

The Role of Immigrant Workers in the Green Transition

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Executive Summary

Governments worldwide have committed to decarbonizing their economies, but these goals are being impeded by difficulties attracting workers with the necessary skills into the green economy. Investments such as the United States' *Inflation Reduction Act* are predicted to create millions of green jobs, forcing job losses in high-polluting industries and requiring workers to reskill. But since it takes time to develop new apprenticeships and training programs, and amid other trends such as population aging and tight labor markets in many high-income countries, labor shortages have already emerged in the green economy, potentially delaying the time-critical work of cutting global emissions. In 2022, four in five energy technology employers in the United States reported challenges finding workers; by 2030, one model estimates a global "green worker shortage" of 7 million people. Thus, alongside efforts to fill these roles with workers already in the country, both native born and immigrant, by increasing job pay and conditions and investing in workforce development, employers are increasingly looking to recruit from abroad.

Employers in green sectors across high-income countries are already bringing in immigrant workers. This includes companies based in Canada, France, Germany, and the United States, and in industries

such as electric vehicles, nuclear energy, solar, and offshore wind. For example, Germany's solar industry association and its Indian counterpart have agreed to set up a pilot program to recruit Indian workers. Indeed, data show that immigrants already make up significant portions of green economy jobs, from 8 percent of renewable energy workers in Spain (in 2022) to 26 percent in Australia (in 2021). Yet immigration policy and green transition strategies are rarely connected, and thus most of these developments have happened organically.

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Going forward, governments will need to more proactively monitor and steer these shifts if they are to maximize immigration's ability to help alleviate green labor shortages. Some shortages are emerging in green jobs with low pay and poor job quality, for instance in solar panel installation, raising questions about how to address these needs without risking worker exploitation. Moreover, relying on internationally trained workers to fix immediate shortages can come at the detriment of more sustainable workforce development—as has been seen in some countries failing to train a domestic workforce for

care and health positions, for instance—and hinder much-needed investments in career pathways, job quality, and pay. Thus, if governments consider tweaks to immigrant admissions policy—whether lowering certain visas’ salary thresholds, adding to shortage occupation lists, or creating new visas to attract workers into specific sectors—this should be done in consultation with worker associations and industry, and with a long-term strategy in mind.

While most discussions at the intersection of immigration and the green transition focus on expanding or reshaping admissions, governments can also make much-needed investments in helping resident immigrants better utilize their skills and experience. Many jobs in the green economy require licenses and qualifications, but the process for workers to gain recognition for skills and credentials earned abroad can be difficult and lengthy, forcing some immigrants to work below their skill level. For example, some 58 percent of Australia’s engineering workforce was born overseas, and one-third of these foreign-born workers believe they are underemployed given their industry experience. Streamlining credential recognition processes requires getting into the nuts and bolts of licensing requirements, and often complex negotiations between industry bodies, but it is just as important as bringing in more workers. Similarly, the skills of accompanying family members, international students, refugees, and other groups can be neglected when policymakers focus solely on the admission of labor migrants.

As high-income destination countries work simultaneously toward their climate goals, they will find themselves competing for a limited talent pool—that is, unless they collaborate to invest in green skills development globally. This could be done through industry-led train-to-hire models, where employers find workers abroad with relevant experience and provide the extra training needed to meet their standards, or through government-led skills mobility partnerships, where destination-country

governments train workers in origin countries to prepare them to work either in the local labor market or abroad. The problem for such partnerships to date has been scale, and a key bottleneck to scale is having consistent and strong industry demand that ensures training systems can be aligned over the long term. Thus, the green transition may prove an opportunity to rethink migration partnerships. For instance, destination countries and industry bodies could collaborate to harmonize training and credential standards and investments in skills and vocational training, helping to build a mobile talent pool with much-needed green skills, able to move where workers are most needed.

As employers navigate difficulties sourcing workers for green jobs, immigration policy will play an important role. Still, governments should not lose sight of the potential risks—to local and migrant workers alike—of over-reliance on expanding labor migration. Instead, achieving net zero in a timely fashion requires working proactively across government agencies to couple responsive admissions priorities with investments in labor market integration and retraining. The urgency and scale of the green transition could also provide much-needed impetus for governments to work together with industry to address pervasive barriers to skills mobility. Balancing immigration policy alongside investments in skilling and training has been a perpetual challenge, but the green transition offers a unique opportunity to build inclusive, productive, and sustainable economies and labor markets.

