



Working paper

Migration for climate action

How labour mobility can help the green transition

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Key messages

Human mobility can help provide the labour flexibility and skills urgently required for green transitions, to address climate change and other environmental crises.

Evidence across four case studies shows how opportunities and challenges can differ according to the nature of migration, the country context and sectoral green transition needs.

Opportunities are identified across the case studies to support green transitions with migrant workforces; improve the environmental impact and working conditions of migrant jobs; create new green jobs for both migrant and host workers; and foster green skills for current and future migrant workers.

Progressive partnerships, engaging migrants themselves as well as host and destination countries, civil society and the private sector, are essential for mutually beneficial outcomes in support of green transitions.



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Acronyms

ASM	artisanal and small-scale mining
DRC	Democratic Republic of Congo
EV	electric vehicle
GDP	gross domestic product
GHG	greenhouse gas
ILO	International Labour Organization
IT	information technology
LIC	low-income country
LSM	large-scale mining
NDC	nationally determined contribution
RMG	ready-made garment
STEM	science, technology, engineering, and mathematics
TVET	technical and vocational education and training
UN	United Nations

Executive summary

The relationship between climate change and human mobility is critical. Many have already moved, or will move, as a result of climate-related events and outcomes, and to try to adapt to climate change. Yet to date, little attention has been paid to whether and how migrants, and specifically labour migration, can contribute to societies and communities as they transition towards a low-carbon, environmentally sustainable future.

Global climate targets require an unprecedented level and speed of transformation, to decarbonise existing sectors, build new ones and adapt to the impacts of climate change. The world needs to halve annual greenhouse gas (GHG) emissions in the next eight years to meet the aim of the Paris Agreement to limit global warming to 1.5°C above pre-industrial levels (UNEP, 2021). Annual climate investment of at least \$4.5-5 trillion is required until 2050 (Buchner et al., 2021), as well as reallocating much current spending away from high-carbon and unsustainable activities. Simultaneously, workers and skills are urgently needed to support a green transition. Some of this capacity will need to come from migrants, who contributed roughly \$6.7 trillion (or 9.4%) to global gross domestic product (GDP) in 2015 (Woetzel et al., 2016). It makes sense to utilise the huge economic potential of human mobility to support the unprecedented economic shift required by the environmental crises, above all climate change.

As this paper shows, dynamic labour markets are crucial enablers of climate and wider 'green' transitions towards environmentally sustainable economic models. While the geographic mobility of workers is key to such dynamism, it is often overlooked: to ensure that migration can support rapid and just green transitions, incentives and pathways must be available for those with the skill sets to move and fill labour gaps. Obstacles to fostering new skills through various mobility schemes also need to be removed.

This paper builds on previous research, 'Migration and skills for the low-carbon transition', and investigates the relationship between climate action, migration, and labour and skills in specific country contexts and sectors.

We find that countries are yet to harness the potential of migrant workforces to support their green transitions. Efforts to facilitate the economic integration of migrants are currently not aligned with green skills development and job creation, which are themselves inadequate. Similarly, there is a lack of coordination between international cooperation to support green transitions and green skills development, and international cooperation on global migration policies.

We identified only one promising, nascent example of an initiative specifically focused on labour mobility in support of green objectives. This seeks to enable young Moroccans to contribute to the development of **Spain and Morocco's renewable energy sectors** through circular

migration. Four other case studies analysed in this paper show the clear potential for existing and new migrants to help enable green transitions. They cover a range of countries with different migration challenges, and sectors relevant to the green transition.

- In **Bangladesh**, green jobs and skills development across **multiple sectors** can create opportunities for both **internal migrant workers** and long-time city residents, in a context of rapid urbanisation.
- In **Colombia**, (re)skilling and incorporating **Venezuelan migrants** in the **renewables sector** can build on the existing proactive and economically beneficial approach to their integration, while supporting the country's decarbonisation ambitions.
- In **Malaysia**, progressive migration partnerships with Indonesia could help tackle the exploitation of **Indonesian migrant workers** and the environment in Malaysia's **palm oil plantations**.
- In the **Democratic Republic of Congo (DRC)**, **Chinese migrants** could support a more equitable and environmentally sustainable approach to **mining cobalt**, a key ingredient in renewable energy batteries and therefore in high demand for electrification of transport and other sectors.

The case studies reveal that action across four, interlinked areas will be required, mapped in Table 1 and described as follows:

1. **Supporting green transitions with migrant workforces.** Where migrant workers bring relevant education and skills, they can immediately help to fill labour gaps or support skills transfer. This requires:
 - a. Measures to enable these migrants' movement and integration in labour markets, e.g. cross-border recognition of green skills; enhancing labour market information systems; active matching of migrant workers to green jobs; and visa schemes.
 - b. Measures to ensure host community workers also benefit, e.g. career counselling and training; incentives to increase employment and training of local, non-migrant workers; and social protection measures.
2. **Improving the environmental impact and working conditions of migrant jobs.** Where migrant workers are already in employment that exploits both them and the environment, a progressive stance on managing migration, building skills and tackling environmental degradation is needed. Public policy and consumer action should incentivise companies to invest in sustainable production techniques and build and properly remunerate the skilled labour required to implement these, whether through regulation or voluntary standards.
3. **Creating new green jobs for migrant and host workers.** Where green employment opportunities are lacking, whether for migrant or host workers, countries can grow green jobs by ramping up in green sectors and diversifying into new ones. The potential for migrant workers – whether international or internal – to support green transitions can be seized from the start, e.g. through:

- a. Cross-industry collaboration to transfer learning from more mature migrant-dependent sectors to green sectors with potential for growth and a need for migrant workers.
 - b. Dialogue to improve coherence between migrant integration policy and other policy areas relevant to green transitions, including climate and environment, skills and education, trade and industry.
4. **Fostering green skills for current and future migrant workers.** Where green skills are lacking, building them for current and future migrant workers, as well as host workers, can increase capacity and flexibility to meet green transition needs. Mobility can also itself be used to develop green skills development. Relevant measures include:
- a. Improving migrant access to green skills development opportunities in work, training and education settings, using digital technology to support access before and after people move.
 - b. Expanding more progressive and reciprocal partnerships to build green skills, including migration skills partnerships; circular migration pathways; and apprentice and student exchanges.

Table 1 Key opportunities and relevant policy measures from the case studies

Countries	Bangladesh (internal)	Venezuela-Colombia	Indonesia-Malaysia	China-DRC	Relevant policy areas
Sectors	Various	Renewable energy	Palm oil	Extractives	
Supporting green transitions with migrant workforce		•		•	<ul style="list-style-type: none"> • Labour market integration for migrants • Commensurate support for host community workers
Making existing jobs for migrants green and decent	•		•	•	<ul style="list-style-type: none"> • Labour and environmental regulation • Voluntary standards
Creating new green jobs for migrant and host workers	•	•			<ul style="list-style-type: none"> • Industrial collaboration • Coherence with other policy areas, e.g. industry, trade
Fostering green skills for current and future migrant workers	•	•	•	•	<ul style="list-style-type: none"> • Access to green education and training for migrants (inc. digital routes) • Skills partnership and exchange e.g. migration skills partnerships

To support green transitions, different stakeholders can play a variety of roles to strengthen migration and employment pathways, as well as training and skills development provision. The incentives are in place:

- **Host countries** can supplement and add flexibility to their domestic labour force by utilising migrant workers where appropriate. Strengthened relations with origin countries can yield other benefits, such as trade in green products and services.
- **Countries of origin** may see a return on investment in green skills development for outward migrants – for example through remittances and other support from the diaspora or, eventually, through the further skills, networks and capital gained by returnees. Poorer countries will nonetheless need international support to upskill their citizens for green transitions, whether they choose to remain or emigrate.
- **Development partners and development finance institutions (DFIs)** are mandated to act on the different elements of this agenda (i.e. safe, orderly, regular migration; climate mitigation and adaptation; decent work); opportunities to address all three simultaneously should be seized.
- **Countries with significant internal migration** can address macro-economic challenges such as urban and youth unemployment by developing routes for economic diversification around new green industries and greening of existing industries, available to both newcomers and local populations.

1 Introduction

1.1 Background

Climate change and migration are defining features of our time and sit at the top of the global political agenda, both domestically and internationally. To date, much of the research and debate around migration and climate change has focused on people that will be forced to move due to climate-induced disasters and other climate change-related reasons. These are critical issues to address and have rightly received attention from multiple stakeholders. But this focus has also meant that much of the public narrative around climate change and migration has been negative, dramatising and scaremongering around the high numbers of people who will be moving. Thus far, evidence of the impacts of long-term climatic and related changes on migration is limited, and high-end projections of future climate-related migration are unlikely to be credible (Selby and Daoust, 2021).

Meanwhile, very little attention has been paid to the new *opportunities* that people on the move can bring to countries and communities on the cusp of transitioning towards a low-carbon, environmentally sustainable future (Gençsü et al., 2020; Adaawen, 2022).

Migration boosts productivity. In 2015, migrants contributed as much as \$6.7 trillion, or nearly 10%, to global GDP (Woetzel et al., 2016). Thus far, however, the economic contribution of migration is not being used to support the green transition (Box 1). Climate change mitigation and adaptation alone are estimated to require at least \$4.5–5 trillion in investment per year to 2050 (Buchner et al., 2021). Alongside this investment, there will be significant shifts in the work we do, and the skills required to do it.

As argued in our previous paper in this series, ‘Migration and skills for the low-carbon transition’, migration of workers both within and between countries can help meet the labour market needs of the low-carbon and wider ‘green’ transition – alongside appropriate skills development for those in situ, including workers displaced within the labour market as high-emission industries disappear (Gençsü et al., 2020). This paper builds on that work with more in-depth country examples to understand how opportunities can be seized in different countries and sectors.

Box 1 Green transitions

In this paper we use the phrase ‘green transitions’ to refer to the economy- and society-wide shifts that will align countries’ development pathways with global climate goals and other planetary boundaries. These include decarbonisation of various sectors, but also aspects such as building resilience to the impacts of climate change, reducing pollution and increasing resource efficiency. The language, while less familiar than ‘low-carbon transitions’, is deliberately chosen for its association with major national and international initiatives, such as the African Union (AU)’s Green Recovery Action Plan and the European Union (EU) Green Deal. Implicit in our use of the term is that transitions should also be ‘just’, recognising differences and inequalities within and between countries (ILO, 2016a).

1.2 Objective

The objectives of the paper are two-fold:

- To change the narrative around climate change and migration among key audiences internationally and domestically, by exploring the ways in which migration can also offer positive opportunities to build a low-carbon, climate-resilient and environmentally sustainable future.
- To make the most of local and migrant skills and labour to meet the urgency of the green transition by assessing the specific opportunities, challenges and solutions arising in different contexts.

The research addresses three research questions:

1. What are the skills and labour gaps that inhibit green transitions, and what contribution can migration (international and/or internal) make to bridging those gaps?
2. What sectors, in what countries, hold opportunities to accelerate green transitions through new migration arrangements or better migrant labour practices?
3. How can policy help to ensure that migration plays a positive role in accelerating green transitions – at national and international level?

1.3 Structure of the paper

Section 2 assesses where key skills and labour gaps arise in green transitions, and how migration can potentially play a role in addressing these (question 1). Section 3 considers four case studies, characterising different migration types, sectors and country contexts, to illustrate the range of opportunities and challenges. The case studies focus on internal migration in Bangladesh, and international migration between Venezuela and Colombia, Indonesia and Malaysia, and China and the Democratic Republic of Congo (DRC) (question 2). Section 4 concludes with reflections on the policy implications (question 3).

2 Mapping the landscape: skills, labour and migration for green transitions

2.1 Green skills and jobs

‘Green jobs’ have been variously defined. We follow the International Labour Organization (ILO), which defines them as decent jobs that contribute to preserving or restoring the environment (ILO, 2019). Based on current predictions in line with countries’ climate plans, the world will need at least 20 million additional workers in green sectors by 2030, and many tens of millions more until 2050 (ibid.; see Box 2). These additional needs will emerge against the backdrop of a rapidly ageing workforce, especially in high- and middle-income countries, where employers are already suffering labour shortages.

There is no clear definition of ‘green skills’ (ILO, 2019). More generally, skills refers to the knowledge, competence and experience needed to perform a specific task or job. Distinctions are typically made along two dimensions:

1. Skills specificity: the extent to which skills are specific to a job or industry. *Core* (soft) skills are the most transferable. Examples include communication or problem-solving skills. *Semi-technical* skills can also be transferable, e.g. marketing, driving or information technology (IT) skills. *Technical* skills are generally applicable to a certain job or industry, e.g. engineering. However, they may be transferable, especially between non-green and green sectors.
2. Skill level: there is generally a distinction between high-level (university-level), mid-level (vocational training or equivalent) and low-level (basic secondary education) skills. Informal qualifications can also be relevant, but are more difficult to categorise. Such distinctions have, however, been criticised as arbitrary and sometimes contradictory, and for failing to properly account for soft skills (Cepla, 2021).

