From Shortages to Solutions

Good Green Jobs and Labour Migration in Cities

C40 CITIES

Mayors Migration Council

Climate Migration Council

Acknowledgements

This report is part of C40's Inclusive Climate Action programme and was made possible through a joint effort by the Climate Migration Council - a group of leaders who share a commitment to accelerating global solutions to climate-related migration - and the Mayors Migration Council, a mayor-led coalition that accelerates ambitious global action on migration and displacement.

We recommend reading this report in conjunction with our latest policy brief on the critical role of climate migrants and migration for a green and just transition in cities: Good Green Jobs and Labour Migration: Opportunities for Urban Leaders, as well as the C40-MMC Global Mayors Action Agenda on Climate and Migration and the Climate Migration Council's Action Guideline for Local Governments.

This summary report captures for external audiences the research and full study results conducted for C40 Cities by kMatrix Data Services, a data house that specialises in providing evidential data for business modelling and analysis on a multi-sectoral basis.

C40 is a global network of nearly 100 mayors of the world's leading cities that are united in action to confront the climate crisis. Mayors of C40 cities are committed to using an inclusive, science-based and collaborative approach to cut their fair share of emissions in half by 2030, help the world limit global heating to 1.5°C, and build healthy, equitable and resilient communities.

The Climate Migration Council is a group of nearly 90 leaders who share a commitment to putting people at the centre of climate action and to accelerating global solutions to climate migration.

Together, the CMC urges governments and other relevant stakeholders across the globe to develop and adopt equitable and inclusive solutions to address climate mobility.

The Mayors Migration Council is a mayor-led coalition that accelerates ambitious global action on migration and displacement to create a world where urban migrants, displaced people, and receiving communities can thrive.

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Mayoral perspectives

The political significance of both migration and climate action today demands bold, pragmatic, and integrated responses: driving the creation of good green jobs, investing in skills training, and making opportunities accessible for all residents, including newcomers. This research provides Bogotá with essential evidence, alongside past C40 and MMC studies on our city's projected climate migration patterns, to plan ahead, harnessing the opportunities that both climate action and migration offer to our city.

Mayor Galán
Bogotá

Our city's climate interventions not only aim to safeguard our city and residents' livelihoods, they are a key part of our efforts to provide essential services to residents in our growing city. As this study underscores, locally-led climate action is an essential tool for cities to build the competitive workforces of the future - but can only succeed through sustained infrastructure investment, inclusive opportunities for training and jobs for all. We call on international actors to support mayors' efforts to scale climate action and investment, providing sufficient and accessible climate finance.

Mayor Hill-Lewis
Cape Town

Through Chicago's commitment to green, inclusive economic development, our city is moving beyond our 'rust belt' identity of the past and emerging as a leader of a new 'green belt.' As this research shows, by investing in equitable, place-based workforce development programs, coupled with welcoming immigration policies, Chicago and other American cities can continue to ensure that our ambitious climate agenda serves as a catalyst for transformation.

Mayor Johnson
Chicago

Guadalajara's UN-awarded Climate Action Plan is built on a core principle: that good, green jobs are essential and beneficial for everyone. We are committed to making sure these opportunities benefit local residents, new arrivals and migrant returnees alike; this research will be instrumental to support these efforts at an urban level.

Mayor Delgadillo
Guadalajara

At this year's Urban20 Summit in Johannesburg, mayors from across the world called on G20 leaders to strengthen green, social, and economic inclusion, creating access to decent work opportunities for all – including migrants and refugees.

For Johannesburg, this research makes it clear that we must advance a green and just transition in our city, through integrated action and strong partnerships at every level.

Mayor Dada Morero
Johannesburg

We are proud of Madison's leadership in delivering climate action which not only cuts emissions but creates more opportunities for good-paying, high-quality jobs for all. However, as this research shows, there is still more to be done for cities to meet our ambitious climate goals.

Workforce development efforts, which we are proud to be pushing forward through our GreenPower Program, are a key priority. But like all cities, we know that it will be essential to ensure that green skills and job opportunities are accessible for all, including newcomers, to ensure our city's diverse workers are able to benefit from these opportunities.

Mayor Rhodes-Conway
Madison

Milan, like many cities in Europe, has long benefitted from labour mobility, both domestic and international. Foreign-born residents and migrant communities already contribute greatly to our growing green economy, especially in sectors like construction, transport and water and waste.

The research provides additional evidence on the need for legal and safe migration pathways to respond to the increasing demand for workers in good green jobs in cities.

Mayor Sala
Milan

As Nairobi's Governor, my priority is practical climate action that protects residents and creates green jobs—especially for our youth who make up a majority of the population. Through innovative research and projects like City of Choice, we show how linking climate, migration, and skills can shape the future of cities worldwide. We are building a resilient, inclusive city that sets an example for urban futures in the region.