1 Introduction

The shift toward a more environmentally sustainable economy is poised to transform workforces across high-income countries. As jobs are created in green sectors such as clean energy, other jobs in more carbon-intensive sectors such as oil and gas will be phased out. The effects of the green transition will

also be felt across the larger economy, for example in construction where demand for more energy-efficient buildings will grow, in waste management as countries try to meet new recycling and waste reduction targets, and in tourism and hospitality where curbing short-haul flights could transform how people travel and spend their money. This transition coincides with the digital transition and accelerating population aging, which are also poised to further disrupt and constrict future workforces.

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As this transformation progresses, green skills are at a premium. But there is a lack of consensus on how to identify and foster these green skills among the local workforce, let alone where immigration policies could and should play a role in meeting needs. For example, green jobs account for between 2 percent and 40 percent of all jobs in the European Union, depending on the definitions and measurements used.¹ “Green skills” as a category can refer to technical skills (such as solar panel installation), more transferable skillsets (such as sustainability reporting), and green-related soft skills (such as environmental awareness)—all of which require different approaches to assessment and training.² This complexity makes it difficult to comprehend how systemic green skills shortages are and where they are emerging (at a national or subnational level), as well as what is driving these shortages in the first place.

The burning questions for employers and policymakers alike are how and where to source workers with the right skills for these green jobs. Investing in upskilling and reskilling local workforces, including people displaced from obsolete roles, will be critical, as will efforts to promote decent pay and working

conditions to better attract and retain local workers. But immigration and related skills mobility interventions can also play important roles in sourcing workers and plugging skills gaps.

This issue brief starts by reviewing the state of evidence on labor shortages in the green economy and on immigrant employment in green and brown jobs, and then outlines key considerations for adapting labor migration policy to facilitate a green transition. It argues that immigration already plays a key role in the green transition, but that there are risks to relying on immigration alone to meet short-term labor shortages and that immigration policy updates should be paired with other investments, including in worker reskilling, credential recognition, and global talent pool development.

2 Unpacking Demand for Foreign Workers in the Green Transition

Governments are making massive investments in green energy as part of their efforts to decarbonize their economies, fueling demand for workers with relevant skills and qualifications. Recent examples include the *Inflation Reduction Act* in the United States, which was passed in 2022 and is estimated to add some 1.5 million jobs by 2030,³ and the implementation of the European Green Deal, which aims to make the European Union climate-neutral by 2050 and is projected to drive significant demand for workers involved in manufacturing and installing clean technologies (with estimates ranging from 400,000 to nearly 600,000 new jobs created by 2030).⁴ Globally, the number of jobs in the renewables sector nearly doubled between 2012 and 2022.⁵ This rapid growth in green jobs has led to concerns that demand for green skills could outstrip the supply of qualified workers, with dire consequences for green transition ambitions, and spurred

interest in immigration as a possible policy response alongside investments in education and training.

A. *What Is Driving Green Skills Shortages?*

Difficulties recruiting workers are already common across the green economy. For example, in a 2022 survey conducted for the U.S. Department of Energy, more than four in five energy technology employers in the United States reported difficulties finding qualified workers.⁶ These gaps are projected to grow as governments pursue their green transition agendas. One global model estimates a “green worker shortage” of 7 million people by 2030, although these estimates range widely depending on how

broadly green jobs (and skills) are defined and assumptions about how demand for these workers will evolve (see Box 1).⁷

These shortages have spurred employers to invest in measures to train new workers, improve the attractiveness of their jobs, explore automation,⁸ and develop new recruitment strategies to tap underrepresented segments of the workforce (e.g., women and minority communities). Employers have also stepped up their international recruitment efforts: nuclear energy companies in France have recruited from Canada and the United States,⁹ and electric vehicle battery manufacturers in Canada have relied to some extent on foreign workers.¹⁰ South Korea is expanding its visa program to recruit 300 foreign

BOX 1 Defining and Measuring Green Jobs and Skills

Some of the difficulty of understanding labor shortages in the green economy comes down to the fuzzy definitions of “green jobs.” One definition is industry-based and specifically focuses on jobs in renewable energy (e.g., wind, solar, hydro, nuclear). Estimates of worker shortages in these sectors are easier to produce, but they have nuanced implications for immigration policy because they often include both jobs directly involved in energy production (such as engineers) and jobs indirectly involved (such as accountants or human resources professionals working in green sectors). This industry-based approach is simple but imprecise; it includes jobs that are not directly linked to the green transition (and that might not face shortages even if the industry does as a whole), and it excludes other green jobs outside renewable energy that may face shortages. A second definition is broader and includes all occupations needed for the green transition, including those in sectors other than renewable energy (e.g., in retrofitting infrastructure, public transportation, and recycling). These jobs are just as critical to a green transition, and the number of workers who need new skills or training in renewables-adjacent sectors undergoing decarbonization may be greater than the scale of workers needed for renewables jobs alone. But creating this detailed estimate requires digging deep into various sectors’ occupations and skills, requiring detailed data breakdowns that may not be available or take considerable time to produce.