Despite the absence of agreed definitions, most countries identify a lack of green skills in their workforce and acknowledge that they do not have the human capital needed to achieve a low-carbon/green transition. For instance, among the first drafts of Nationally Determined Contributions (NDCs), the climate plans submitted by United Nations (UN) Member States under the UN climate framework, more than three-quarters of 169 recognised the importance of capacity development and skills training to implement necessary climate change adaptation and mitigation measures (ILO, 2019). Forty per cent of these countries have specified plans for ‘green’ skills training to prepare them for the implementation of adaptation and mitigation measures. In the UK, targets on biodiversity, offshore wind power, electric vehicles and other green measures are jeopardised by shortages of skilled workers (Dempster et al., 2022).

Box 2 Forecasting the job implications of green transitions

In 2019, the ILO forecast global net job creation of 7–18 million by 2030 based on two scenarios (ILO, 2019).¹ The net figures hide significant changes in the labour market. The cumulative number of jobs created under both scenarios is over 100 million until 2030, while the cumulative number destroyed is close to 80 million (ibid.). In total, this would disrupt around 2% of the global labour force. The process of job destruction is likely to be sporadic and immediate, responding to policy decisions (e.g. banning plastics, closing down coal mines). Job creation will be a more gradual process.

The effects are likely to be underestimated. Since the ILO's 2019 forecasts, many countries have submitted more ambitious climate change mitigation plans. Country-level estimates also imply higher levels of net job creation. For example, Egypt will require 8 million new additional workers in sustainable agriculture by 2050 (Amin, 2018). The energy transition forecast on which the ILO models rely suggests the renewable energy sector alone will account for 43 million jobs in 2050, compared to 20 million today (IRENA and ILO, 2020).

A comprehensive green transition extends well beyond climate action. All types of jobs will be affected, with the highest growth in demand expected for jobs in construction, mining, manufacturing, transport and skilled agriculture (ILO, 2019). A separate assessment of the employment effects of an energy transition using the same database as ILO's estimated that manufacturing and construction, as well as electricity, represent 85% of the global net job increase (Malerba and Wiebe, 2021).

Finally, it is crucial to consider who *will* gain and lose jobs, including issues around gender and social inclusion. For example, employment levels are still lower for women than they are for men. Creative destruction (destruction and creation of new jobs) will take place in so-called medium-skill occupations, which are trade-related and often male-dominated (ILO, 2019). Targeting women therefore represents an opportunity to alleviate the gender imbalance in affected occupations.

1 The ILO mapped low-carbon sector labour gaps based on EXIOBASE, an input-output model, across 163 industries and 44 countries. The 18 million net job estimate is derived using an 'energy sustainability' scenario, mapping job changes caused by changes in the amount of energy produced, the way it is produced and spill-over effects to other sectors. The 7 million net jobs estimate is derived using a 'circular economy' scenario, which models sustainability in resource use and consumption supported by recycling, repair, reuse, remanufacture, rental and longer durability of goods. The circular economy scenario is more disruptive, with more jobs created and destroyed (ILO, 2019). The ILO did not extend its quantitative forecasts to 2050 owing to uncertainties around factors such as the growing need to adapt to the physical effects of climate change, more ambitious policy action or shifts in green technology or green markets.

The up- and re-skilling implied by the reallocation of workers from sectors with job losses to those with job gains, as well as to fill net additional jobs, is conditional on various factors:

1. The transferability of skills from old to new sectors.
2. Governments and other education or training providers, including employers, offering the necessary opportunities to re- or upskill. Measures include career counselling, fiscal incentives such as bonuses or tax breaks, social protection and training and education.
3. Workers' willingness to invest in new skills.
4. Coordination and forward-looking skills strategies between training providers, employers and governments, including information on gaps and shortages in skills for green jobs.

Perfect reallocation is unlikely. It is not always possible to transfer some skills from high-carbon industries to low-carbon ones: a coal miner whose job is made redundant cannot automatically provide the skills required in a circular economy, such as engineering zero-waste systems – and they may not be able or willing to be retrained in those skills.

On the supply side, there is a general lack of investment in training to develop skills, as well as insufficient labour demand for vocational training and associated mid-level occupations. For example, the United Kingdom has suffered from chronic underinvestment in technical and vocational education and training (TVET), and many low-income countries (LICs) do not have comprehensive, national-level education systems in place.

In some cases, training modules and qualifications can be added to existing systems with relative ease, for example equipping existing gas engineers with the skills needed to install electric heaters, or farmers learning how to apply climate-smart agricultural practices. Other re- or up-skilling efforts are minimal, such as greater environmental awareness (e.g. among refuse collectors) or simple adaptations to work procedures (e.g. among construction workers handling new materials). These re-skilling efforts may only take weeks or months. However, there are also jobs that will require a complete overhaul of existing skills, such as in the design of sustainable buildings, products and systems, which may take years (ILO, 2019).

Failure to address these factors will result in persistent labour gaps that emerge as the demand for green skills rapidly exceeds their supply on the labour market. Worse still, divestment and decommissioning of carbon-heavy employment will result in long-term structural unemployment if affected jobs and workers cannot be reallocated or re-skilled, increasing the likelihood of an unjust transition. Ultimately, an undersupply of green skills in the labour market will prevent countries from implementing their increasingly ambitious plans to tackle climate change.

While re- and upskilling remain critical, greater flexibility is needed in labour markets given the pace of change required. Human mobility has offered both long- and short-term solutions to structural labour gaps and skill shortages in the past, and will continue to do so in the future. Done well, labour migration can complement existing skills in the labour market and help countries reap the full potential of the green transition, including decarbonisation and climate adaptation.

2.2 How human mobility can help fill green skills and labour gaps

Human mobility writ large, i.e. the capacity for people to move from one place to another, can be an important tool for green transitions. It can fill skills and labour gaps, facilitate skills development (Box 3), create networks and foster innovation. It can also provide second-order benefits that can support green transitions, for example through investments by diaspora members (Darlu and Quelin, 2022) or remittances back to countries of origin. There is evidence that remittance flows to Bangladesh have helped generate additional demand for modern renewable energy services under the Solar Homes System programme, the largest national programme for off-grid electrification in the world (Das et al., 2021; Cabraal, 2021).

Box 3 How human mobility can facilitate skills development

Human mobility can itself support the acquisition of green skills, through various routes.

First, student migration, for those that can afford it, has been an important route to acquire technical and soft skills, including in green sectors. In the US, the top receiving country for international students, although data on participation in environmental subjects specifically is not available, science, technology, engineering and mathematics (STEM) and other technical subject areas are preferred by a majority of international students. Engineering, maths and computer science and business and management represent the top three fields of study for international students and together account for over half of international student enrolment in 2019–2020 (Israel and Batalova, 2021). International student or apprenticeship exchanges may also provide a short-term solution for both host and origin countries to improve skills in the workforce, though for the latter the long-term solution is the development of domestic training and education systems.

Second, for those already in the workforce there are opportunities to organise short-term and targeted skills exchanges to help develop green skills, especially at management or entrepreneur level, using private sector partnerships or inter-company training centres. Most top skills for employability in growing green industries are linked to soft skills such as communication, problem-solving and teamwork (ILO, 2019), and thus might be strengthened through cross-border interactions.

Finally, there are skill or talent partnerships, a growing area of practice whereby training and migration are specifically linked. For example, under the ‘Global Skills Partnership’ model, the destination country commits to ‘train potential migrants in their country of origin with targeted skills, prior to migration’, thus ensuring the country of destination receives ‘precisely the skills they need’, as well as contributing to the development of skills and workers in a way that is also useful for the origin country, potentially at lower cost (Clemens and Gough, 2018: n.p.). To be successfully implemented, skills partnerships require a clearly defined sector of interest and a government-to-government agreement between sending and destination countries, as well as significant investment in understanding skills requirements and developing curricula and training materials (CGD, n.d.).

All types of migration (e.g. internal and international, permanent and temporary) and migrants (e.g. workers, students, refugees) are potentially relevant. While recognising this diversity, this study and the cases focus on labour migration, considering both international and internal² examples.

2.3 The role of labour migration

Labour migration intersects with green transitions in three main ways.

First, migrant workers already play an important role in sectors relevant to climate change mitigation and environmental sustainability. To meet the needs of a green transition, they will need to be up- or re-skilled, along with non-migrant workers. Responsible mining of cobalt for car batteries; optimising agricultural yields while controlling the use of pesticides, chemical fertilizers and water; or manufacturing garments with increased energy efficiency, waste-water treatment and green renewable technologies will not be possible without re- or upskilling the significant numbers of migrant workers currently employed in those sectors – alongside non-migrants.

Second, as noted in Box 3, labour migration pathways that facilitate training can help foster skills relevant to green transitions, whether on a South–South, North–North, North–South or triangular cooperation basis (ILO, 2019). Circular migration can also provide opportunities for skills development and transfer between countries. Indeed, circular migration is the focus of the only example that we identified in our review of an initiative deliberately targeting the link between migration and green skills and labour (Box 4).

Finally, human mobility can be used to plug labour gaps in sectors that will be crucial for the green transition, but where domestic labour is not available, either due to high employment

2 Internal migration provides an equally important complement to international migration in offering flexibility to plug skill and labour gaps for green transitions. However, there are also obvious differences, including less formal regulation of internal migrants’ status and rights in most countries, compared to their international migrant peers.

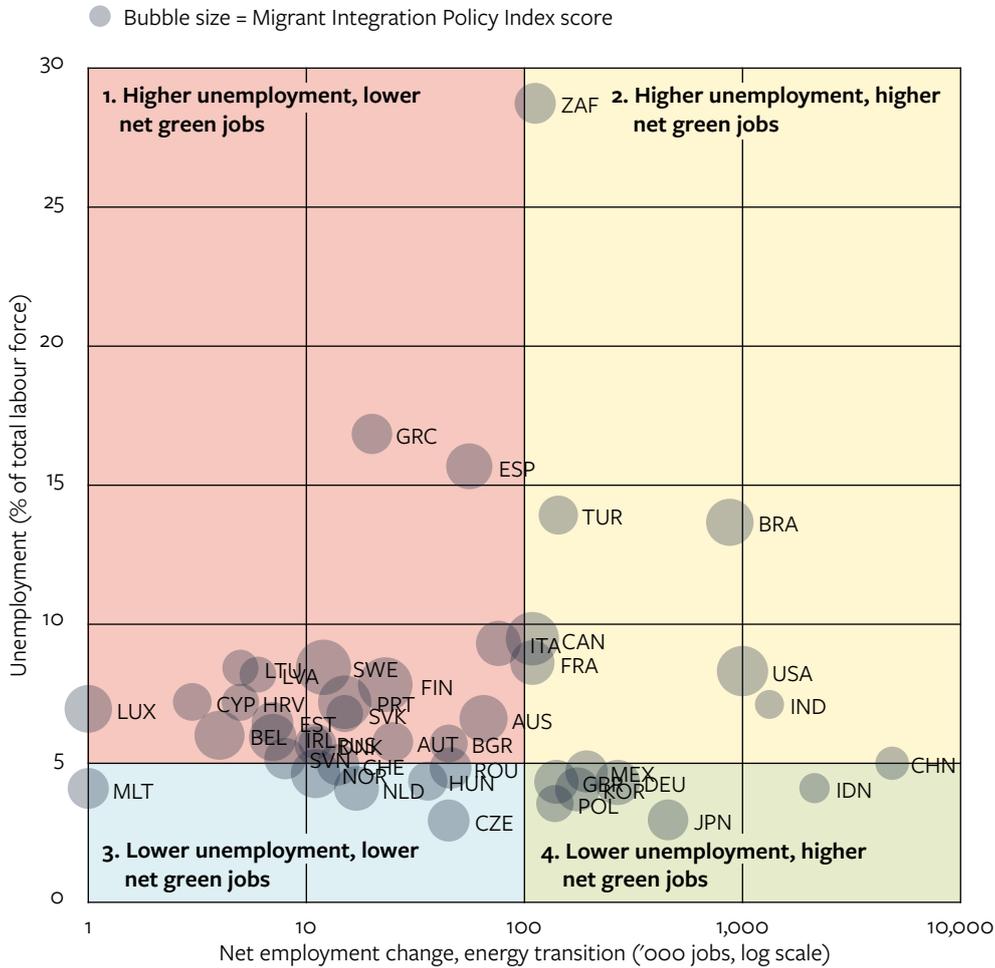
rates or because domestic workers are unwilling to work, or invest in the skills needed, in those sectors. Examples include sectors that rely on STEM-related skills such as engineering, as well as waste management, construction, transportation, the extractive sector and agriculture. In these sectors, labour shortages already exist and are only likely to worsen as green investment piles in. A 2022 Communication from the European Commission – one of very few high-level policy statements recognising that “legal migration also has to accompany the... transition towards a green and digital economy, which requires specific skills” – highlights the construction, transport, energy, and manufacturing sectors as particularly requiring additional labour and new skills (EC, 2022, p.2).

