>

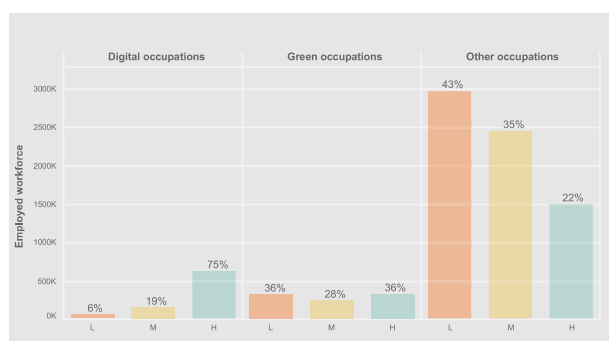
## SOCIODEMOGRAPHIC CHARACTERISTICS OF TCN EMPLOYED IN THE EU IN 2021

In general, TCNs have slightly lower levels of education than EU mobile citizens and native workers. However, the level of education of TCNs differs significantly across types of occupations. Some 75% of TCNs employed in

digital occupations are highly educated, versus only circa 35% of them in green occupations<sup>17</sup> (cf figure 4).

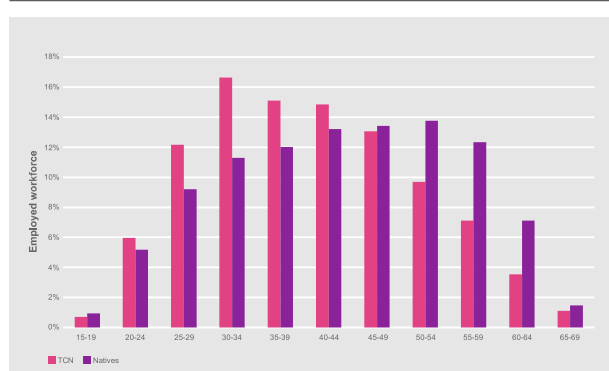
Over one third of TCNs in employment in the EU27 are young (aged 15-34); this is a larger share than in the case of native workers. Moreover, only one fifth of TCNs are over 50 years old, versus a third of all employed natives. Figure 5 shows that the most populated age bracket is the one of 30-34 year-olds in the case of employed TCNs, while for native workers it is the one of 50-54 year-olds. TCNs in digital occupations are even younger, with almost half of them aged 15-34, while the age distribution of TCN in green occupation resembles the one for all TCN.

**Figure 4 – Distribution of highest educational achievement (low, medium, high) by TCNs, per occupation group, 2021**



Source: Eurostat LFS 2021, JRC elaboration

**Figure 5 – Comparative age distribution of TCN and Natives employed in the EU27, 2021**



Source: Eurostat, LFS 202, JRC elaboration.

14 OECD (2023), Indicators of Talent Attractiveness, <https://www.oecd.org/migration/talent-attractiveness/>

15 According to Cedefop, the Netherlands, Sweden and Ireland are among the five countries with the highest numbers of ICT professionals as share of country employment. <https://www.cedefop.europa.eu/en/data-insights/ict-professionals-skills-opportunities-and-challenges-2023-update>.

16 Disclaimer: analyses at such detailed level rely on smaller numbers of observations, meaning that the data has a lower statistical significance.

17 Eurostat LFS codebook defines education levels as follows: Low corresponds to lower secondary education levels, Medium corresponds to completed upper secondary education levels, and High corresponds to completed post-secondary and tertiary education (GESIS, 2022).

In 2021, the majority (56%) of TCNs employed in green occupations had resided in their country of work for 10 years or longer. On the other hand, in digital occupations, only about one third of TCNs had been residing in the country of work for at least 10 years, while almost 38% of them had been residents for no longer than 4 years.

Migration reasons also differ between the two groups. The majority (60%) of TCNs working in digital occupations in EU27 reported to have migrated because of a job offer received prior to migrating or education and training, while for those in green occupations the main reasons for migrating were employment search and family reasons.

The profile of TCNs in digital occupations as highly educated and young, coupled with their relatively recent arrival to the EU for professional motives, suggests a good level of attractiveness of the EU digital sector.

## **POLICY IMPLICATIONS AND RESEARCH NEEDS**

The shares of TCNs in the EU27 labour market remain low, indicating that in order to meet the labour market needs, initiatives such as Talent Partnerships and the Talent Pool shall work in parallel with other initiatives on up- and reskilling and addressing ageism. However, the stronger presence of migrants in shortage occupations, both overall and specifically in green and digital occupations, confirms that migration contributes to **filling labour market shortages** and can be a viable tool to do so in the future.

The concentration of TCNs in a limited number of EU Member States points at important **territorial disparities and an overlooked potential for labour migration in vast parts of Europe**. Both migration and labour market policies could help improve the geographical distribution of TCNs between Member States, but choosing an adequate policy option requires analysing the reasons why most Member States hosts relatively few workers from non-EU countries - whether it is less pressing labour shortages, struggles to attract foreign talent, or differences in national policies on legal migration.

The limited participation of TCNs in green and digital occupations – when compared to other occupations – points to untapped opportunities for policymakers.

Policy actions could include the development of targeted **training** and skills development programmes for migrant workers in green and digital jobs, the facilitation of the recognition and validation of **qualifications** and work experience of migrant workers, the increase in opportunities for migrants' **entrepreneurship** in the green and digital sectors, and the promotion of migrants' **integration** in green and digital jobs.

TCNs in digital occupations are highly educated and have initially arrived in the EU27 either for training and education or through recruitment, meaning their migration is linked to professional motives. They have mostly come in the past decade, as shown by the exponential growth in their numbers and their short period of residence in the country of employment. This demonstrates that attracting the needed talent from outside the EU is possible even in a relatively short time period. Considering the pressing Digital Decade objectives in a context of ageing population, policymakers as well as the private sector could take the **digital sector as an example to follow**, monitoring how TCNs will contribute to his target and identifying key factors of success and potentially replicable actions.

There is an overall age difference between TCNs and EU workers since people tend to migrate at a young age. In digital occupations, the difference tends to be higher. In this context, promoting **circular migration and skill development** in origin countries is key to avoiding brain drain and supporting the digital transition of partner countries affected by high emigration levels.

The more diverse educational profile of TCNs in green occupations shows that persons with jobs requiring low to medium skill levels are also contributing to the twin transition. This finding supports the **definition of talent across all education levels** and dependent on labour market needs, as defined for the Talent Pool.

Digital occupations seem to be the most relevant to the global race for talent, whereas the green transition also 'absorbs' migrants who did not enter the EU on the merit of their skills and education. Either way, the important contribution of TCNs to the twin transition and notably so in shortage occupations is valuable knowledge to policymakers and the broader public and can help **develop more balanced migration narratives** in support of

initiatives such as Talent Partnerships and the Talent Pool.

As green and digital transitions are key to social and economic development across the globe, it is likely that international competition for talent will increase in the coming years. The EU and its Member States should focus on improving their global **attractiveness** to pull and retain international talent, while avoiding brain drain through continuous skill development both in the EU and partner countries and circular migration schemes. This involves tailor-made migration policies for talented individuals, recognizing and rewarding international talent, integrating migrants into the broader social environment, and supporting education and vocational training.

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## CONTACT INFORMATION

Fiona Seiger - [fiona.seiger@ec.europa.eu](mailto:fiona.seiger@ec.europa.eu)



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