There is a case for pursuing both approaches. Given the immediacy of labor shortages specifically in renewables, it may make sense for policymakers to focus first on these needs and possible immigration policy responses. But in the medium term, governments will need to develop a much more nuanced understanding of green jobs and green skills needs across the economy if they are to reach their decarbonization targets.

Sources: Organization for Economic Cooperation and Development (OECD), *Job Creation and Local Economic Development 2023* (Paris: OECD Publishing, 2023); International Labor Organization (ILO), *World Employment Social Outlook 2018: Greening with Jobs* (Geneva: ILO, 2018); Erich C. Dierdorff et al., *Greening of the World of Work: Implications for O*NET®-SOC and New and Emerging Occupations* (Raleigh, NC: National Center for O*NET Development, 2009); National Center for O*NET Development, *O*NET® Green Task Development Project* (Raleigh, NC: National Center for O*NET Development, 2010); Shoshana Davidson, Sujatha Krishnan-Barman, and Ed Whincup, *Green Jobs: Rapid Evidence Review* (London: Nesta, 2023).

workers for power line transmission jobs.¹¹ And in 2023, the German solar industry association Bundesverband Solarwirtschaft and India's Skill Council of Green Jobs agreed to facilitate the recruitment of Indian workers for solar jobs in Germany and to support their integration upon arrival.¹²

The challenges of filling green jobs can be partly attributed to skills mismatches, and partly to a difficult hiring environment. For example, the construction sector in Europe faces growing demand to expand housing supply and retrofit older buildings to meet energy-efficiency and net-zero goals, but one-third of its workforce is nearing retirement age and workers commonly report long hours and physically demanding working conditions.¹³ Meanwhile, new technologies and techniques (such as building information modeling and industrialized construction) can streamline building and renovation processes, improve productivity, and reduce carbon emissions, but they also change labor demand—from low-skilled workers with on-the-job experience in favor of more high-skilled workers with cutting-edge digital and green skills.¹⁴

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Several different dynamics are driving skills shortages in the green economy. In some cases, the issue is supply, with employers struggling to find qualified workers and limited numbers of instructors available to train more workers on a short timeline. In other cases, the issue is attracting and retaining workers, especially in green jobs that are low paid or have more precarious working conditions.¹⁵ One complication is that many green jobs exist outside of

major urban centers and in rural places—Australian government modeling shows more employment growth in clean energy jobs outside the country's metropolitan areas¹⁶—and these places often do not have enough existing workers, the infrastructure to train new workers, or the living conditions to attract workers from elsewhere. This illustrates the importance of scrutinizing what might qualify as a genuine shortage, and what the appropriate policy response might be, whether encouraging employers to raise wages, investing in education or training, or bringing in qualified workers from other countries.

Current and projected shortages are also in flux, in part due to the scale of government investments in the green transition. Governments have poured funding into reaching net-zero targets (through tax concessions, direct funding, and investments) and training new workers with green skills, shaping demand for renewable energy and the supply of workers. Thus, anticipating shortages in the green economy requires not just understanding scenarios that can affect labor supply, such as demographic change or investments in (re)training local workers, but also modeling the impacts of investments in apprenticeships and training and how future demand for these workers will change as the green transition matures. Tools such as the International Labor Organization's Green Jobs Assessment Model can help map the impact of green policies on jobs,¹⁷ and most point to the unprecedented speed and scale of this labor market upheaval as economies decarbonize.

A final consideration is the urgency of different aspects of the green transition. Some green jobs (such as solar panel installers) have fairly quick on-ramps with options for short apprenticeships or on-the-job training, especially for workers with adjacent work experience, but others require advanced technical skills (such as engineers or electricians in renewable energy) and thus a longer lead time to train workers. Although governments and industry are investing in training and apprenticeships to build the talent

pool, these are medium- and long-term fixes at a moment when time is of the essence for securing sufficient workers to meet urgent decarbonization goals, which could spur a focus on shorter-term fixes such as international recruitment.