As well as sectoral differences, countries have different levels of need and opportunity for (international) labour migration to bridge gaps in this way. For example, while green skills shortages exist globally, there is likely more potential to train young workers in LICs given high levels of unemployment and informal employment, whereas high-income countries are generally closer to exhausting their labour supply. Helping LICs develop their general education and TVET systems to supply green skills therefore offers greater potential in plugging the global green skills shortage. But a necessary corollary is recognition of relevant qualifications, industry certifications and competency standards across borders to promote the hiring of capable workers in emerging industries, no matter where they are situated (ibid.).

To assess the differentiated approach needed between countries, we construct an illustrative typology. As shown in Figure 1, countries with low levels of unemployment that expect to create large numbers of (net) green jobs would be more likely to require migrant labour, with appropriate skills development, to keep pace with their green transition ambitions (quadrant 4, green). Countries with high expected net green jobs but higher unemployment would more naturally concentrate on developing their domestic labour force to fill those jobs (quadrant 2, yellow). Other countries may expect fewer net green jobs (quadrants 1 and 3), though this may change due to increased policy ambition or shifts in markets and technologies, altering the job creation and destruction implications of countries’ green transitions.

A country’s approach to (im)migrant integration is also important. Taking the countries with comparatively high net job creation and low unemployment (quadrant 4, green), it appears that countries such as Germany, South Korea, Mexico and the UK may be better situated in the near term – by virtue of more integrative migration policy – to utilise migrant workers in their transitions. Those such as Indonesia and China, which have some of the lowest scores for migrant integration (shown by the smaller bubbles), would need to consider reforming their migration policies to take advantage of the flexibility labour migration can provide in meeting green transition needs.

Figure 1 Expected net jobs created by the energy transition, current unemployment and migrant integration in 43 countries



Notes: Data sources: unemployment data: World Bank (2022); net employment change created by the energy transition: Montt et al. (2018); Migrant Integration Policy Index score: Solano and Huddleston (2020). The four quadrants are illustrated using example thresholds (x-axis: 100,000 net jobs; Y-axis: 5% unemployment). Coverage is limited – 44 economies in the case of net jobs data; 56 countries in the case of Migrant Integration Policy Index score. See sources for assumptions e.g. in modelling the data for net jobs and unemployment and in creating the composite Migrant Integration Policy Index.

This is not to argue that labour migration is a panacea. One issue is that immediate opportunities to import skills for semi-technical or technical occupations can be limited by the global shortage of these skills. For most countries, professionals such as engineers, technicians and technologists critical for the green transition are in short supply. Fewer men and especially women pursue education and training in STEM subjects (ILO, 2019). Meanwhile, importing soft skills, which are, as noted, relevant to many green (and non-green) jobs, through labour migration can be

challenging. For example, they are more difficult to assess or transfer across languages and cultures (although there are countries where such barriers are minimal, such as Colombia and Venezuela - see Section 3.3).

The theory and high-level observations made above get us only so far. In the next section we consider opportunities and challenges to use labour migration to support green transitions in specific country and sectoral contexts.

Box 4 Spain–Morocco circular mobility scheme for promoting green sectors

One nascent initiative that aims to use migration to support the development of green skills and sectors is the ‘Move Green’ initiative between Spain and Morocco. Launched in September 2021, this is a three-year project aiming to contribute to improvement of employability and entrepreneurship in Morocco through a circular mobility process with Spain.

The initiative aims to address several interlinked challenges: climate change, youth unemployment and irregular migration. Through strengthening and reinforcing partnerships between businesses and local authorities, the project seeks to also establish a deeper understanding of the challenges and solutions regarding the renewables sector in both countries.

In its recently updated NDC, Morocco has committed to reach a share of 52% of renewable energy in installed electric capacity by 2030 (Climate Action Tracker, 2021; Government of Morocco, 2021). The country has high potential to develop solar and wind energy (which each make up 20% of its 2030 pledge), as well as hydropower (which makes up 12%). There is therefore important scope for a growing workforce specialising in these sectors.

The initiative selects candidates in northern Morocco – in the Tanger-Tetouan-Al Hoceima and Oriental regions – to develop the skills and profiles needed in the green sectors in both Spain and Morocco. Mostly university students, but also graduates of other specialist training, candidates are provided with training in the green economy, including in technical areas, through enterprise visits and work experience in Spain.

The initiative is based on three established stakeholder networks of local, public and private entities. The leading partner is FAMSI, a network of 100 municipalities and city councils in Andalusia working together to reinforce the role of local governments in international development cooperation. The initiative’s other two core partners are CLANER, a cluster of Andalusian renewable energy companies, which provide technical knowledge and training, and AN^MAR, a federation of local authorities in Andalusia and northern Morocco.

The project begins with a 'mobilisation' phase, which identifies green economy needs in Spain and Morocco. Participants are then selected and provided with training on relevant green sectors in Spain, as well as language and cultural training. Local employment authorities, universities and the businesses are given a key role in the selection of candidates, which ensures they are invested in the success of the project. Candidates then take part in four months' training in Andalusia on specific skills and knowledge on the green economy via placements in relevant companies. Finally, participants are supported by local stakeholders on their return to Morocco to (re)integrate in the labour market.

As the initiative is in its early stages, results are yet to be seen. But the meaningful involvement of multiple key stakeholders, including academia and training institutions, local authorities and specialised businesses, makes for a promising opportunity for dialogue and collaboration.

3 Where and how labour migration can support green transitions

3.1 Overview

This section presents four case studies on the potential to engage migrant workers in green transitions, selected to provide sectoral and geographic range. The cases exemplify very different challenges. They are:

- Rapid urbanisation creating a need for decent jobs which support the green transition, for current and incoming urban residents (Bangladesh, internal migrants in various sectors).
- Abrupt migrant influxes requiring proactive and economically beneficial integration, in line with decarbonisation objectives (Venezuelan migrants in Colombia's renewables sector).
- Large migrant workforces in unsafe/undignified employment, which is environmentally damaging and undermines climate efforts (Indonesian migrants in Malaysia's palm oil sector).
- South-South migration in a context of new opportunities – and challenges – created by green transitions (Chinese migrants in the DRC's extractive sector).

An overview of the key elements of and opportunities related to these case studies is presented in Section 4.

3.2 Internal migrants and green opportunities in Bangladesh

Globally, international migration is dwarfed by internal migration, i.e. people relocating within their own countries. In low- and lower-middle income countries, a substantial share of internal migration typically entails the movement of people from rural to urban areas. Rural-urban migration and natural population increase in urban areas typically outpace job creation. Governments thus face the challenge of creating enough jobs for growing urban populations, while also developing the skills of both in situ and migrant workers. Viewing the urban employment and skills challenge through a green lens can generate new opportunities and solutions.³

3 Although this example focuses on rural-urban migration, other internal migration dynamics may be relevant (i.e. urban-urban, rural-rural and urban-rural). For example, rural destinations provide an important locus for agriculture, forestry and other land use-related climate change mitigation, and other environmental actions.

In Bangladesh, almost two in every five urban workers have migrated from elsewhere (BBS, 2018), mainly from other parts of the country. While Bangladesh is also known for outward migration,⁴ this case focuses on the opportunities arising with internal (rural–urban) migration in one of South Asia’s fastest-growing economies, which is also a climate and development innovator.

3.2.1 Context

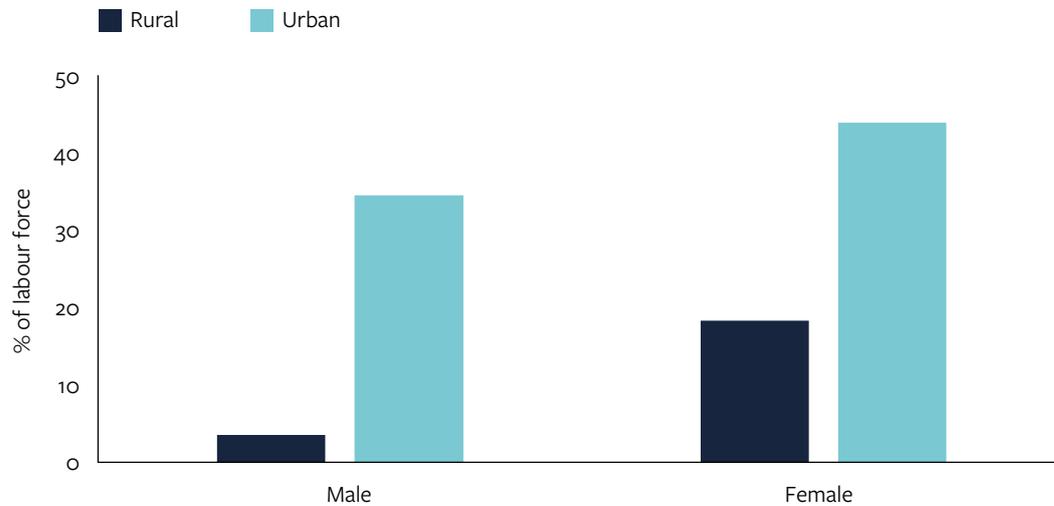
The case study illustrates how green jobs and skills, in both existing and new sectors of the economy, and for both migrants and in situ workers, can help address multiple, interconnected challenges: harnessing the potential rapid urban population growth driven in part by rural–urban migration; providing decent work for all while enhancing the competitiveness, productivity and diversity of the economy; and achieving environmental sustainability.

Rural–urban migration. Rural–urban migration has been an important driver of urbanisation, with the urban share of the population expected to reach 58% by 2050 (from 36% in 2018). Female urban migrants are especially likely to have migrated (Figure 2).⁵ Rural–urban migration can be expected to continue due both to pull factors such as economic opportunity, and push factors including, increasingly, climate-induced migration, which could create as many as 13.3 million climate migrants by 2050 (IFC, 2021). Most internal migrants head to the slums of Dhaka and a few other major cities (Rana and Ilina, 2021; GED, 2020). The resulting, largely unplanned, urbanisation imposes significant stress on jobs, as well as services and health (GED, 2020).

Ensuring jobs and skills. Rural–urban migration will combine with an increase in the adult working-age population to sustain demand for decent work opportunities in cities, with a ‘youth bulge’ expected to peak by 2025 (World Bank, 2021a). Historically, the ready-made garment (RMG) sector has been one of the few routes for poor, less-educated migrants, especially women, to gain formal employment and skills in cities. The sector employs around 4 million workers, and up to 85% of garment workers are migrants (Bossavie et al., 2019; 2020; Raihan and Sonchoy, 2016). The industry is improving working conditions and increasing skill development opportunities, limitations which have historically led to high turnover (BGMEA, 2020; Hearle, 2016).

4 Net migration was -1.85 million in 2017 (UN Population Division, 2019), and in recent years Bangladesh had the fourth-highest level of outward migration globally, after Venezuela, Syria and India (World Bank, 2022). The total number of migrants from other countries in Bangladesh stands at 2.12 million, equal to 1.3% of the population (IOM, 2021).

5 World Bank (2021a), drawing on the 2011 census, suggests that rural–urban migration has made a smaller contribution to urban population growth in Bangladesh, and South Asian countries more widely, than in East Asia. However, the 2016–2017 Labour Force Survey implies that migration could be significantly higher among workers (BBS, 2018). There is some debate about whether Bangladesh has reached the ‘Lewis turning point’, prior to which surplus labour tends to transfer from primarily rural agriculture to primarily urban industry; several scholars suggest this is some way off (see Bairagi and Kamal, 2019; Islam, 2014; Zhang et al., 2014).

Figure 2 Percentage of labour force classed as a migrant, 2016–2017

Source: BBS, 2018

More recently, employment growth in RMG has not followed output growth (GED, 2020; ILO, 2018), as the sector comes under pressure from factors such as automation⁶ and competition from countries with cheaper labour. Bangladesh's latest economic development strategy, the 8th Five-Year Plan (2020–2025), therefore has a strong emphasis on economic diversification. There is a particular focus on expanding export-oriented manufacturing beyond RMG, which makes up over 80% of exports (GED, 2020).

Environmental sustainability. Climate adaptation in Bangladesh has huge urgency. Mitigation is increasingly important, given economic growth and industrialisation. Currently, Bangladesh's total emissions rank 37th globally (World Bank, 2022). Its updated NDC (2021) commits to 22% reductions in emissions below business-as-usual by 2030, if support is forthcoming from international partners (MoEFCC, 2021). Wider pollution of water, air and soil is considerable, with environmental pollution responsible for 280,000 child deaths every year (ILO, 2018).

3.2.2 Opportunities

Green jobs, including for existing and future internal migrant workers, are part of the answer to this triple challenge. They can contribute to providing decent work, for migrants and long-term city residents alike. And they can ensure that Bangladesh's next economic development chapter is both sustainable and internationally competitive.