Governor Johnson
Nairobi

The City of São Paulo has been consistently advancing in the climate change adaptation agenda, with continuous investments in environmental initiatives. The city is moving forward with actions such as the Green Package, which includes the planting of thousands of trees, the creation of urban forests and conservation units, the expansion of the replacement of diesel bus fleets with electric and biomethane-powered ones, as well as the modernization of waste collection with biomethane-powered trucks.

Currently, the capital already has more than 50% vegetation coverage and stands out as a reference in sustainability among the world's major cities. This effort is also reflected in the job market through the creation of green jobs, largely driven by municipal public policies. These jobs contribute to the city's performance, which now has the lowest unemployment rate in its historical series, 5.4%, and the best average salary balance in Brazil. São Paulo not only talks about a sustainable future but also demonstrates in practice that it is possible to combine economic growth, job creation, and environmental care

Mayor Nunes
Sao Paulo

Credit: Alan Dow

Executive summary

Climate change is the real crisis of our time, but the way in which people adapt to its impacts, including through migration, does not need to be. While climate migration is increasingly recognised as an urgent issue, a critical element is often ignored: the contributions migrants can make to the green transition, particularly in cities[1]. This oversight is often fuelled by negative, alarmist narratives about mass migration[2], and climate displacement in particular, which ignore the opportunities that pragmatic and integrated solutions can offer for both climate action and economic inclusion.

This is especially relevant given green labour and skills shortages—a major challenge but also a great opportunity for cities, climate goals, and fair economic growth. Experts warn that without addressing shortages of green labour and skills, climate progress and the economy are at risk[3]. Conversely, well-planned labour migration, combined with inclusive workforce development, can fill these shortages and lead to a faster, fairer green transition. This potential is increasingly recognised, but evidence to guide action remains scarce, particularly for cities where it matters most.

New research by C40, the Climate Migration Council and the Mayors Migration Council, provides first-of-its-kind data on green jobs creation and labour shortages and identifies opportunities for skills training and inclusive migration solutions. Looking at 2040 projections for 25 cities across seven countries, and focussing on the Construction, Transport, and Waste Management sector, the analysis finds:

1. **Urban climate action is projected to be a major driver of job creation and employment in cities,** with 13 million green jobs projected to be needed to meet demand, representing 43% of all jobs in the sectors studied, if Climate Action Plans and country-level NDCs are delivered as planned.

2. **Significant labour shortages are projected across green sectors in urban economies,** with between 3 to 6 million additional workers needed by 2040 to implement planned climate interventions. Failing to address these shortages would represent a missed opportunity both for workers and local economies, and could slow or stall the green transition.

3. **Green labour shortages can be addressed through a two-part solution: training existing workers with new skills and supporting migrant workers to access these opportunities.** The analysis estimates that a 50% increase in public investment in technical and vocational training could reduce shortages from 6 million from 3 million. Yet, this would still leave significant demand and opportunities for employment unable to be met.

4. **Ensuring projected shortages are addressed would present a major economic opportunity for cities,** as the combined impact of skills training and inclusive immigration policies could see up to US$280 billion in economic growth by 2040, across the 25 cities studied. This would not only ensure that the green and just transition succeeds, but drive inclusive, economic development.

Addressing this gap is not just about filling jobs; it is an opportunity to generate significant economic output and deliver a faster, fairer transition for all.

Previous evidence from C40, the CMC and MMC shows that mayors are already leading in action, building a strong case for integrated and inclusive solutions on climate, just transition and migration. In fact, across regions, leading mayors are already proving that successful solutions exist, but significant policy and finance shifts are needed at the national and international level to bring these solutions at scale - including by working in close coordination with businesses, unions, and frontline communities. Also, in the context of a green and just transition, it is important that multi-level responses do not overlook global injustices and deeper inequalities that underpin these global trends, at all scales of governance. In particular:

Mayors are already proving that successful solutions exist, but significant policy and finance shifts are needed at the national and international level to bring these solutions to scale.

- Efforts to economically include migrant workers must go hand in hand with measures to protect and support the existing local workforce – especially those frontline workers who are more likely to be affected by the green transition.

- Solutions to leverage labour migration do not perpetuate dependencies, by eroding the human capital of Global South countries and fuelling brain drain.

With this in mind, and based on the new evidence put forward in this research, we call on our partners around the world, from national governments to international organisations and the wider businesses community to:

- Invest in city-led climate action that creates good green jobs in cities of origin, transit and destination, to both tackle root causes of migration and foster the economic inclusion of newcomers in resilient cities.

- Ramp up urban workforce development programmes in cities, ensuring that a growing demand for green labour is met with a qualified, inclusive and diverse workforce.

- Improve training, employment access and skills development for newcomers, prioritising green urban sectors where shortages of labour and skills are most acutely felt, and working in partnership with the private sector.

- Establish labour pathways focused on green skills and urban sectors with high demand for labour, unlocking benefits for both countries of origin and of destination, including for climate migrants.

- Work with cities to promote decent working conditions, social protection, and dialogue, starting by driving recognition of informal workers in green sectors – including migrant workers.