B. What Role Are Immigrants Playing in the Green Transition?

Assessing whether and how immigration can unlock bottlenecks in the green transition requires understanding where immigrants already work in green jobs and brown (carbon-intensive) jobs.¹⁸ Workforce planning depends on robust data—for instance, Australia is building on a comprehensive study of foreign-born workers in clean energy jobs to inform its upcoming National Energy Workforce Strategy, which will explicitly consider skilled migration. Understanding how many immigrants work in green jobs and how they secured those jobs, including whether an employer sponsored their admission to the country or they accessed the job opportunity after arriving through another channel (e.g., as international students or family admissions), can help calibrate future immigration policies.

The available data point to foreign-born individuals making up considerable proportions of workers in some green economy sectors.¹⁹ In Australia, about one-quarter of workers in clean energy sectors in 2021 were foreign born, rising to more than half of all electrical engineers.²⁰ Occupations with higher skill requirements were more likely to have foreign-born workers, despite acute shortages in some low- and middle-skilled roles, potentially pointing to a mismatch between employer needs and visa policies that target and are more generous toward high-skilled immigrants. In Spain, 8 percent of renewable energy workers were foreign born in 2022, and more than 60 percent of those foreign-born workers were from outside the European Union.²¹

Still, these data are incomplete. Breakdowns of the green workforce are patchy in many countries and may not provide much-needed insights into national versus regional dynamics and the share of foreign-born workers in different occupations—let alone whether workers entered on a work visa for that specific role or were recruited while already in the country. There are also few insights into these immigrants' specific occupations, skill levels, and credentials, which could speak to whether their roles are fully leveraging their skills and qualifications, nor their pay and working conditions and how these compare to roles held by native-born workers.

Just as important is understanding where immigrants work in brown jobs that are likely to be eliminated or to require substantive retraining to perform in less carbon-intensive ways.²² Job losses for all workers in brown jobs are predicted by the International Labor Organization to reach 78 million by 2030 (24 million involving workers unlikely to easily find similar jobs in other industries), prompting some governments to invest massively in job opportunities for displaced workers.²³ But these efforts to promote a “just transition” generally do not account for the position of immigrants within the workforce and their specific profiles and needs. Topline data are available in some countries on immigrants in brown jobs: immigrants made up 3 percent of Spain's extractive industry, oil refining, and chemical industry workforce in 2021,²⁴ and 14 percent of workers in the mining, quarrying, and oil and gas industry in the United States were foreign born in 2023.²⁵ Beyond fossil fuel industries, immigrants also work in sectors likely to transform as they decarbonize, including construction²⁶ and agriculture.²⁷

Knowing how many immigrants work in brown jobs (and their profiles) can help ensure they are not overlooked in reskilling programs and related supports (e.g., if their visa status bars them from accessing unemployment benefits, or if they need translation services to access training programs). Immi-

grants may also find it harder to use their skills and qualifications to retrain for new jobs; for example, some offshore drilling workers could reskill to fill offshore wind jobs, but workers with foreign-acquired qualifications may find it more difficult to access top-up training and earn new credentials. Finally, immigrant workers on temporary employer-sponsored visas may need to return home if companies close or their roles are eliminated, in which case the onus may fall on countries of origin to reintegrate and potentially help their nationals reskill as they return.

3 What Are the Implications for Immigration Policy?

Uncertainty about how demand for green skills is likely to evolve and what role immigrants could play in meeting these needs poses a conundrum for immigration policymakers. The limited evidence suggests that immigrants already play an important role in some green jobs—and that, on balance, this role may grow as more destination countries rely on immigration to tackle skills gaps and sustain their workforces. But there is little information available on how employers are currently utilizing economic migration channels to fill green jobs, and where the missed opportunities lie. These data gaps not only constrain policymaking but leave governments on the backfoot from a communications perspective. Companies recruiting foreign workers for green jobs have at times faced fierce public backlash, especially because governments have invested public funds so heavily in these sectors. Canada's Building Trades Union has protested one electric vehicle company's plans to recruit 50 foreign workers, and offshore wind farms in the United States are facing congressional efforts to bar them from using foreign labor.²⁸ Given these emerging anxieties, governments will need to make a clear case for when and why immigrants should be admitted for green jobs, and how

admissions can happen alongside support for local workers.