⁶ In RMG, automation has particularly affected tasks traditionally performed by female workers (GED, 2020), many of whom are migrants. While further automation and the 4th Industrial Revolution are not necessarily expected to reduce aggregate employment, they may well change the types of job available, and the skills required (World Bank, 2021b).

Opportunities differ according to sector, but there are three broad groups. First, existing *formal* sectors, such as RMG. Second, *informal* sectors, which account for 77% of employment in urban areas (BBS, 2018). Some, such as waste management, are central to climate change mitigation and pollution control, but currently depend on manual waste pickers and scavengers, who are often exploited (Islam, 2021). Third, Bangladesh will need to consider *future growth* sectors. Economic diversification, including through a wider range of export-oriented manufacturing besides RMG, will be essential in expanding green jobs and enhancing green skills, as well as improving the resilience of the economy. Below, we consider green job and skill requirements in an example of each of these three sector types.

Formal sector: RMG

RMG accounts for around 15% of industrial GHG emissions in Bangladesh (IDCOL, 2020), and many processes produce a range of other pollutants. Improving environmental sustainability is one of several ways that Bangladesh can add value to its offering in the global apparel market (Berg et al., 2021; Khatun, 2021).

To date, greening efforts have focused on technology and equipment, with nine of the top 10 green RMG factories located in Bangladesh. This kind of technology upgrade will be essential for Bangladesh to maintain competitiveness and sustain, if not increase, jobs in the sector. However, upgrades to machinery and factories could be insufficient without commensurate investment in human capital (ibid.). Bangladesh's RMG sector has a relatively advanced system of public and private training provision, helping to drive down the proportion of unskilled workers in the sector, from 28% in 2010 to 16% in 2015. On-the-job and informal training has, historically, predominated, with 70% of factories surveyed in 2016 having in-house training facilities, and there is a need to improve provision by TVET institutes (BIDS, 2016). In a 2018 assessment, ILO found that skills training for green jobs was not on offer. It observed gaps in required skills at all levels, from managing directors and production managers to electrical, dyeing and textile engineers and machine operators (ILO, 2018).

Globally, a major shift in skill requirements across textile and apparel value chains is foreseen, with growth in repair, resale and related services like textile collection and sorting. It is possible that this shift will relocate circular fashion services closer to and within major consumer markets (Repp et al., 2021). However, the globalised nature of wider recycling value chains suggests that aspects of this shift could benefit textile and apparel producer countries too. A recent assessment of the implications for the fashion industry in the Netherlands points to some of the skill domains that could also be relevant to Bangladesh, including collection and sorting, logistics and procurement and repair and maintenance (Circle Economy, 2021). To these can be added the analytical and management skills needed to reduce GHG emissions and other pollutants, and enhance resilience, within individual factories and workforces and across the industry.

Informal sector: waste management

Bangladesh's waste sector exemplifies the challenge of widespread informal employment. Around half a million people are thought to be involved in the recycling trade, many of them rural–urban migrants (Islam, 2021; Uddin et al., 2020). There is an urgent need to expand urban waste management capacity, with 23–63% of solid waste going uncollected across different cities, while addressing worker exploitation. In Dhaka alone, around 100,000 waste pickers, primarily poor and uneducated women and children, sell on recyclable items to top up meagre wages for street-level waste collection (Islam, 2021; ILO, 2018). Exploitative and unsafe, there is a clear imperative to improve safety and remuneration, alongside reuse and recycling rates, while maintaining the sector's ability to provide employment.

The need for Bangladesh to significantly increase its waste management capacity means that the workforce is also projected to continue to grow, albeit slowly. There is high potential to develop the plastics recycling sector, in particular (IFC, 2021). Thus far, efforts to enhance green skills in the sector are limited to isolated donor projects, suggesting there is scope for a more concerted and coordinated effort that combines greening with improvements in safety and welfare. Lower-skilled occupations may require limited adaptation, for example improving environmental awareness, through on-the-job learning (ILO, 2019). Several new occupations could also be required, including hazardous-material removal workers, engineers and managers specialising in waste-to-energy, and distributors of recyclable materials (ILO, 2018). However, these generally imply higher levels of education that newly arrived, poorer rural–urban migrants are unlikely to have.

Future growth sector: light engineering

Light engineering, typically the assembly of pre-fabricated goods into final products, currently employs around 100,000 workers and primarily serves the domestic market, but has considerable potential to expand the export market from below \$500 million today to \$9 billion in coming years. There are promising signs in bicycle manufacturing, where Bangladesh is the third-largest exporter to the EU, as well as industrial products including batteries, transformers and objective lenses (IFC, 2021).

The growth in bicycle exports exemplifies an opportunity to diversify into low-carbon and environmentally sustainable exports specifically, which can support the transition in other countries while generating green jobs in Bangladesh. In principle, however, all emergent sectors have the potential to be developed with environmental sustainability at the forefront.

Light engineering is not especially labour-intensive, but requires a skilled workforce to operate machinery. This workforce is currently not adequately available. The dependence on unskilled workers and difficulties recruiting suitable middle management has constrained productivity for the small- and medium-sized enterprises that currently proliferate in the sector. Meanwhile, international out-migration of skilled workers is further reducing the availability of suitable

workers (IFC, 2021). While the historical success of RMG does not provide a blueprint for diversifying into light engineering, it can offer some inspiration in terms of both greening and skilling efforts, including the development of on-the-job training.

Table 2 provides an overview of relevant green jobs and skills in each sector, and how action could address the triple challenge of managing rural–urban migration, providing decent jobs and improving environmental sustainability.

Table 2 Summary of sectoral opportunities to provide green jobs for rural–urban migrants in Bangladesh

Example sector	Jobs	Skill domains	Contribution to address triple challenge
Formal: RMG	Managers Specialists e.g. electrical and dyeing engineers Machine operators New roles e.g. circular textile sorters	Collection and sorting Logistics/procurement Repair and maintenance Management Analysis	Green skills upgrade alongside (green) technology upgrade can help Bangladesh maintain competitiveness and sustain, if not increase, jobs in a key sector, both for new rural–urban migrants and for in situ workers.
Informal: Waste	Recycled material coordinators and distributors Environmental engineers Waste-pickers and collectors	Hazardous material management Reuse and repair Circular economy expertise	Green skills upgrade alongside formalisation/regulation can improve reuse and recycling rates and worker safety while maintaining the sector’s ability to provide employment, including to rural–urban migrants.
Future growth: Light engineering	Managers Machine operators Welders Designers	Green design and process engineering Management Artisanal	Green diversification across promising export sectors can generate new job opportunities including for future rural–urban migrants, while enabling transitions in consumer markets.

Source: Authors, building on ILO (2018)

3.2.3 Potential policy responses

Despite the potential, there are considerable challenges to developing green skills in Bangladesh in a way that is inclusive of all urban residents, whether newly arrived or long-term. The ILO has identified a general lack of active labour market policy measures, initial and continuing training provision and labour market information for green jobs and skills (ILO, 2018).

In 2020, the National Skills Development Authority published a draft National Skills Development Policy. This included a short section on green skills and a soft commitment that, ‘depending on the assessment of demand for emerging green skills, training courses will be developed and introduced in the various training centres, where possible’ (NSDA, 2020). Individual efforts by international agencies and NGOs continue. For example, ILO has worked with the Bangladesh Technical Education Board, which monitors and develops technical and vocational education, to revise skill standards for TVETs, including incorporation of green skills. This work has concentrated on three skill standards, Sewing Machine Operation, Welding and Refrigeration and Air Conditioning.

Bangladesh’s situation is not uncommon among low- and lower-middle income countries, several of which face high rates of rural–urban migration, growing youth unemployment, a raft of environmental challenges and a need to diversify their economies. Green skills have a role in addressing all these challenges, but green jobs need to be generated too. The case study reveals that, in Bangladesh, as in many countries, there is no extensive pool of existing green jobs looking to be filled, or upskilled for, by internal migrants. Green skill development for migrants therefore needs to go hand in hand with growing green, labour-intensive sectors. To ensure green skills development benefits Bangladeshi urban workers, both long-term residents and newly arrived, it needs to:

- Target opportunities with the greatest potential for generating high-quality jobs, across formal, informal and future growth sectors, identifying competitive advantage in the context of megatrends such as automation.
- Be available through channels that can be accessed by future, incoming and existing internal migrant workers, including TVET institutions, on-the-job training and secondary and tertiary education in both rural and urban areas – utilising digital technologies where appropriate to improve accessibility.
- Be closely coordinated with efforts to diversify the economy, linking to areas such as industrial and trade policy, as much as urban, labour and environmental policy.

3.3 Venezuelan migrants as an opportunity to drive climate action in Colombia

3.3.1 Context

Colombia's climate ambition. Colombia has shown strong climate ambition in recent years. Colombia's NDC pledges to reduce its GHG emissions by 51% compared to business-as-usual levels by 2030 (Government of Colombia, 2020). The country's Low Carbon Development Strategy, launched in 2012, aims to mitigate GHG emissions across different sectors, while contributing to broader social, environmental and economic goals (Colombian Ministry of Environment, 2012).

Colombia's pathway to reach its GHG reduction target, as set in its NDC, relies heavily on emissions reductions in the forestry and land use sectors. The country continues to rely heavily on fossil fuel consumption for its energy needs, with oil, natural gas and coal making up 38%, 26% and 12% of the energy mix (Climate Transparency, 2020). Colombia's NDC does not sufficiently address domestic emissions from fossil fuels, particularly in the energy and transport sectors. Despite this, there are some recent signs of progress on renewables, in particular on solar and wind energy, for which the country has great potential (IRENA, 2021). The government has set a target to increase its share of non-conventional renewable energy (i.e. excluding hydropower) from around 1% in 2018 to 12% by the end of 2022 (Climate Transparency, 2020). In June 2021, the Senate passed the Energy Transition Bill, which aims to promote the use of renewables (Lexology, 2021).

In line with Colombia's renewable energy goals, the country's large-scale renewable energy auctions in 2019 and 2021 have resulted in a growing pipeline of wind and solar projects (Sanchez Molina, 2021).

Promising regions for renewables. While there is strong potential for renewables across various parts of Colombia, the Caribbean region, comprising the departments of Atlántico, Bolívar, Cesar and La Guajira, is most promising. About 55% of existing projects are located there, with La Guajira department pre-eminent for both solar and wind power (Caicedo, 2021) (see Figure 3). However, it has also been noted that, although employment opportunities are expected to be high in coming years, these will depend on the availability of an educated and skilled workforce. This is not straightforward in traditionally marginalised zones (IRENA, 2020).

Figure 3 Solar map of Colombia



Source: <https://solargis.com/es/maps-and-gis-data/download/colombia>

Venezuelan migrants in Colombia. According to the World Bank, by March 2021 an estimated 1.7 million migrants from Venezuela had moved to Colombia, amounting to nearly a third of all Venezuelan migrants in Latin America, with 70% of them concentrated in 25 of the country's 1,122 municipalities. Colombia has shown exemplary leadership in welcoming these migrants, including through '(i) issuing work, transit, and stay permits; (ii) extending access to health, education, and social programs and housing subsidies; (iii) investing to benefit both host and migrant communities; and (iv) protecting vulnerable populations through programs to reunify families, protect children, and prevent human trafficking' (World Bank, 2021c). In March 2021, Colombian President Ivan Duque announced the granting of 10-year residence permits to Venezuelan migrants, which gives them rights to legal employment, health care, education and banking services. The policy was applauded internationally by heads of state and key international agencies.

Given the scale of the regularisation process envisaged under the new reforms, the country has faced major logistical challenges. Implementation has included a nationwide information campaign and setting up registration points and mobile units to enable the in-person biometric registration process (UNHCR, 2021a). In December 2021, it was reported that over 1.6 million people had registered, the first step to accessing Temporary Protection Status (Rosales, 2021).

The Colombian government is already several years into the implementation of a wide-ranging integration plan. Labour market integration efforts have mainly focused on the certification of apprenticeships, organising job fairs and ensuring support from the Public Employment Service to enable Venezuelan migrants to access employment, as well as support for entrepreneurship and business development (Sebastian et al., 2020).

This does not amount to a comprehensive labour market integration strategy, however, and despite the country's constructive approach Venezuelans have generally had poorer labour market outcomes – including lower wages and employment rates – compared to the local population (Graham et al., 2020). Notably, Venezuelan migrants are younger and typically better educated (Bahar et al., 2018; Sebastian et al., 2020). They are also more likely to be working informally than the local population, and this has been particularly the case for those with university or postgraduate qualifications (Graham et al., 2020). Together, this points to a history of significant under-utilisation of the skills of many highly educated Venezuelans.

A significant barrier is the recognition of educational and professional credentials: only 10% of Venezuelans in Colombia reported having had their professional credentials recognised as of October 2020 (Chaves-González, 2021). The Colombian government's integration strategy seeks to address this, with commitments to speed up degree recognition and skills certification, alongside improving access to job training programmes and support for wider income generation efforts (Muñoz Gómez, 2020).