1. Introduction

Credit: Stephen Yang

This joint report by C40, the Climate Migration Council (CMC) and the Mayors Migration Council (MMC) presents first-of-its-kind projections on green labour and skills shortages by 2040. This report showcases the potential of climate action to drive significant job creation in cities, while highlighting the need for a two-part solution to ensure that cities can meet the demand for green labour: training existing workers with new skills and supporting migrant workers to access these opportunities.

The research covers 25 cities across seven countries and focuses on three urban economic sectors: Construction, Transportation, and Waste. These sectors are already emerging as critical for local green jobs creation[4], and also tend to see a higher representation of migrants - both domestic and international - in the current workforce[5]. Findings included in this document are based on original quantitative and qualitative analysis, and rely on extensive consultations with both subject-matter experts and officials from the cities involved. By providing this crucial data, the report advances the vision - shared by C40, CMC and MMC - that while climate change is the real crisis of our time, the way in which people adapt to its impacts, including through migration, does not need to be.

Worldwide, there is growing recognition that the climate crisis is a major driver of migration. Projections show that up to 216 million people could be internally displaced by 2050[6], with many moving toward cities[7]. Yet, despite this reality, policy and research have been slow to explore how migration, both within and between countries, can be harnessed for a just transition. Too often, the dialogue is shaped by alarmist narratives, obscuring the immense potential for integrated solutions that can advance both climate action and economic inclusion.

This is where the global narrative must shift. The green transition is not just a climate goal; it is one of the most transformative trends for the global labour market[8] and a core issue of social justice that has its epicentre in cities. Increasing, yet still largely insufficient, levels of public and private climate financing has the potential to drive significant green jobs creation, especially in larger urban areas, as leading action and research by C40 members has repeatedly shown[9]. This increased demand for a green workforce provides the perfect opportunity for both existing workers - especially those who are employed in more polluting industries - and new ones, including migrants, refugees, and other marginalised groups. By linking green job creation directly to inclusive skills training and social protection programmes, cities can solve for both sides of the equation: accelerating their climate goals while ensuring no one is left behind, including migrants and refugees.

The green transition is not just a climate goal; it is one of the most transformative trends for the global labour market and a core issue of social justice that has its epicenter in cities.

This is not just a social imperative, it is also an economic and a climate necessity. The focus is shifting to the green transition's biggest bottleneck: an increasingly evident shortage of green labour and skills, that threatens both climate progress and the economy. The reality is stark: according to the International Organisation of Employers[10], no country has enough domestic talent to achieve the Paris Agreement goals alone. Failing to fill these green jobs could cost the global economy US$1 trillion in growth[11] and delay climate action enough to raise global warming by an

additional 0.1°C by 2030[12]. The role that labour migration, in tandem with inclusive workforce development, could play to address these gaps is clear, underscored by the data included in this report and the lived reality of cities as the world's economic and employment hubs.

The scale of this workforce gap is now coming into sharp focus, yet its prominently local and urban dimensions are often underappreciated. New research presented in this report aims to address this gap, with a focus on how cities are leading in action and what mayors need others to do to deliver at scale. Across the 25 cities analysed in this report, an additional 3 to 6 million workers will be needed in the construction, transport, and waste sectors by 2040. Addressing this gap is not just about filling jobs; it is an opportunity to generate significant economic output and deliver a faster, fairer transition for all.

However, despite limited mandates and resources, mayors are not waiting for others to take action. They are already at the forefront of delivering just and equitable solutions and their unique position enables them to meet this challenge head-on[13]. In Kenya (Nairobi), where this research projects a shortage of up to 300,000 construction workers by 2040, the municipal **CHOICE Innovation Hub** is already working to train marginalised youth, including migrants and refugees, identifying employment barriers and creating targeted pathways into green sectors where demand for workers is highest. In São Paulo (Brazil), the city's **Programa Operação Trabalho** (Work Operation Programme) is turning public land into vibrant classrooms and workplaces, providing green employment opportunities for both local residents and newcomers, while weaving a stronger and more sustainable fabric for local communities. This project provides a clear blueprint for how São Paulo, and cities worldwide, can meet the demand for green labour that this report projects. For example, projections show that by 2040, São Paulo could face a shortage of 51,000 bus operators, 38,000 water infrastructure workers, and 4,000 workers in waste site operations; while the city could also see an inflow of over **300,000 internally displaced people**, due to climate change.

These are only some of the innovative examples of how cities included in this report are already turning challenges into opportunities. Previous work by the **C40-MMC Global Mayors Task Force on Climate and Migration** and policy analysis carried out in partnership with the CMC provides an additional **blueprint** of how city-led solutions on climate and migration can deliver a fairer and faster green transition for all.