More work is needed to connect the dots and to develop a strategy for how immigration policy can complement efforts to build the green jobs talent pool and support local workers (both native born and immigrant) in accessing decent green jobs.

Another challenge is that while immigration can help address green skills gaps, there is a striking lack of coordination between immigration, workforce development, and climate and energy policymakers. For example, a 2021 UK Green Jobs Taskforce report on delivering green jobs and addressing skills mismatches did not include a single mention of immigration or immigrant integration.²⁹ There are some signs that these policy siloes are starting to break down: the National Energy Workforce Strategy under development in Australia explicitly includes “skilled migration to meet energy workforce needs” as a consideration,³⁰ and Germany's Climate Action Program 2023 calls for “ensuring skilled labor for climate change mitigation” and references both climate-related vocational training and high-skilled immigration.³¹ But more work is needed to connect the dots and to develop a strategy for how immigration policy can complement efforts to build the green jobs talent pool and support local workers (both native born and immigrant) in accessing decent green jobs.

A. Adapting Admission Policies to Meet Green Economy Needs

As the green transition creates new jobs and transforms occupations, immigration policymakers should regularly review their admissions priorities to ensure they reflect labor market needs. One step

is ensuring that tools to manage and prioritize admissions, such as shortage occupation lists, quotas, and points tests, are regularly updated and reflect the latest insights on employer needs and economic priorities in the green economy. Governments can invest in better tracking hiring dynamics (e.g., with greater use of web-scraped data) and regular consultations with employers and worker associations to understand where hiring needs are most acute and where immigration should be considered as a policy response. Input from employers, industry, unions, and worker associations can help immigration policymakers assess whether shortages are driven by a lack of local workers with the right experience and skills, employers failing to hire domestic talent, and/or challenges retaining workers—and thus where and to what extent immigration policymakers should consider additional or new types of visas.

For green jobs with lower wages or more precarious working conditions, policymakers should consider both how to assess which shortages are genuine and how to push for decent work standards that could lessen domestic recruitment challenges.

This scrutiny is especially important in low-paid yet essential jobs, where reliance on foreign workers is likely to grow, raising questions about how to manage recruitment responsibly and to implement appropriate worker protections. For green jobs with lower wages or more precarious working conditions, policymakers should consider both how to assess which shortages are genuine and how to push for decent work standards that could lessen domestic recruitment challenges. Recent issues with exploitation of international care workers in the United Kingdom, including cases in which care workers were misled about job terms or pay, underscore the need for extra safeguards to prevent the exploitation of

lower-wage workers during recruitment, admission, and employment.³² As the green transition progresses and demand for green skills in lower-wage or more precarious jobs grows, immigration policymaking should be accompanied by efforts to promote decent work by incentivizing employers to boost job quality and create career pathways for workers that allow them to build skills and move into higher-paying jobs.

Alongside reviewing how many immigrants should be admitted through different pathways, immigration policymakers may also need to consider how to address hard-to-fill green jobs that fall outside current admission priorities. Destination countries often focus on admitting high-skilled immigrants holding job offers with high salaries, either by only offering work visas to this group or by offering more favorable conditions (such as longer and renewable visas, a pathway to permanent residence and citizenship, and the ability to bring in family members). And when national climate policies or strategies do consider migration, as in Canada and the United States, they tend to focus on these highly skilled workers.³³ Yet many green jobs in sectors such as clean energy, construction, and waste management do not fit this mold, in that they do not require postsecondary education or formal qualifications and/or offer lower salaries. Thus, even when facing labor shortages, employers may not be able to fill many of these jobs via international recruitment either because the needed workers are ineligible for work visas entirely or only qualify for time-limited temporary visas without an option to renew or transition to a longer-term status.

Opening up opportunities for low- or middle-skilled workers could take a couple of different approaches. For example, governments could adjust some admission criteria (such as minimum salary thresholds) for green workers or consider introducing a standalone green visa that could be tailored to the particular needs and profiles of green jobs. Creating

a green visa could also be a way to promote a country as a destination for green employers and green workers, although this requires navigating questions such as which occupations qualify as green, how to account for fast-changing labor market needs, and what the trade-offs are of adding a new visa in terms of additional bureaucracy.³⁴

Given the wide range of estimates for job creation and destruction in the green transition, immigration policymakers should also explore ways to accommodate this uncertainty through more flexible approaches to admissions. For example, policymakers could make it easier for immigrants working in green jobs to switch employers, or even explore alternatives to employer sponsorship such as offering open work permits for specific in-demand sectors. Policymakers may also want to revisit the design of admissions policies to incorporate ways to identify transferable green skills alongside technical skills related to a specific job, for example by integrating self-assessment tools or employer-administered skills assessments alongside formal qualifications and work experience requirements.