3.3.2 Opportunities

Economic integration needs and opportunities

There is already a significant commitment to support the economic integration of Venezuelan migrants. This presents an opportunity to ensure migrants also support Colombia's climate aims. Betts (2019) argues that Venezuelan migration is a development opportunity, one that can benefit both migrants and citizens. Betts argues that, to do this, new jobs must be created. And that requires new investment from multilateral financial institutions, bilateral donors and the private sector. The public sector employment service cannot fulfil this task alone. Thousands of people – nationals and migrants – are looking for work and new jobs must be created. At the time of Betts' research, the employment service had 9,240 job vacancies across the entire country. Norte de Santander has 314 vacancies listed, and around 40,000 people registered as looking for work, of whom around 4,000 are Venezuelans.

Employment opportunities in renewables. Given Colombia's ambitions in terms of the economic integration of nearly 2 million Venezuelan migrants, as well as its ambitious climate plans, there is an opportunity, for migrants and locals alike, to be employed in the renewables sector.

The need to create new jobs must therefore be seized as an opportunity to create *green jobs* that are compatible with the country's climate ambitions. As of 2019, the solar and wind sectors were not major sources of employment in Colombia, together accounting for 4,900 jobs. But with the share of wind and solar increasing from 1% to 12%, there is sizeable job growth potential.

Some of the regions with the highest potential in terms of wind and solar are also home to the largest number of migrants in Colombia, including the very high number of migrants from Venezuela. As argued by Castillo (2020), a bold plan to expand and integrate solar and wind projects along the Colombia–Venezuela border regions can bring energy, water and food security to this region, as well as others in northern Colombia, while creating much-needed jobs. The two regions with the highest potential in terms of solar power, Atlantico and La Guajira, are also home to the highest number of Venezuelan migrants after the capital, Bogota, and Norte de Santander (see Figure 4).

strategy targeting Atlantico and La Guajira, for example, could also seek to recruit Venezuelan migrants from urban areas to new – and better-quality – employment, if necessary to attract the most appropriate skills for the non-conventional renewables workforce.

Of course, in addition to the wind and solar sector, there is scope for migrants to also work in conventional renewable energy sectors, such as biofuels, hydropower and biomass, where most of the current jobs are.

Developing and matching green skills needs

There may be a need for skills development of Venezuelan migrants to work in the renewables sector.

According to interviews with local stakeholders specialising in the energy sector and human resources, the skill set of Venezuelan migrants is often based on hydrocarbon industries, including technical skills such as drilling, construction and plant management in the oil and gas sectors.⁷ Some of these skills are not easily transferable to clean industries. When asked about potential employment in the renewables sector, one Venezuelan engineer said he would prefer to work in the oil sector where he has many years of experience in drilling, and changing his specialty would imply training time, and the economic resources to achieve it. The head of an energy company that specialised in both fossil and clean energy agreed that most Venezuelans had skills that are mainly relevant to the hydrocarbons sector, but noted that they are also highly skilled in construction, something that could be transferable to work in wind farms, photovoltaic parks and other similar large projects.

Stakeholders noted the general lack of job opportunities in Colombia, including in green sectors. In particular, the lack of opportunities for women in most sectors, including the energy sector, are a concern. This points to a need to invest in green skills training for locals and migrants, with a view to supporting gender equality goals, and in line with Colombia's goals to rapidly expand its green sectors.

Support for Venezuelan migrants to integrate into green sector labour markets need not displace or disadvantage Colombian workers. Occupational downgrading of migrant workers (i.e. providing them jobs with lower skills and lower wages) can push down the hourly wages of less-educated natives in both the short- and long-term (Lebow, 2021). However, it is seen as quite likely that the different profile of Venezuelan migrants, and particularly their higher education levels, means they could effectively complement, rather than displace, the local labour force (Bahar et al., 2018).

7 Based on interviews conducted with local stakeholders in Colombia, including the founder-CEO of an energy company, a human resources coordinator with experience in sustainable sectors, and a Venezuelan engineer specialising in the oil sector.

Research into a previous amnesty programme offered to undocumented Venezuelan migrants in 2018 (which provided around half a million Venezuelans with the right to work) found no large effects on the labour market outcomes of local workers (Rozo, 2022). This included the impact on hours worked, wages and employment rates of Colombian workers in both the informal and formal sectors. Further analysis indicates that the regularisation initiative has led to significant benefits for Venezuelan migrants, including substantially higher consumption and labour income (though mainly from informal labour), as well as better job satisfaction. Migrants also reported feeling more integrated into Colombian society (ibid.).

3.3.3 Potential policy responses

Colombia has received several new loans, including from the World Bank and InterAmerican Development Bank, to support the social and economic integration of Venezuelan migrants (IDB, 2021; World Bank, 2021c). Further financing should follow, particularly given that the country has received relatively little support in the context of significant inflows of displaced people. New investments are likely to support social infrastructure, services and economic inclusion programmes, and it is possible that a significant share will flow to border regions. This is an opportunity to develop a tailored strategy to support the country's energy transition and economic inclusion goals.

Key next steps include skills surveys and fast-track credential recognition. Specialised job fairs and efforts to match skills with potential employers will be critical. Employers in the energy sector likely do not have information on the migrant population and their education and professional skills, and targeted support will be required to match workers to employers. Given job opportunities are concentrated in a small number of departments, and within particular municipalities, partnerships with local authorities will be critical to taking this type of activity forward. Ideally, a sector-level strategy for economic integration would be developed for the renewables sector, in conjunction with companies and local governments.

3.4 Palm oil migration partnership to address exploitation of Indonesian migrants and Malaysia's environment

The world is increasingly hungry for cheap vegetable oils, both as food and to produce biodiesel and consumer products such as soap, cosmetics and cleaning products. An ever-greater share of this demand has been met with palm oil – global production stood at 75.5 million tonnes in 2021, up from 11 million tonnes in the 1990s. Malaysia produces between 25% and 30% of this oil, second only to Indonesia (USDA, 2022). To produce such vast quantities, Malaysia relies on large plantations, which are environmentally unsustainable and exploit low-skilled and mainly migrant labourers.

The reasons for palm oil's dominance are simple: it is cheaper and has the highest yield of any vegetable oil (Lim et al., 2015). A hectare of land can produce as much as 10 times the oil of the

next most efficient crop (sunflower). Replacing palm oil with other vegetable oils would require around 50% of the world's agricultural land (ibid.). As there are currently no viable alternatives, the challenge is to reduce the environmental impact and improve conditions for plantation labourers.

This case study looks at the ways in which palm oil production exploits natural resources and migrant labour. It then suggests that an improved migration system, with training for migrants, could contribute to developing the skills necessary for greener palm oil production, and improve the lives of migrants. A greener palm oil sector will require skilled plantation labourers, oil mill technicians and plant scientists. In addition, environmental remediation specialists will be required to manage existing pollution and prevent future damage from mill by-products. These skills are in short supply in Malaysia as elsewhere, including Indonesia. A skill/talent partnership between the two countries could improve migrants' livelihoods and reduce the environmental impact of palm oil production.

3.4.1 Context

Palm oil in Malaysia. Malaysia's palm oil production is essential to meeting global demand and to the country's continued economic growth. Palm oil production constitutes 38% of Malaysia's agricultural output and 2.7% of its gross national product. Some 6.8 million hectares or 73% of Malaysia's agricultural land is given over to the growing of oil palms (Statista, 2020). Just over 60% of that land is made up of large plantations that depend heavily on migrant labour, mainly from Indonesia (Puder, 2019). Plantations are more environmentally destructive than smallholder farms, reliant on migrant labour and produce most of Malaysia's palm oil. As such, they are the focus of this case study.

The movement of labour from Indonesia to Malaysia is central to the production of cheap palm oil: 77% of palm oil plantation workers are of migrant origin (ILO, 2020), typically from Indonesia, where there is a surplus of low-skilled labour with experience of working on palm oil plantations (Shahiri, Zhiming and Al-Hadi, 2021). Malaysian workers perceive the palm oil sector to be dirty, dangerous and difficult, and as wages are relatively low they are reluctant to work in the sector. Employers prefer Indonesian workers, who are often undocumented and so can be paid below minimum wage and work longer hours (ibid.).

The exploitation of migrants. The majority of employees on Malaysia's plantations are undocumented. For example, in Sabah State, 70% of migrant palm oil workers are undocumented (Solidar Suisse, 2019). Employers often prefer to employ undocumented workers to avoid the high costs of legal employment, including the costs of transport and medical fees (Ramli and Kamarulnizan, 2018). Documented migrants also pay a levy of between \$95 and \$425 to the government, which means many also prefer to remain undocumented (ILO, 2016b).

Due to the reliance on undocumented migrants, repressive practices are common, and exploitation has become part of the plantation business model (Pye et al., 2016). Even though wages are higher

than in Indonesia, they remain very low – as little as \$1 or \$2 per day – and labourers must pay off the cost of their international travel and visas to brokers involved in the recruitment, processing and transport of workers (Anderson, 2020; Pye et al., 2016). This can lead to multiple forms of exploitation, including debt bondage (Low, 2020). The work is often extremely hard physically, and many suffer from the health consequences of working with chemicals banned in the EU and the US (Pye et al., 2016). Unregistered migrants – most frequently those who have overstayed their visas – are subject to deportations, fines, imprisonment and even caning. Women usually carry out the most physically dangerous work, such as the application of fertilizer. Child labour is reportedly common to improve parents' meagre earnings (Pye et al., 2016).

Even for registered migrants, life can be precarious and difficult. Migrants are given three-year permits that tie them to a plantation and its parent company, which makes wage negotiations difficult and facilitates their exploitation (Pye et al., 2016). While legally entitled to join a union, migrants are barred from holding office and are frequently poorly represented (Puder, 2019).

Registered migrants are subject to regular health checks and are sent home if they are unwell or become pregnant. The visa regime does not permit migrant workers to bring their families, and the children of migrants born in Malaysia are stateless and banned from school and accessing healthcare (Puder, 2019; Pye et al., 2016). It is estimated that there are at least 72,000 such 'stateless children' – children of undocumented Indonesian migrants who have neither Malaysian nor Indonesian citizenship – working on palm oil plantations (Gottwold, 2018).

The exploitation of natural resources. To date, increases in palm oil production have been driven by environmentally detrimental practices, primarily the expansion of land under cultivation and the application of yield-enhancing chemicals (Lim et al., 2015). The area covered by palm oil plantations expanded more than six-fold between 1980 and 2020 (Statista, 2022). This expansion was made possible by converting virgin tropical forests, with concomitant devastating GHG emissions, water and land pollution and biodiversity loss, as well as violations of customary land rights (CIFOR, 2011).

Southeast Asian palm oil production, including the conversion of virgin forests, is estimated to contribute upwards of 1.2% of global annual CO₂ emissions (Cooper et al., 2020). Careless production techniques are partially responsible for these GHG emissions: 40kg of methane are emitted for each tonne of palm oil produced, mainly due to the anaerobic digestion of waste products (ibid.). Palm oil production that relies on converting virgin forests and large amounts of agrochemicals has been estimated to have a carbon footprint between two and 18 times higher than other plant-based oils (Lim et al., 2015). As discussed below, much can be done to reduce GHG emissions from palm oil.

Fertilizer and pesticides are applied liberally on plantations to increase palm oil yields quickly and cheaply. The injudicious application of these chemicals has resulted in the contamination of soil and water (Lim et al., 2015).

Both expansion into virgin forests and the application of harmful chemicals have devastated biodiversity. The orangutan is listed as ‘critically endangered’ and is often used to raise awareness about deforestation. However, other, less well-known animals are also at risk. An assessment of biodiversity on Malaysian plantations found that they are usually home only to invasive species or those of little interest to conservation. Some 80% of the species found in Malaysian rainforest habitats are not found on plantations (Dhandapani, 2014).

3.4.2 Opportunities

Greening palm oil production. As the world cannot do without palm oil, at least for the time being, greening production methods is essential. Fortunately, there is a great deal that can be done to reduce the environmental impact of palm oil and increase yields per hectare, rather than encroaching further on virgin forests. Importantly, these changes also provide opportunities for higher-skilled, more productive and healthier jobs for migrants. The changes to be made to palm oil production fall into four categories: improving yields, greening plantation production methods, improving oil extraction rates and capturing methane emissions.

Key to improving yields is changing management practices and replanting old plantations with newer, more productive varieties. Breeding and planting improved varieties that are optimally suited to local conditions could double oil production from four to eight metric tonnes per hectare per year (Vogelgesang et al., 2018). The breeding, choice of plants and improved management practices require a range of skills, from agronomic practices to plantation management and plant breeding.