Against this backdrop, this report is organised into the following sections:

- **Section 1:** Establishes the report's conceptual framework, exploring the intersection of climate migration, green job shortages, and the role of cities, while also outlining the methodology and innovative model used for the analysis.
- **Section 2:** Presents the key global and city-level research findings, showing how a two-part strategy of workforce development and labour migration can address projected green job shortages, thereby meeting the projected demand for green jobs in cities, and highlighting the pivotal role of cities and local data in the process.
- **Section 3:** Identifies five priority areas for scaled-up action, demonstrating how migration and green transition policies can complement one another, benefitting people, the planet, and the economy.

Credit: Alastair Johnstone

2. Research approach

Credit: Joan Sullivan

While climate change is increasingly recognized as a driver of human mobility, research to date has largely overlooked[14] the positive role labour migration can play in the green transition and how climate action can promote economic inclusion across countries of origin, transit, and destination. Despite local leadership on green jobs, migration, and inclusive climate action, data-driven research on this topic at the local level is particularly scarce. In this study, C40 has developed new local-level data on projected labour shortages in 2040 across 27 cities (full list on page 23) in economic sectors (construction, transport and waste) that are critical for the green transition.

This research leverages a proprietary modelling methodology developed by **kMatrix and Harvard University**. Based upon smart data 3D modelling of the economy of each city, the model provides probabilistic and measurable evidence of future economic and labour development in cities. The data consolidation model uses multiple trusted sources per datapoint, triaged for consistency (based on the accuracy of estimates from each source in the past), and applying a unique data triangulation approach to any gaps in data, mitigating biases or inflated values from individual sources, to build a dataset.

Building on 2023 baseline data, the model estimates projected labour shortages of direct, green jobs for key economic sectors in cities by modelling the projected economic activity needed to meet each city's own Climate Action Plan and country's national NDCs. It compares this with modelled scenarios of projected levels of workforce development in each city, to estimate the size of the labour market per economic sector. In comparing these two projections, the model can identify, at a city-level, what the projected labour shortages will be per economic sector, down to the occupational level. Leveraging the 2023 baseline and data triangulation approach, the model establishes a sales per employee value, per sector and activity level. Applying this value to a city's projected shortage determines the economic activity generated by meeting that shortage.

The scenarios used in this model are designed to offer a comparative analysis of the extent to which labour shortages may be mitigated through increased investment in workforce development across the countries and cities studied; thereby underscoring the critical role of both workforce development as well as labour migration in addressing such shortages. The Business-as-Usual scenario serves as a baseline, illustrating the projected impact of maintaining current levels of training investment on future labour deficits. In contrast, the Optimistic scenario shows the potential for significantly reducing these shortages through a substantial—yet plausible—increase (+50%) in training investment. Importantly, both scenarios continue to project notable labour shortfalls, thereby highlighting the need for a multifaceted policy approach, including by attracting and mobilising new talent in cities, whether through domestic or international migration. This includes, but is not limited to, strategies that facilitate labour migration as a means of effectively responding to evolving workforce demands. Each scenario, and the broader modelling approach, is summarised in the table on the following page.

The model estimates projected labour shortages of direct, green jobs by modeling the economic activity needed to meet each city's Climate Action Plan and their country's NDC.

Modelling scenarios

	Scenario 1 Business as Usual	Scenario 2 Optimistic
Labour demand	Calculated based on the economic activity needed to meet the goals of each city's CAP and national-level NDCs by 2040 in the Construction, Transport, and Waste sectors. This remains consistent across both scenarios. *Sources: CAPs and NDCs, among others.*	
Supply of workforce	Assumes that current workforce development programmes and investment levels remain consistent through 2040.	Projects that workforce development programmes and investment levels will increase by 50% by 2040 (find details below).
	Sources: Current training, industry-led training provision, and public workforce development programming.	
Labour shortage	Calculated as the difference between the required number of workers (labour demand) and the supply of workforce generated in the Business as Usual scenario, per occupation per sector, in each city studied, by 2040.	Calculated as the difference between the required number of workers (labour demand) and the increased supply of workforce generated in the Optimistic scenario, per occupation per sector, in each city studied, by 2040.
Economic impact	Calculated as the total economic activity generated in a calendar year by each worker's role.	

Further background information about these scenarios, including values measured for each of them and sources leveraged, are available in the **full study report** including detailed methodology and results.

For the purpose of this research, this study looks at the following:

- **Direct jobs:** The jobs analysed in this study are exclusively those which produce the goods and services needed for the green economy, within the selected sectors of construction, transport, and waste. This does not include indirect or induced jobs. A full list of jobs included in this study can be found in Annex A.
- **Green jobs:** Per C40, a green job is one which helps reduce greenhouse gas emissions (GHG), protects nature, and improves wellbeing. A full list of jobs included in this study can be found in Annex A. C40's green jobs **FAQ document** provides more information on defining green jobs.
- **Formal and informal jobs:** This study analyses both formal (regulated) and informal (unregulated) employment across selected sectors in each city. The methodology establishes a robust estimate of the share of informal workers in each sector using 2023 baseline data, and then projects these trends forward. The aim is to capture the full extent of informal employment and provide a comprehensive picture of local labour markets. Given cross-country variations in definitions of informal employment, the study aligns with national definitions where possible.
- **City Scope:** Jobs measured and forecasted within this study are those which are based within the geographical limits of each city, defined as the legal or regulated administrative units according to the legal or regulated administrative boundaries of the city (not including the surrounding municipal areas). While this provides a consistent geographical scope, it is important to recognise that the level of authority and influence on labour market policies varies by city.
- **Workforce Development:** Workforce development refers to the strategies, initiatives and programmes designed to train the workforce to meet the needs of industry for the current and future job market. For this research, investment in workforce development was measured through the value of Technical and Vocational Education and Training (TVET), which encompasses programmes that train practical skills and knowledge for specific occupations, given its targeted nature and potential to offer stronger benefits for a smaller increase in investment. Furthermore, the model weighed not only how long it takes to train workers, but also how long it takes to train those who provide the workforce training and its variance per sector and economic activity.
- **Economic Sectors:** Three economic sectors were selected for this study, based on their relevance to the green transition and significance for urban economies. While additional sectors were considered, the study's focus was intentionally narrowed to prioritise sectors that are fundamentally urban, green, and supported by robust data. For instance, the knowledge economy was evaluated but not included due to concerns regarding data integrity and the potential impact of greenwashing. A full list of jobs, per sector, included in this study can be found in Annex A. Given the inherent complexity and overlap of real-world economic activity, C40 defines each sector as follows:

Construction

Green, economic activity related to the design, building, repair, and maintenance of infrastructure and real estate projects. This includes residential, commercial, and industrial construction, including for energy projects relating to electric vehicles, solar energy, and wind energy, as well as civil engineering projects such as roads, bridges, and dams.

Transport

Green, economic activity related to the operation, manufacturing, maintenance, and management of vehicles and services for the movement of people and goods. This includes public transit, commercial shipping, and maritime services, including for projects relating to shared mobility, charging infrastructure, and enabling infrastructure like logistics hubs.

Waste

Green, economic activity related to managing waste materials, from their generation to their final disposal or recycling. This includes collection, transportation, processing, and treatment of various waste streams as well as the implementation of technologies and policies aimed at minimising waste generation and promoting resource recovery.

Credit: Mark Linel Paderio

While reading this report, it is important to consider the following. This study:

- Leverages thousands of sources from various institutions (local and national governments, financial institutions, private sector, among others) to develop the most robust projections of estimated labour shortages in the future. Key policy documents, including each city's Climate Action Plan and the relevant national NDC, serve as critical inputs for this proprietary model, and as such, the forecasts presented are this report's own analyses rather than the city's official projections. Importantly, no one scenario should be considered the "most likely" outcome.

- Allows the user to assess the potential future levels of labour shortages in key economic sectors in selected urban economies, thereby supporting efforts to determine the optimal inclusive workforce development, migratory, and economic development policies which support the green transition and climate goals.

- Does not account for new or adjusted policies or investment - across workforce development, migration, green transition, climate investment - which may be implemented in the future.

- Does not incorporate unemployment in the model, but rather focusses exclusively on the active workforce within each sector. Due to the challenges of modelling the possibility of unemployed populations (given varying skill levels, geographic locations, etc) filling existing or projected labour shortages, unemployment is assumed to remain consistent in projections. By omitting unemployment from the core analysis, the study establishes a robust baseline that can serve as a foundation for subsequent unemployment modelling at the city level. However, we note that increased investment in workforce development could include support for programmes which tap into unemployed and underemployed groups.

Further information about this research and the modelling approach are available in the **full study report** including detailed methodology and results.

Credit: Sara Hylton

3. Research results

Credit: Hans Johnson

This research provides first-of-its-kind city-level estimates of projected labor shortages of direct green jobs for key economic sectors which are critical for the green transition across seven countries and 25 cities.

The following section details the overall results at an aggregate level followed by an in-depth examination of the findings for each city.

This report acknowledges that the scope of municipal power over the policy areas examined varies significantly across the national contexts studied as does the political context of migration and climate action.

Brazil	Curitiba	**Italy**	Milan	**USA**	Boston
	Fortaleza		Rome		Chicago
	Rio de Janeiro	**Kenya**	Nairobi		Denver
	Salvador	**Mexico**	Guadalajara		Madison
	São Paulo		Mexico City		Phoenix
Colombia	Barranquilla	**South Africa**	Cape Town		Seattle
	Bogotá		Durban		Washington DC
	Cali		Ekurhuleni		
	Medellín		Johannesburg		

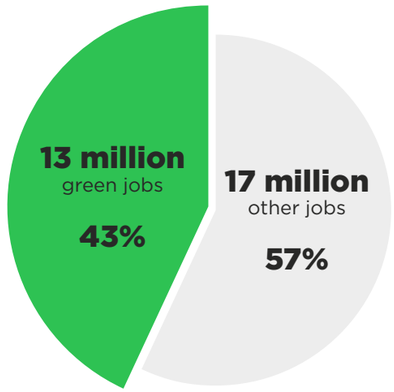
Global results

Direct, green jobs by 2040 across 25 cities in the Waste, Transport, and Construction sectors.