Finally, immigration policy can support entrepreneurship and innovation in the green economy. Innovation is a priority in many climate mitigation strategies because significant technological improvements will be needed to achieve net-zero goals.³⁵ In turn, immigrants tend to be overrepresented among entrepreneurs and patent holders in countries such as the United States.³⁶ Attracting and retaining foreign nationals with in-demand green skills and entrepreneurial potential will likely require a combination of creating an appealing immigration “package” for them and their families, such as eased access to visas, expedited processing, and a clear route to permanent residency and citizenship, as well as broader investments in a supportive innovation ecosystem.³⁷

B. Tapping the Skills of the Foreign-Trained Workforce

Alongside efforts to update admissions policies for the green transition, governments should also consider how to create on-ramps to green jobs for their local workforce, including resident immigrants and refugees. Some employers are already trying to tap into underrepresented demographics to strengthen their workforce: in the United States, for example, the National Clean Energy Workforce Alliance brings together employers, training providers, recruiters, and others to build a skilled workforce, with a particular focus on workforce diversity and inclusion of underrepresented groups such as veterans and minority groups.³⁸ Such initiatives could, with the right policy environment, also look to better harness immigrants’ skills. In short, the green transition has implications not just for immigration policy, but also integration policy.

One important step is improving the processes by which foreign-trained workers can get their qualifications recognized and, where relevant, gain the license they need to practice. Some occupations critical to the green transition, such as engineers and electricians, require obtaining a professional license, which can be time-consuming and costly. For workers who were educated or gained relevant experience abroad, this entails seeking recognition for those qualifications from industry bodies that may or may not be familiar with origin-country technical standards, and at times completing additional training or local work experience. Credential recognition challenges can prevent some well-qualified workers from taking up positions that fully utilize their skills, leading to “brain waste.” For example, an estimated 58 percent of Australia’s engineering workforce was born overseas, and one-third of these foreign-born workers believe they are underemployed (particularly those with more than five years of international work experience).³⁹ Delays and complex bureau-

cratic procedures to obtain engineering licenses in Canada have also been criticized as bottlenecks for migrant workers.⁴⁰

Ongoing efforts in a variety of fields aim to smooth training and qualification recognition processes for international workers. Some are government-led, such as the Australian government's pledge to invest AUD 1.8 million in streamlining skills assessment in the housing construction industry.⁴¹ Others come from industry. For example, greentech.training offers bridging programs to help technicians access Germany's green energy market by building technical and German language skills. The training and recruitment firm offers a dedicated program pairing people, particularly refugees, who have international qualifications with solar energy firms in Berlin and provides credential recognition support.⁴² Policy-makers should work closely with industry to explore ways to build on-ramps for different categories of green jobs, such as highly technical roles that may require a license and/or significant retraining and roles that require less formal education but substantial hands-on experience.

Tackling these barriers to entry will also require immigration and immigrant integration policymakers to work closely with their counterparts in education and labor ministries, national and regional authorities (where appropriate), and industry to explore ways to simplify credential recognition processes. This could also involve intergovernmental cooperation to harmonize qualifications so people can move more easily between green jobs across countries, or industry coming together to develop common standards and qualifications (as done to an extent in accounting, for example).⁴³ For example, the European Union's Net-Zero Europe Platform aims to promote the recognition of relevant qualifications across EU countries and support Member States' policies for attracting new talent from non-EU countries, and as part of this plan, to establish academies to develop common training materials on net-zero technologies

for use across the bloc.⁴⁴ While these are coordination mechanisms that aim to facilitate qualification recognition, rather than a single European qualification, such initiatives hint at the potential for greater harmonization of training and qualifications to enable greater skills mobility in the green economy.