Greening palm oil on plantations relies heavily on increasing the skills of migrant labour. Particularly important here would be to train migrants in less resource-intensive methods, such as agroforestry, livestock integration, intercropping and improved crop management. Livestock-rearing on palm plantations, for example, could increase yields and provide meat to the Malaysian market, which currently relies on imports (Lee et al., 2018).

Finally, changes need to be made in palm oil mills. Oil extraction is often inefficient and generates large volumes of unused husks, fibrous remains and shells high in nitrogen-causing pollution. Improving extraction rates and the management of by-products will require technological innovation and skilled labour (Vogelgesang et al., 2018). Similarly, capture of methane created by the anaerobic digestion of palm oil mill effluent will require investments, including in skilled labour (Padfield et al., 2011). Both environmental management and improved extraction offer opportunities for qualified or upskilled migrants, as these skills are currently in short supply in Malaysia.

Political economy of change

Introducing these measures is outside the control of migrant labourers and will require commitment to sustainable production at the highest levels, including by the Malaysian government, plantation owners and oil processors. This is only likely to happen if the incentives for these actors shift away from pure profit maximisation in the short term.

Malaysia's palm oil sector came under intense pressure to improve sustainability and working conditions for migrant labour as plantations expanded and became more destructive throughout the 1980s and 1990s (Greenpeace, 2018; Pye et al., 2016). Campaigns and lobbying efforts of organisations such as Greenpeace, WWF and the Rainforest Action Network have had such impact on consumer awareness that most consumers now have negative views of the oil (Ostfeld et al., 2019; Hinkes and Christoph-Schulz, 2019).

There have also been some very tangible outcomes of these campaigns, which have increased pressure on Malaysian producers and the government. The EU has legislated to phase out the use of palm oil for biodiesel and to only permit the import of 'sustainably' produced oil for consumption and other goods (Vogelgesang et al., 2018). Major private sector actors, including HSBC, Unilever and Nestlé, have rethought their engagement in the sector (Lim et al., 2015). Large-scale producers of palm oil have set up the Roundtable on Sustainable Palm Oil (RSPO) and the Malaysian government has committed to making palm oil sustainable (WEF, 2022; Ayompe et al., 2021).

However, political headwinds remain. A coalition of political and agribusiness interests has made real change difficult. Cheap labour and agrichemicals have produced large profit margins for plantation owners, while expanding into virgin forests has increased their production capacity (Pye et al., 2016). Private brokers who source undocumented labour for plantations also have significant vested interests in the status quo and may oppose the formalisation of labour recruitment (ibid.). This coalition of interests has collaborated to undermine meaningful change. While there are private sector initiatives and government legislation to reduce the impact of palm oil, these are often more about deflecting criticism than environmental or labour protection. Greenpeace argues that standards for environmental protection are too low, that there are loopholes in the legislation and that policing is inadequate (Greenpeace, 2018; Dauvergne, 2018). The government has sought to challenge EU efforts to make palm oil production more sustainable by putting a complaint to the World Trade Organization regarding its decision to restrict palm oil imports and ban its use for biofuels (WTO, 2020).

3.4.3 Potential policy responses

How could migration facilitate the greening of palm oil? Strategic and sector-wide action will be required by the government of Malaysia, plantation owners and oil processors to reduce the environmental impact of the country's palm oil production. Central to this would be ending the reliance on undocumented migration to provide cheap labour to the current, unsustainable

production model, while also ensuring that the necessary skills are available to produce palm oil more sustainably (Kassim, 2017; Harkins, 2016; Anderson, 2020). Instead, a system of migration is needed that facilitates migration for labour with the appropriate skills to assist in a green transition.

This could be achieved via a government-to-government migration scheme between Indonesia and Malaysia that provides Indonesian migrants a simple way to access training and a legal pathway for migration. There are many possible models for achieving these goals. One option would be a global skills partnership, delivering skills to both the countries of origin and destination, and providing an improved migration experience.⁸

With a global skills partnership, the governments of Malaysia and Indonesia would agree to jointly manage the migration and training of labourers heading to Malaysia's palm oil plantations. Typically, migrants would be trained in the origin country so that both countries of origin and destination would see their labour forces benefit from the training. In this case, Indonesia would provide training to its labour force, with Malaysian support, and a proportion of those trained would migrate to work on Malaysian plantations. The rest would employ their skills in Indonesia. Global skills partnerships have become popular as they deliver a triple win – the country of origin sees its workforce trained, the country of destination receives the right skills, and migrants have a safe, simple pathway to migration.

To be successful, a critical step in a global skills partnership is the development of curricula and training materials tailored to the sector, and specifically to the transformed job roles that are implied in the new (greener) strategy for the sector. In this case, a focus on two skill sets would be most beneficial: greener agricultural production techniques and the reduction of emissions and waste in milling and processing (Vogelgesang et al., 2018).

As discussed above, this would require targeted training to meet the varied needs of a greener sector: for example, oil milling staff would require different skills to plantation labourers. Likewise, middle management would need to be prepared for managing this substantial transformation of the sector. It will be imperative to involve employers in consultations about the partnership to elaborate the skills and training requirements in detail, as well as to get broader 'buy-in' to the approach. As skills partnerships are developed to benefit workers and employers in both countries of origin and destination, this consultative approach should involve companies in both Malaysia and Indonesia. A skills partnership of the kind proposed here for the palm oil sector will

8 Indonesia's palm oil sector lies outside of the scope of this paper. However, Indonesia is the only country that produces more palm oil than Malaysia – just under 60% of global supply. While it sources most of its labour through domestic migration, it faces many similar issues with regard to labour exploitation and environmental destruction. The similarities between the countries mean that a skills partnership may be ideal.

also require a restructuring of the current labour recruitment system. Migrants who have been trained in Indonesia for this partnership should be afforded improved rights, including the right to healthcare, family reunion and schooling for their children.

Beyond in-depth consultations with industry bodies and private companies to tailor skills to the sector, the Indonesian and Malaysian governments must determine how they share costs, including with the private sector. These types of partnerships are of growing interest to the international development and migration community, and may attract donor financing for such policy innovation. The environmental and climate angle is likely to be of particular interest to donors.

3.5 Ensuring a green skills boost from South–South migration to DRC’s cobalt mines

The DRC has immense natural wealth, both in terms of biodiversity and in its rich mineral deposits. But to date, these resources have been more of a curse than a blessing, contributing to fragility, conflict and displacement. This has resulted in the DRC’s reserves of tin, tungsten, tantalum and gold commonly being referred to as ‘conflict materials’. The country’s reserves of copper and cobalt have until recently received less attention. Explosive growth in demand for lithium-ion batteries has propelled the DRC’s cobalt-rich heterogenite ore to the heart of the global e-mobility revolution. This case study analyses how the transfer of skills for the sustainable extraction and processing of cobalt will be essential to ensure that opportunities in the mining sector spill over to broader green economic opportunities for the country.

3.5.1 Context

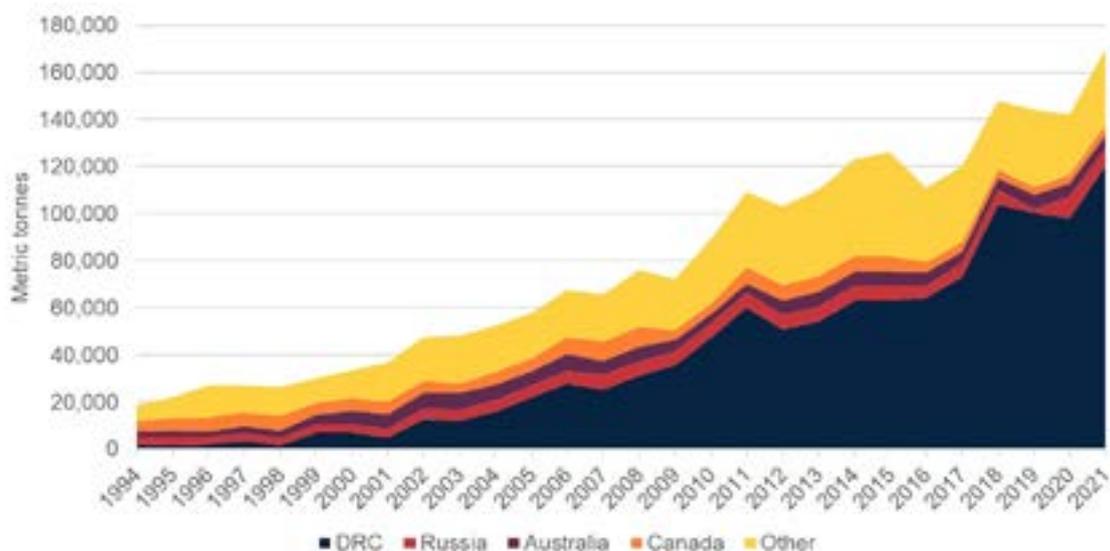
Cobalt is a crucial element in the production of lithium-ion (Li-ion) batteries used to power almost everything, from mobile phones and laptops to electric vehicles (EVs). The metal is essential for boosting energy density and battery life as it prevents corrosion of cathodes, the negatively charged electrode of a battery. While cobalt-free cathodes exist,⁹ they are heavier, less powerful and less durable. This makes them unsuitable for most EVs as they result in significantly shorter driving ranges. Demand for cobalt in EV batteries is expected to increase from 19,000 tonnes per year in 2019 to 375,000 tonnes by 2030 (IEA, 2020). While a circular economy can help meet some of this demand through more efficient recycling of cobalt from used batteries, further extraction of cobalt from mining will be necessary.

The DRC is the only cobalt producer able to meet this demand. It has nearly half (3.5 million) of the world’s 7.6 million tonnes of accessible cobalt reserves. However, it was responsible for nearly 70% (120,000 tonnes) of global production (170,000 tonnes) in 2021 because cobalt is also a by-product of copper extraction (Figure 5). Extraction of heterogenite – which contains high

9 Cobalt-free cathodes use a combination of lithium-iron-phosphate (LFP) as opposed to nickel-cobalt-aluminium oxide (NCA) or nickel-manganese-cobalt (NMC 811).

quantities of cobalt alongside copper (another crucial element of the low-carbon transition¹⁰) – is concentrated in the Katanga copperbelt, which straddles the provinces of Haut-Katanga and Lualaba in the south of the country. Kolwezi, the main city around which mining operations are located, has experienced a modern-day gold rush.

Figure 5 Global cobalt production by country, 1994–2021



Source: USGS (2022)

Rising demand for cobalt and copper has led to a flood of international investment in large-scale mining (LSM) concessions, led by Chinese companies such as Molybdenum (China Moly), CATL, the Jinchuan Group and Zheijian Huayou. These firms supply the world's largest technology companies with cobalt for their batteries, including Apple, Google, Dell, Microsoft and Tesla. In addition to production from LSM, roughly 20% of the country's cobalt production comes from artisanal and small-scale mining (ASM) (Rubbers, 2020). Artisanal diggers (*creuseurs*) can legally mine for heterogenite within 'artisanal mining zones' and sell it to small- and medium-sized traders and smelters, mostly Chinese.¹¹ ASM is important to the DRC's labour market, but in practice is marred by ethical concerns such as child labour, lack of basic protective equipment and extremely dangerous working conditions (Marcini et al., 2020; Amnesty International, 2016).

¹⁰ Copper is an efficient electrical conductor. It is essential in the construction of solar and wind power plants, EVs and batteries, as well as energy-efficient buildings (Goldman Sachs, 2021).

¹¹ Heterogenite from artisanal mining methods is traded and smelted in small- and medium-sized enterprises initially created by Greek and Indian businesses, followed by Chinese migrant entrepreneurs from the 2000s (Rubbers, 2020).

Similar to most of Africa's other mining operations, the DRC's copper and cobalt sector is highly dependent on migrant labour.¹² Historically, the Katanga copperbelt was a sparsely populated region, and mining companies have struggled with labour shortages due to its isolated location. In the early twentieth century half the labour force was brought in from other countries.

More recently, high copper and cobalt prices have drawn greater numbers of both international and internal migrant workers to the area around Kolwezi. There are an estimated 429,000 international migrants in the DRC who are not refugees (Box 5). Many of these are international workers, traders and entrepreneurs seeking economic opportunities in the extractive sector, the engine of the Congolese economy accounting for a quarter of formal employment and further informal employment (EITI, 2019).¹³

Box 5 Migration to and from the DRC

Recent figures suggest that the DRC is the largest host country in Central Africa, with 953,000 international migrants in 2020 (UN DESA, 2020). Of that, 429,000 can be considered economic migrants, with the remainder (524,000) classified as refugees, largely from the Central African Republic (213,000) to the north and Rwanda (211,000) to the east. There are substantial numbers of refugees from South Sudan (56,000) and Burundi (41,000) (UNHCR, 2021). Historically, the DRC has been an important refuge for people displaced by conflict in neighbouring countries, notably up to two million following the Rwandan genocide in 1994 (UNHCR, 2000). Prolonged political, economic and health crises in the DRC itself have also led to significant displacement within and out of the country. It is estimated that there are up to 450,000 Congolese refugees in neighbouring countries, and millions of internally displaced people (MPI, 2016).