1. Urban climate action is projected to be a **major driver** of job creation and employment in cities.

By 2040, as a direct result of policies and investments in city Climate Action Plans and country-level NDCs, 13 million green jobs will be needed in the Construction, Transport, and Waste sectors in the 25 cities studied in this report.

Notably, green jobs are estimated to be approximately half (43%) of all jobs in the sectors and cities studied.

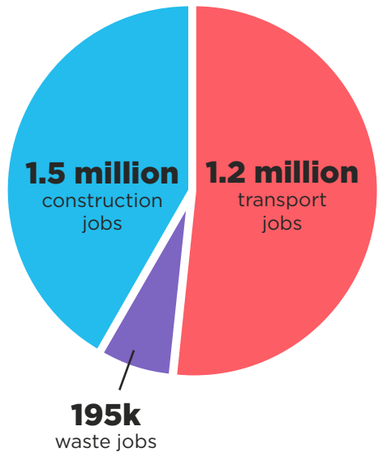


Projected labour demand

2. Significant **labour shortages** are projected across green sectors in urban economies.

This growing demand will create unprecedented job opportunities - with between 3 to 6 million shortages projected by 2040, based on planned climate interventions in the Construction, Transport, and Waste sectors alone.

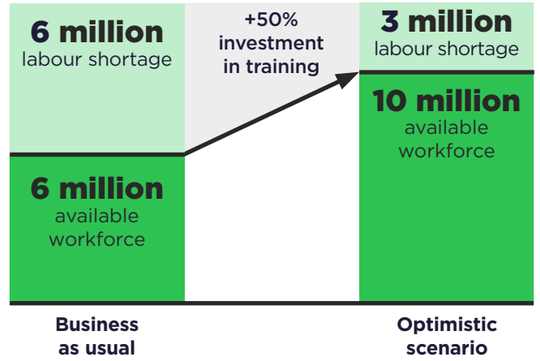
Without concerted investment and policy intervention, these labour shortages could represent a missed opportunity both for workers and local economies, and could slow down or stall the green transition.



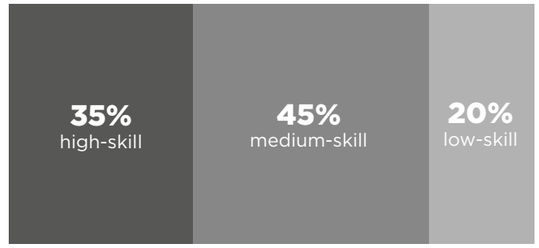
Projected labour shortage

3. Shortages can be addressed through a **two-part solution**: training existing workers with new skills and supporting migrant workers to access these opportunities.

Inclusive training and skills building programmes for local communities will be essential for cities to meet the demand for green workers. A 50% increase in public investment in technical and vocational training could bring down shortages from 6 to 3 million. Yet, this would still leave significant demand and opportunities for employment unable to be met. With 65% of projected shortages falling into "low" or "medium skill" categories, ensuring that training programmes are inclusive, and also accessible for newcomers, will be especially effective in developing the workforce needed. Yet skills development programmes cannot address all labour shortages. Attracting new talent through domestic and international migration which meets the higher demand for labour could further help cities address gaps that cannot be filled through local workforce.



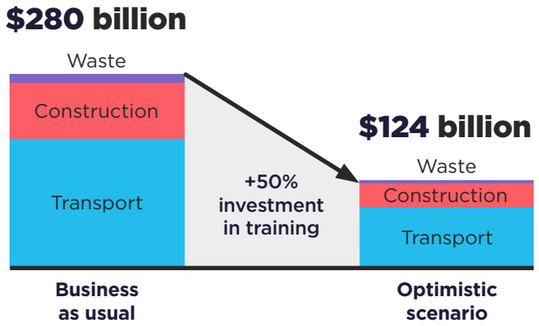
Projected labour shortage scenarios



Projected skill level of shortages

4. Ensuring projected shortages are addressed would present a major **economic opportunity** for cities.

By ensuring projected shortages are addressed, through combined skills training and inclusive immigration policies, the 25 cities studied could see from US$124 billion up to US$280 billion in economic growth by 2040. Addressing projected green shortages can not only ensure that the green and just transition succeeds, but can also drive inclusive, economic development. Failing to address these labour shortages would mean leaving that opportunity on the table.

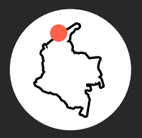


Projected economic value of addressing labour shortages
(Values in 2023 US Dollars)

Business as Usual Scenario: Assumes that current workforce development investment levels remain consistent through 2040.

Optimistic Scenario: Assumes that workforce development investment levels increase by 50% in 2040.