Alongside efforts to ease labor market entry, governments can also consider ways to tap the skills of overlooked immigrant populations. For example, labor migrants who hold certain visas are permitted to bring family members with them, but those dependents' qualifications and skills are often not fully explored. A U.S. study of the spouses of H-1B skilled workers, for example, found that 90 percent held a bachelor's degree—nearly half of which were in fields related to science, technology, engineering, and mathematics (STEM)—yet many were not authorized to work in the country.⁴⁵ Governments could also expand pathways for international students to stay and work after graduation if they earned a "green" degree, although this may run into political headwinds, given efforts in some destination countries to curb migration levels or impose restrictions on international students specifically. Ultimately, ensuring access to work and recognition of qualifications for all immigrants with in-demand green skills (whether labor migrants, international students, refugees, or visa holders' family members) can mitigate brain waste and help meet labor market needs in the green economy.⁴⁶

C. *Building the Global Talent Pipeline*

Immigration policy decisions will also need to factor in where international workers will come from, especially as competition for workers with green skills grows and intersects with demographic transitions in destination and origin countries. A key consideration is how to encourage international recruitment in a way that does not exacerbate skills shortages in

less-wealthy countries, which have their own green transition needs, and that instead grows the global pool of workers with green skills. An international agreement modeled on the World Health Organization's Global Code of Practice on the International Recruitment of Health Personnel could be one way to protect against brain drain, although the fact that the green transition cuts across sectors would make implementing a similar code challenging.

Another consideration is how to promote greater skills mobility across countries to allow green workers to potentially apply their skills in multiple settings. One step is improving skills recognition processes, as discussed in Section 3.B, to allow foreign-trained workers to quickly apply their skills in the same profession without needing to repeat training or gain additional work experience locally. Governments and industry representatives may wish to work together to align education and training standards in some fast-growing sectors or explore workarounds such as developing joint degrees or industry-led qualifications that could be recognized in multiple settings.

There is also growing interest in government-to-government partnerships that could combine migration opportunities with investments to train a larger pool of workers. The global skill partnership model, for example, proposes a dual-track approach to training in countries of origin that prepares participants to work either in the local labor market or in another country, with costs shared between governments and participating employers.⁴⁷ This model, which has been piloted in different settings, has attracted attention for its potential to address brain drain concerns and to build the talent pipeline for the green transition.⁴⁸ But while promising, projects often face challenges to implementation, including how to align countries' education and training standards to enable participants to apply their skills in both settings, how to ensure training programs remain aligned with changing visa requirements, how to

navigate scenarios in which an uneven share of trainees wish to either relocate or stay, and how to ensure the costs of training, recruitment, and relocation are competitive and sustainable.⁴⁹

There is also growing interest in government-to-government partnerships that could combine migration opportunities with investments to train a larger pool of workers.

Another approach garnering attention is the train-to-hire model, where governments and employers work together to deliver tailored training to new recruits to perform a specific role. This approach allows employers to specify and potentially provide state-of-the-art training tailored to their own standards and the role in question. In Germany, several projects have sought to recruit people for full vocational training in sectors such as nursing.⁵⁰ Meanwhile, the EU-Passworld project has worked with refugees seeking to move to Italy, with ongoing pilots to train refugees in Uganda to work for IT companies and refugees in Egypt to work in ship-building companies.⁵¹ This model holds particular potential in sectors where standards evolve quickly, by creating a pipeline of recently trained workers. One estimate anticipating a 7-million-person green skills gap by 2030 found that about 40 percent of these required workers would need "only limited training" to close this gap,⁵² potentially making a train-to-hire approach attractive for filling some of these roles. However, more work is needed to flesh out and test this model, including where and how training would be delivered, what conditions would be attached to an employment offer, who would pay for training (the destination- or origin-country government, employer, or trainee), and whether other employers would recognize and value this training.

Providing training after people move to the destination country would require navigating visa rules and opportunities to switch from a study visa to a work visa should a participant complete training and receive an employment contract. Delivering training remotely in migrants' country of origin could be an option for some green jobs with fewer hands-on training requirements, potentially drawing on insights from nonprofits that provide remote training and employment opportunities to refugees, such as Re:Coded or Robo Co-Op.⁵³

This all speaks to the multipronged challenge at hand. Creating more ethical recruitment policies, aligning education and training standards, and supporting efforts to build the pool of workers with green skills across different geographies and at scale will require sustained engagement by different parts of government (including immigration, labor, education, and international development) and industry.

4 Conclusions and Recommendations

Immigration is often overlooked in green transition plans, but without migrant workers, advanced economies will struggle to deliver on their net-zero targets. As investments in green skills development take center stage, the available data suggest that immigrants already play an important role in some strategic green jobs, and these contributions will likely continue to grow as demand increases and workforces age. Thus, meeting green transition goals will require aligning immigration and immigrant integration policies with workforce development strategies.