Renewed interest in the DRC's cobalt and copper has attracted migrant workers from outside Africa, especially China (Mung, 2008). Official figures put the number of Chinese labourers in the DRC at between 4,000 and 6,765 (EITI, 2017; Johns Hopkins SAIS-CARI, 2022). However, unofficial figures suggest that the actual number could be as high as 100,000 (New Yorker, 2021). While the share of foreign workers in a company cannot legally exceed 10% (Rubbers, 2020), there is considerable room to manoeuvre around this by employing workers indirectly through subcontracting companies. This particularly applies to the use of temporary migrant workers from mining operations in Shanxi province linked to the start-up of LSM operations in the DRC.

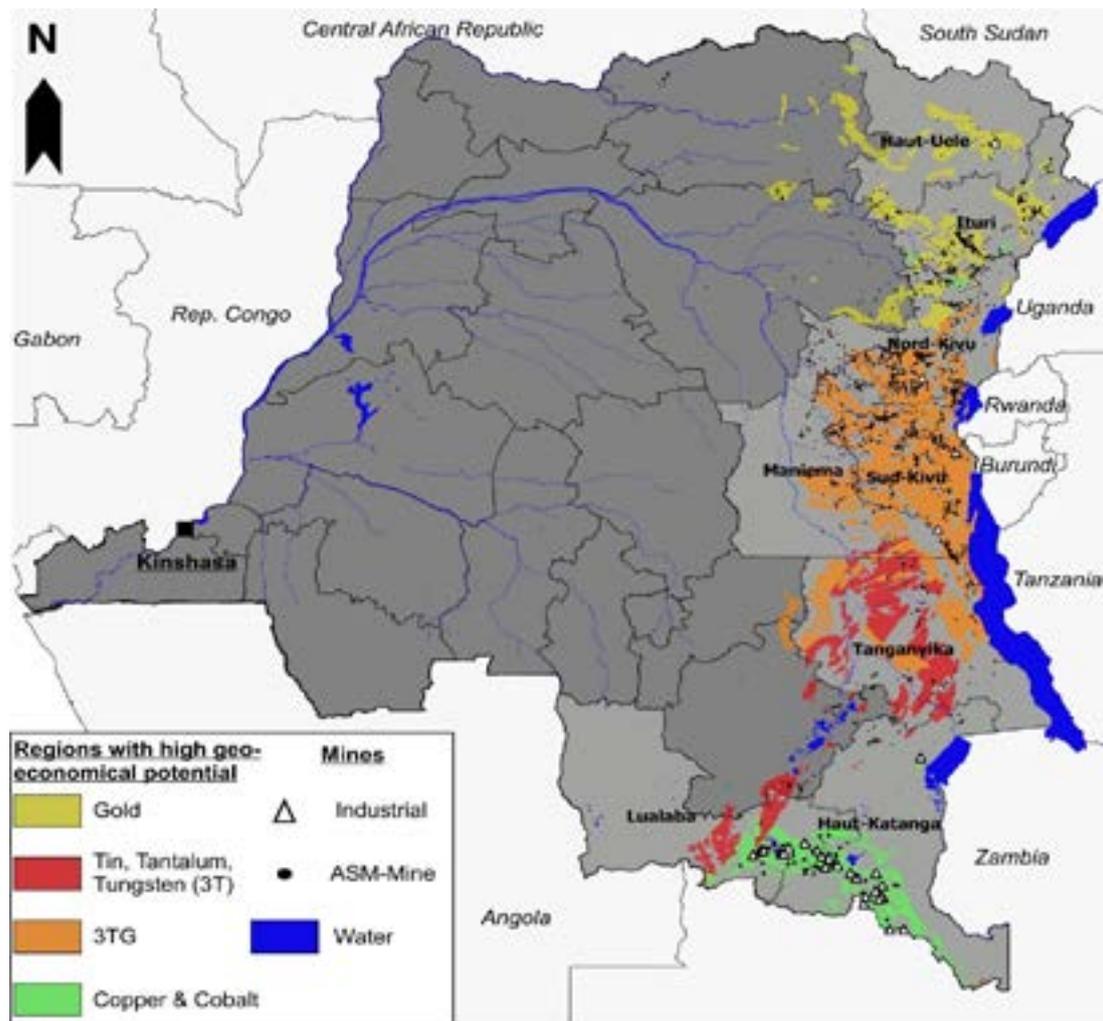
12 For example, South Africa's Witwatersrand mines historically relied on workers from Mozambique (Van Onselen, 2021).

13 Before the cobalt crunch, the DRC's mining industry employed 50,289 workers directly and 29,150 workers indirectly (EITI, 2017). In total, it is estimated that between 150,000 and 200,000 creuseurs work in the ASM sector (BGR, 2019).

The presence of foreign merchants, dealers and traders has been a steady feature throughout the history of the DRC's extractive industry. Traditionally, these merchants were of Indian or Lebanese origin, but today China represents the biggest share (BGR, 2019). Since the 2000s, traders have also started operating small- or medium-sized industrial or semi-industrial mining operations (Rubbers, 2020), sometimes illegally, linking the informal ASM supply chain to international markets.

Finally, international LSM operations tend to recruit highly skilled permanent staff as expatriate executives, technicians or engineers from abroad (Carter and Sturmes, 2020). While programmes to 'Africanise' management personnel were put in place from the 1960s, the recent boom in foreign investment has contributed to a revival in the market for expatriate workers in the DRC (Rubbers, 2020). Global mining companies transfer expatriate workers from other projects or recruit from the international market through specialised sites or agencies. They can also retain foreign staff by assigning them to newly acquired mining projects, resulting in the share of foreign workers exceeding the legal 10% limit.

Figure 6 Map of mineral deposits in the DRC



Source: BGR (2019)

3.5.2 Opportunities

In the long term there is clear potential for Chinese and other foreign investors to contribute towards skill development in African labour markets, including the DRC's. Evidence suggests that Chinese firms have created large numbers of skilled jobs for workers in Africa and helped countries across the continent build an industrial labour force and achieve structural transformation (Oya and Schaefer, 2019). This research has been confined to existing hotspots of industrial transformation, such as Ethiopia and Angola, but points to the possibilities for the DRC.

Chinese migrant workers play an invaluable role in transferring technical know-how in several African countries (see Botchwey et al., 2018 for Ghana and Cameroon and Oya and Schaefer, 2019, for Angola and Ethiopia). It is a common pattern for newly arrived foreign investors to bring in expatriate staff to assist with start-up and help train local workers. Two-thirds of over 1,000 Chinese firms surveyed across Africa train local employees (Sun et al., 2017). Firm-level training and education can range from sophisticated training centres offering intensive learning, skills development, on-the-job training and career development programmes, to more informal regimes to improve both technical and 'soft' skills, such as improved financial literacy (Oya and Schaefer, 2019).

Citizens in many African countries hold largely positive views of China's influence on the economy (Appiah-Nyamekye Sanny and Selormey, 2021). In the past, Chinese firms have made a conscious effort to expand technical training programmes aimed at improving skills among local populations as part of efforts to improve the integration of corporate social responsibility into their local business practices (Alden, 2011; Financial Times, 2017). This has resulted in faster 'workforce localisation', meaning a quicker transfer of skills from migrant to local workers (Kernen and Lam, 2014). Skills transfer is also a central part of the Belt and Road Initiative (BRI), and is meant to occur in all collaborations (Gu and Qiu, 2019).

There have been claims that Chinese firms make very limited contributions to skill development (Baah and Jauch, 2009). Whereas Western firms have been shown to bring their own practices with them, Chinese firms are more likely to adopt local practices, which can be problematic if there is an absence of laws and regulations protecting human rights or the environment (Chen and Landry, 2018). There have been incidents of land grabbing, failure to meet commitments to provide social services or infrastructure and poor working conditions (Oya and Schaefer, 2019). There have also been suggestions that Chinese migrant workers can undercut local businesses, creating job losses (see e.g. Renwick et al., 2018).

Despite the evidence being mixed, and concentrated in countries in Africa besides the DRC, there remains potential for Chinese migrant workers to play a role in promoting the development of green skills in the DRC's extractive sector. This would include greater environmental literacy, rehabilitation of waste areas, monitoring of environmental impact metrics or digital skills associated with smart geology and the use of Responsible Sourcing Blockchain Network (RSBN)

(IBM, 2021). Such upskilling will likely be a long-term project, especially where it is associated with advanced mining technology. At present, Chinese mining companies lag behind European and North American companies in terms of the technologies applied (this is cited as one of the reasons why Chinese firms acquire Western mining projects (Economy and Levi, 2014)).

Opportunities for green skills transfer from migrant workers have the most potential in professional occupations such as mining engineers, technicians and metallurgists, as well as among plant and machine operators and assemblers. Greater effort is needed to transfer these skills to local skilled Congolese workers, who themselves can play an important role in transferring technical know-how and green skills to mining operations elsewhere in Africa and globally.

There are also opportunities to integrate a greater number of informal ASM workers into expanding, large-scale industrial mining operations. Qualitative research shows that there is demand for training and skills among ASM workers, and that cooperatives could be used to provide that training (Savacool, 2019). Conditions in the ASM sector are extremely poor, acting as a push factor and encouraging formalisation of employment and training opportunities. Although LSM is more capital-intensive and offers significantly less direct employment at mine level, it will require tens of thousands of additional workers to meet global demand in the coming decades. A string of new investments in the Congolese cobalt sector is already in the pipeline, including a \$2.5 billion investment by China Moly to start a new production line in 2023.

Transfer of green skills for processing cobalt and other minerals into lithium-ion battery cathode precursor materials could present further skilled job and training opportunities. At present, raw materials for batteries are imported from the DRC into China, before finished batteries are exported to Europe. Producing cathode materials in the DRC would help to shorten transport distances, and therefore emissions, especially if final assembly takes place in Europe, North America (BloombergNEF, 2021) or Africa. Access to other minerals required for cathode production, such as nickel, is available through the African Continental Free Trade Area (AfCFTA), although challenges remain around the infrastructure needed to import the necessary materials. It will also take years, if not decades, to build the necessary human and physical capital to move up the value chain.

Diversifying skills would also help avoid the known risks of concentrated skills specialisation in the extractive sector. Proximity to mining deposits can lead nearby cities to specialise in scalable activities associated with mining, such as steel production. This stifles local entrepreneurship (Glaeser et al., 2015) and can lead to the decline of existing sectors such as agriculture.¹⁴ Firms in the immediate vicinity of mines can also be adversely affected as their ability to access inputs, labour and infrastructure is hampered by mining activities (De Haas and Poelhekke, 2016). Early evidence suggests that there are already signs of skills and employment concentration in the DRC, with years of completed schooling – and therefore alternative skills and education – declining in

14 Also known in economics as Dutch disease effects.

areas surrounding cobalt mines (Malpede, 2020).¹⁵ This is leading to a reliance on mining income from very young ages. Diversifying skills promoting alternative livelihoods in sectors unrelated to mining, for instance in services, farming and animal husbandry, can prevent skills concentration (Carter and Sturmes, 2020). This would also reduce incentives for children to work in mining and help address social risks and human rights abuses in the cobalt supply chain.

3.5.3 Potential policy responses

Jobs and opportunities for skills development offered by Chinese and other foreign investors can provide countries with the labour force needed for green economic transformation. This is especially the case in countries such as the DRC, where workers have limited opportunities to access good-quality TVET systems. Firm-level training and education led by migrant workers is therefore an essential strategy for addressing skills shortages and promoting green skills, especially in more technically complex sectors such as mining or infrastructure. TVET opportunities can also be provided outside the firm, for instance where foreign investors pool resources to fund colleges, schools and training centres. Training and education opportunities also help firms attract workers and maintain their competitive position (see e.g. Fei, 2018¹⁶).

National and local governments can adopt stricter policies to support the role of foreign labour in transferring skills. For example, it is compulsory to submit localisation and succession plans for the replacement of foreign labour by locals in Tanzania, Ghana and Zambia. In Ethiopia, visa policies allowing only selected categories of foreign workers and strict enforcement have contributed to high workforce localisation among foreign companies. Investment approval procedures can be reformed to include requirements around providing training opportunities to local workers, while investment agencies can provide fiscal incentives to boost green skill formation, such as tax breaks on relevant spending. Multinational lead firms should take on the responsibility to provide embedded services in their supply chains to help develop green skills in priority sectors, such as extractives. Finally, priority for firm-level education and training should be given to women, who are currently marginalised from the mining sector and represent just 4% of the formal workforce.

15 Some of these negative effects may be offset by formal on-the-job training and skill accumulation; see e.g. Atkin, 2016.

16 Fei (2018) reports that many Ethiopian workers were attracted by the opportunities and experience offered by Chinese high-tech companies.