Barranquilla, Colombia



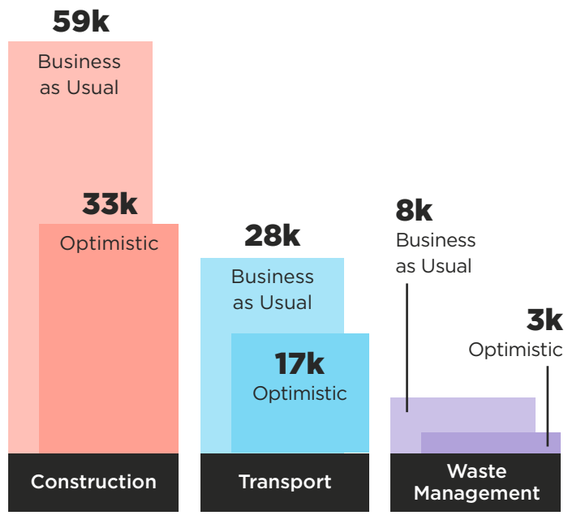
Barranquilla is projected to experience **53,000 to 95,000** green job shortages by 2040. By addressing the shortages, Barranquilla could see an additional **US$1B to US$1.5B** in economic activity, up to 5% of total city GDP.

Projected direct, green jobs by 2040. Key shortages refer to the Business as Usual scenario.

Green job demand and shortages

Over 230,000 green jobs are projected to be needed in Barranquilla by 2040 across the Construction, Transport, and Waste sectors if the city's Climate Action Plan and Colombia's NDC are delivered.

Yet high estimates of labour shortages across the three sectors are projected - **about one-third of all shortages in these sectors are projected to be green jobs**. The role of workforce development as well as labour migration in addressing projected shortages is clear as shortages remain high even when workforce development investment increases in the optimistic scenario.



Key occupational shortages

Highlighting the role of local policies in driving green economic growth, Barranquilla's ambitious and inclusive climate policies will generate demand for a variety of green jobs which are projected to have high shortage rates in the three sectors in this study as well as various others, including green tourism and energy transition. The city's focus on lowering emissions via investment in public transportation, as well as on improving energy efficiency and strengthening its circular economy, will drive significant demand for workers.

- **16k** Installation of Solar Panels
- **10k** Potable Water Infrastructure
- **9.5k** Solar Farms
- **6k** Bus Operation
- **3.3k** Manufacture/ Maintenance of Buses
- **2k** Manufacture/ Maintenance of Bicycles
- **3.6k** Municipal Waste Site Operation
- **1.8k** Kerbside Collection
- **1.4k** Waste Transportation

Bogotá, Colombia

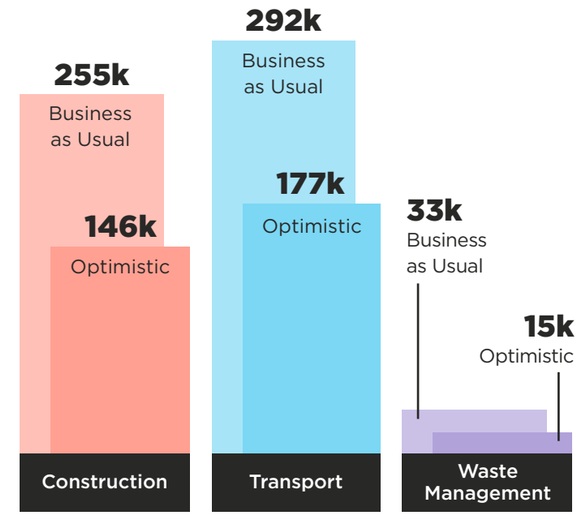
Bogotá is projected to experience **337,000 to 581,000** green job shortages by 2040. By addressing the shortages, Bogotá could see an additional **US$5B to US$9B** in economic activity, up to 2% of total city GDP.

Projected direct, green jobs by 2040. Key shortages refer to the Business as Usual scenario.

Green job demand and shortages

Over 1.4 million green jobs are projected to be needed in Bogotá by 2040 across the Construction, Transport, and Waste sectors if the city's Climate Action Plan and Colombia's NDC are delivered.

Yet high estimates of labour shortages across the three sectors are projected - **43% of all shortages in these sectors are projected to be green jobs**. The role of workforce development as well as labour migration in addressing projected shortages is clear as shortages remain high even when workforce development investment increases in the optimistic scenario.



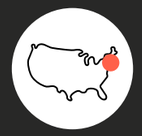
Key occupational shortages

Highlighting the role of local policies in driving green economic growth, Bogotá's ambitious and inclusive climate policies will generate demand for a variety of green jobs which are projected to have high shortage rates.

The city's focus on lowering emissions via investment in public transportation, as well as on improving energy efficiency and strengthening its circular economy, will drive significant demand for workers.