Harnessing migration's full potential to contribute to the green transition, and navigating important policy trade-offs, will require much closer analysis of immigrants' role in the green economy. Currently, there are limited data to indicate how many

immigrants work in green jobs (and what types of jobs these are), let alone insights that could help policymakers answer trickier questions such as whether these workers entered a country through economic or non-economic immigration channels, whether foreign-trained workers' skills are being fully leveraged, and why employers might recruit internationally for these jobs. Likewise, there is little information available about immigrants working in jobs that are most at risk from the green transition, which could impede efforts to develop responsive and inclusive skills development policies to upskill and reskill affected workers. Investments to improve data collection, coupled with consultations with key stakeholders from industry, labor, and civil society, can help shed light on these topics and provide a stronger evidence base for immigration and workforce policy reforms.

As policymakers think through immigration and immigrant integration considerations within green transition planning, they could consider the following steps:

- ▶ **Engage industry and workers to better understand the nature of green skills gaps and existing training programs.** Even amid massive investments in green jobs across high-income countries, building the supply of workers to implement these investments remains difficult, not least because many of the jobs needed to achieve a green transition are not well paid. Governments should work more closely with employers to understand where immigration does and could play a role in meeting labor market needs in these sectors, and work with unions and civil-society organizations to make sure these opportunities offer decent recruitment and working conditions. Such consultations would support the development of better sector-by-sector scenarios for labor supply and demand, adjustable both for investment

levels and emissions targets in each sector, as well as different factors shaping labor supply (e.g., investments in training, immigration levels, improvements in the labor market participation of different working-age populations).

- ▶ **Evaluate whether and how existing visa programs can help meet changing green skills needs.** Before making policy reforms, governments need more comprehensive information about which elements of their existing immigration systems are fit-for-purpose in a green transition and thus which policy adjustments (from revising points tests to introducing new visas) would be most appropriate. Answering key questions—such as how employers are currently recruiting immigrants to fill green jobs—is critical for ensuring the integrity of existing programs, for providing appropriate worker protections and workforce services, and for understanding where the shortcomings in current admissions policies might be as demand for green skills grows. For example, one consideration is whether and under what conditions to admit workers for low- or middle-skilled green jobs, given they may have limited opportunities to move under existing immigration policies yet will play an important role in helping countries meet their green transition targets. Another consideration is how to assess and value different types of green skills (including soft and transferable skills) and practical experience alongside formal credentials.
- ▶ **Tackle skills mismatches and brain waste among immigrants.** Alongside reviewing admissions policies, governments should review opportunities to more fully tap the skills of resident immigrants as they seek to remedy green skills gaps. This includes initiatives to help foreign-trained immigrants

get their skills recognized and work toward professional licenses (in the case of regulated occupations) as well as efforts to help immigrants and other workers in brown jobs or low-quality green jobs access upskilling or reskilling opportunities. In some cases, this could mean industry and governments collaborating across countries to align training and qualification standards, to enable greater skills mobility, and to simplify investments in green jobs that are in demand across multiple contexts. Governments could also explore ways to connect employers with immigrants underrepresented in the workforce, for example by ensuring that visa holders' spouses and other accompanying family members (and immigrants entering on non-work visas such as international students) can fill green jobs if they have the right skills. This could involve granting work authorization, if lacking, or providing job search resources.

- ▶ **Work with other countries to grow the green skills talent pool.** Governments should consider what steps they can take now to invest in this increasingly in-demand talent pool and to facilitate ethical recruitment practices that mitigate concerns about brain drain and skills waste. The race for workers with green skills should not be viewed as a competition that pits one country against another, but rather as a rising tide that can lift all boats. Cross-government cooperation is needed to identify opportunities to work together on issues such as promoting skills mobility and the recognition of foreign-earned credentials and experience; making international recruitment processes more transparent and accessible; and investing in high-quality education and training in green sectors that workers could apply in multiple locations. These innovative

ideas hold promise in growing the global talent pool and should be explored alongside other investments in immigration, immigrant integration, and skills development.

Addressing green skills shortages to meet net-zero targets will require all hands on deck. Immigration holds great potential for helping to fill some

green skills gaps, yet is all too often overlooked by stakeholders leading on green transition strategies. Breaking down siloes between immigration, workforce development, and other policy portfolios and working more closely with industry and civil society will be critical steps if governments are to deliver on their green transition goals.

Breaking down siloes between immigration, workforce development, and other policy portfolios and working more closely with industry and civil society will be critical steps if governments are to deliver on their green transition goals.

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