4 Discussion and conclusions

4.1 Discussion

This paper has taken the general challenges and opportunities identified in our first working paper in the series,¹⁷ and explored them in greater depth across a range of contexts – countries, migration types and sectors, summarised in Table 3.

Table 3 Overview of case studies

Country	Type of migration	Sector(s)	Key messages
Bangladesh	Internal (rural–urban)	RMG; waste; light engineering	<ul style="list-style-type: none"> • More green jobs needed as well as developing green skills for rural–urban migrants and longstanding city residents. • Opportunities in emerging (diversified) as well as existing formal and informal sectors.
Venezuela–Colombia	International	Renewable energy	<ul style="list-style-type: none"> • Progressive stance on migrants’ economic integration provides a strong foundation for them to support ambitious climate targets. • Green job creation and matching/ enhancing migrants’ skills needed to seize this opportunity.
Indonesia–Malaysia	International	Agriculture/ forestry	<ul style="list-style-type: none"> • Dual exploitation of environmental resources and low-skilled immigrant labour. • Reform of migration system to build skills of migrant labour can assist with greening production in both countries.
China–DRC	International	Minerals/ batteries	<ul style="list-style-type: none"> • South–South migration supports (green) skills transfer to local workforces, especially where TVET opportunities are lacking. • Companies can attract local workers by offering training and education on green skills led by migrant workers. • Governments can support skills transfer in priority sectors by making localisation and succession plans compulsory.

Source: Authors

¹⁷ <https://odi.org/en/publications/migration-and-skills-for-the-lowcarbon-transition/>

The case studies are just a few examples of what *could* happen, rather than what *is* happening, to unite migration, skills and labour, and climate action. So what do we learn by looking across them? The following observations seem generalisable.

The relationship between green transitions and migration is reciprocal. Green transitions may be as relevant to meeting the challenges arising from migration, as migration is relevant to meeting skill and labour needs for green transitions. In Bangladesh, for example, diversification into green industries is a potential route to create decent jobs for rural–urban migrants. In Malaysia, reducing exploitation of the environment by the palm oil sector presents an opportunity to simultaneously tackle exploitation of migrant workers.

Migration pathways that benefit both destination and origin communities are needed. More cyclical forms of migration and partnerships will be needed to share, rather than simply import or export, the gains from green skills investments. Green skills shortages are faced by almost all countries. Low- and middle-income countries, especially those with high levels of unemployment, could benefit through well-managed out-migration, provided this reinforces skills for both emigrants and those that remain (e.g. on the model of global skills partnerships).

The movement of people, as well as goods and capital, is an overlooked shaping factor for globally just transitions. Just-transition scholarship has long recognised that the disruptions created by economies’ shift to greener pathways are globalised, and shaped by the movement of goods and capital across borders (Newell and Mulvaney, 2013). The case studies show that the movement of people is a third important factor influencing what a ‘globally just transition’ might look like. Yet there has been very limited research on this to date: the growing academic and policy interest in just transitions pays little attention to the needs, capabilities and political ramifications of labour migration.

Green transitions will create their own distortions and power imbalances, with implications for migrant and host communities. In other words, ‘green’ does not equate simplistically to ‘good’, as shown in recent research on the inequality and poverty impact of energy policies (Dufour et al., 2022). The same is true regarding labour policies. Going back to the ILO definition we cite in Section 2, green jobs *should* also be ‘decent’. In the DRC, for example, the rush for cobalt to feed huge demand for batteries is attracting a new wave of international migration. This holds the potential for skills transfer to benefit the local population, but also a risk of further exploitation of poor and vulnerable local workers in the DRC’s extractive industry, given weaknesses in general and sectoral governance.

Priorities beyond migrant rights, climate change or skills development may help with incorporating migration in green transitions. In Bangladesh, for example, there is an economic imperative to diversify the economy, in a context where environmental sustainability

is increasingly valued in many export markets. This economic imperative offers governments and businesses an incentive to develop green, export-oriented job opportunities for rural–urban migrants, and support for their skills.

The impact for local workers of engaging migrant workers needs to be seen in context.

Skilled migrant workers won't necessarily displace local workers. For example, in Colombia there is evidence to suggest that the regularisation of migrant workers from Venezuela has not had an impact on labour market outcomes for local workers. Their generally higher education levels mean they can provide an effective complement.

As we noted in 2020, the intersection of three policy agendas – climate, migration and labour and skills – means that finding a productive, workable and mutually beneficial way forward is more challenging. The politics at play around each agenda can interact negatively, for example anti-migrant sentiment overlapping with scepticism about the need for, or speed of, green transitions.

There is abundant evidence of the benefits of migration for destination countries, migrants themselves and communities in origin countries (Woetzel et al., 2016). Nonetheless, migration is often still heavily managed, and beset by restrictive policies and negative political rhetoric. Reform is possible, however, when publics and politicians can be convinced of the urgency and benefits. Most recently, governments made rapid fixes to migration systems during the pandemic (Box 6).

Lessons from the pandemic reinforce the need for strengthened labour force data and workforce planning, and approaches to international recruitment from the perspective of mutual benefit – i.e. a shared global challenge, where skills gaps are universal. But perhaps above all, the pandemic experience underscores the importance of persuading people and their leaders of the immediate threat to lives, livelihoods and economies posed by climate change, and the need to respond using all available tools, including migration.

“The pandemic experience underscores the importance of persuading people and their leaders of the immediate threat to lives, livelihoods and economies posed by climate change, and the need to respond using all available tools, including migration.”

Box 6 Can it be done? Lessons from responding to a global health emergency

Countries' responses to the Covid-19 pandemic – when many governments took rapid action to reform restrictive immigration policies – show how migration can, if the political imperative exists, be urgently adjusted and reformed. ODI has been tracking pandemic-related immigration reforms since early 2020. The most striking finding is how many countries fast-tracked migrant workers into their health workforces (Kumar et al., 2021). Operational responses were very similar across countries, with foreign and refugee doctors and other medical staff fast-tracked to join health workforces. Countries also extended the work visas of migrant healthcare professionals and provided emergency visas to medical professionals.

The health sector in the context of a global public health emergency is, of course, a particular example. It is a sector that was already highly dependent on migrant workers in high-income countries before the pandemic (OECD, 2019). It is also a sector that generally has robust labour force data and strong workforce planning units within national health ministries. Further, the sector has a well-established tradition of international recruitment of health workers that should be managed under an agreed framework; the World Health Organization Global Code of Practice on the International Recruitment of Health Personnel. This encourages bilateral agreements to ensure that mutual benefits are shared across origin and destination countries (Clemens and Dempster, 2021).

4.2 Conclusions

In this paper, we set out to look at how migration, and related labour and skills policies, can support climate goals. We find very different ways in which the relationship between climate, migration and labour and skills policies can be strengthened across geographies and sectors.

Across the four case studies, we identify four key opportunities to bring the migration and labour and skills agendas together with green transitions in positive ways: supporting green transitions with migrant workforces; making existing jobs for migrants green and decent; creating new green jobs for migrant and host workers; and fostering green skills for current and future migrant workers (Table 4).

Table 4 Key opportunities identified across the case studies

	Bangladesh (internal migration, various sectors)	Venezuela-Colombia (renewable energy)	Indonesia-Malaysia (palm oil)	China-DRC (extractives)
Supporting green transitions with migrant workforce	–	Many Venezuelan migrants to Colombia bring skills from the oil and gas industries. Some, such as construction, could be rapidly harnessed in support of Colombia's ambitious renewable energy targets.	–	Chinese workers currently apply their skills throughout the cobalt value chain in the DRC. With the right incentives they can transfer technical and digital skills associated with responsible and smart geology, as well as improved environmental standards, to the DRC's workforce.
Making existing jobs for migrants green and decent	Many of Bangladesh's rural-urban migrants work in unsafe, low-pay conditions in informal industries such as waste management. Supporting them to develop green skills such as waste handling and recycling can make work safer and more remunerative while also improving reuse and recycling rates.	–	Malaysia's oil palm plantations exploit both environmental resources and low-skilled migrant workers from Indonesia. Partnerships to build skills for greener oil palm production and processing could benefit both countries.	Migrant workers from elsewhere in DRC and around Africa work in dire conditions in artisanal cobalt mining. They need to be integrated into efforts to transfer and develop skills for greener and safer cobalt extraction.
Creating new green jobs for migrant and host workers	To accelerate creation of skilled green jobs for incoming migrants to cities as well as existing residents, Bangladesh will need to look to emerging sectors such as light engineering as well as established ones like ready-made garments. This also supports the existing priority to diversify export-oriented industries.	The economic integration of Venezuelan migrants and significant development of solar and wind energy are two policy priorities for Colombia. There is an opportunity to achieve both by creating green job opportunities that are open to Venezuelans as well as Colombians.	–	–

	Bangladesh (internal migration, various sectors)	Venezuela-Colombia (renewable energy)	Indonesia-Malaysia (palm oil)	China-DRC (extractives)
Fostering green skills for current and future migrant workers	A cross-industry approach to building green skills for rural-urban migrants as well as other city workers can maximise the benefits for both well-established and emerging industries. On-the-job training and TVET institutions in both rural and urban areas can play a role.	By opening green skills upgrading to Venezuelan migrants, and recognizing their existing skills and educational qualifications, Colombia can expand the labour force for its green transition and tap into Venezuelan migrants' generally high levels of education.	Skills to improve yields, decrease waste, and manage pollution from waste products are needed in the palm oil sector in both Malaysia and Indonesia. A partnership to develop skills of Indonesian workers, whether they stay or migrate to Malaysia, could benefit both countries.	Firm-level training from Chinese enterprises in the DRC's extractive sectors can provide skills development opportunities that are not yet available from domestic TVET systems.

A range of policy measures are needed to tap into the opportunities identified in Table 4. These are framed in general terms to apply across countries – they complement the more context-specific potential policy responses outlined at the end of each case study.

1. **Supporting green transitions with migrant workforces.** In contexts where migrant workers already bring education and/or skills required for green transitions, immediate opportunities arise to bridge labour gaps or support skills transfer. However, this requires:
 - a. Measures to enable migrants' integration in labour markets, such as improving cross-border recognition of skills and educational qualifications; improving coverage of both green jobs and migrant workers within labour market information systems; more active approaches to match migrant workers to green jobs, involving companies, migrant organisations and local governments; and appropriately designed visa schemes.
 - b. Measures to ensure host community workers also benefit, including active labour market policies such as social protection; career counselling and training opportunities for those whose jobs are displaced by green transitions; and legislation/incentives to encourage businesses to plan for increased employment and training of local workers.
2. **Improving the environmental impact and working conditions of migrant jobs.** Where migrant workers are already in employment that exploits both them and the environment – in industries such as poorly regulated palm oil (Malaysia), waste management (Bangladesh) or extractives (DRC) – there is often a need to improve labour and environmental standards simultaneously. Taking a progressive stance on how migration is managed, while simultaneously enforcing stricter environmental standards, incentivises companies to

invest in sustainable production techniques and the skilled labour required to implement these. Public policy and consumer action can bring about change through formal legislative standards and by encouraging information instruments to incentivise compliance on a voluntary basis – such as investor environmental, social and governance (ESG) criteria, or corporate stewardship standards.

3. **Creating new green jobs for migrant and host workers.** In many contexts, employment opportunities for both host and migrant workers are lacking. The global green transition offers opportunities for economic diversification in many countries, oriented to both domestic markets and export. In turn, this provides the potential to create decent jobs in new areas, whether ‘conventional’ sectors that can be greened (e.g. light engineering in Bangladesh), or more inherently green sectors (e.g. renewables in Colombia). Here, the potential for migrant workers – whether international or internal – to support green transitions can be considered from the ground up. Relevant measures include:
 - a. Cross-industry collaboration to identify what worked in developing skills and improving access for migrants in more mature industries (e.g. in Bangladesh, transferring lessons on the role of on-the-job training from RMG to light engineering).
 - b. Improving dialogue and coherence across different policy areas, particularly climate and environment, migrant integration and skills, but also other areas relevant to green transitions, such as trade and industrial policy.
4. **Fostering green skills for current and future migrant workers.** Across all the above areas, a recurrent theme is the need to develop skills in an inclusive way, to benefit both current and future migrant workers, as well as host workers. At the same time, mobility can itself also be used to catalyse skill development. Consequently, relevant measures fall into two groups:
 - a. Improving the accessibility of green skills development opportunities for migrants, whether on-the-job or in tertiary or technical/vocational education. Access needs to be continual, before and after people move – which is increasingly enabled through digital technologies and platforms.
 - b. Expanding more progressive and reciprocal models of skills/talent partnership and exchange, including on a South–South or triangular cooperation basis. Relevant models include migration skills partnerships, circular migration pathways and apprentice and student exchanges.

What is most needed is closer engagement and collaboration to allow for policy coherence and the development of innovative partnerships and initiatives that can be scaled up. These can give us a stronger chance to deliver on our urgent climate goals, while also fulfilling some of the goals across migration and labour agendas.

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