- **47k** Construction of Railways
- **25k** Solar Farms
- **20k** Wind
- **85k** Bus Operation
- **25k** Station Operation Railways
- **19k** Passenger Rail Operation
- **5k** Municipal Waste Site Operation
- **4k** Waste Transportation
- **3k** Kerbside Collection

Boston, USA



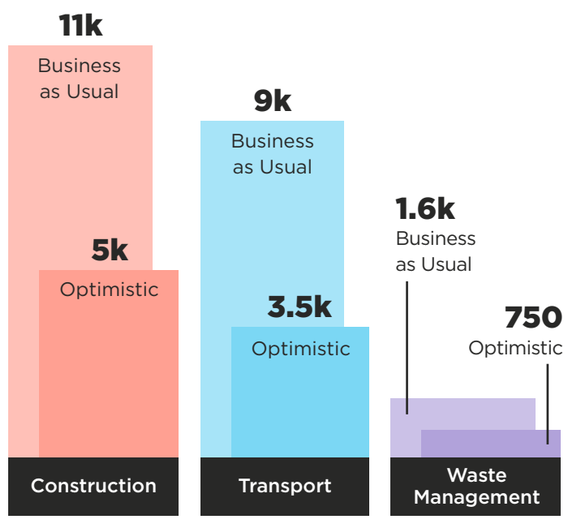
By 2040, Boston may experience a green job shortage ranging from **10,000 to 22,000**. Addressing this could unlock an additional **US$2.6B to US$5.7B** in economic activity for the city, up to 3% of total city GDP.

Projected direct, green jobs by 2040. Key shortages refer to the Business as Usual scenario.

Green job demand and shortages

Over 60,000 green jobs are projected to be needed in Boston by 2040 across the Construction, Transport, and Waste sectors if the city's Climate Action Plan and the USA's NDC are delivered.

High labour shortages are projected across these three sectors, with **green jobs alone accounting for 43% of total shortages**. The persistence of these shortages, even with optimistic workforce development investment, shows that both training existing workers and supporting new workers to access these opportunities in order to meet demand.



Key occupational shortages

Boston's ambitious and inclusive city-led climate policies are set to fuel green economic growth and create high demand for a variety of green jobs, some of which are projected to face especially high shortages as demand increases. The city's focus on strengthening its renewable energy sources is expected to incentivise a shift towards solar energy, and a demand for cooling systems, in addition to plans to expand the commuter rail network, will drive significant demand for workers.

2k Grey Water Infrastructure	**780** Freight Rail Transport Operation	**190** Sewerage
1.3k Potable Water Infrastructure	**510** Railway Maintenance	**170** Water Collection, Treatment & Supply
1k Training (Construction)	**430** Station Operation	**160** Kerbside Collection

Cali, Colombia

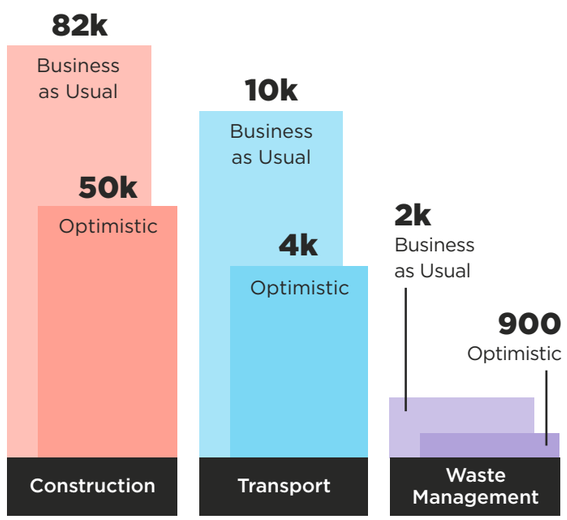
Projected green job shortages in Cali range from **94,000 to 163,000** by 2040. Addressing those shortages could generate from **US$1.3B to US$2.2B** in additional economic activity in the city, up to 3% of total city GDP.

Projected direct, green jobs by 2040. Key shortages refer to the Business as Usual scenario.

Green job demand and shortages

Over 380,000 green jobs are projected to exist in Cali by 2040 across the Construction, Transport, and Waste sectors if the city's Climate Action Plan and Colombia's NDC are delivered.

Yet high estimates of labour shortages across the three sectors are projected - **over 40% of all shortages in these sectors are projected to be green jobs**. The persistence of high shortages, even in the optimistic scenario where training investment increases, highlights the need to support new workers to access these opportunities to fill projected shortages.



Key occupational shortages

Cali is leveraging its ambitious and inclusive climate policies to fuel green economic growth. These policies will create a strong demand for key green jobs, which are projected to face high shortage rates. With one of the fastest growing economies in Colombia, the city's focus on lowering emissions via investment in the expansion of its public transportation system, as well as on enhancing its renewable energy sources, will generate substantial labour demand.

20k Installation of Solar Panels	**9k** Passenger Rail Operation	**2k** Waste Transportation
8k Potable Water Infrastructure	**6k** Station Operation	**1k** Kerbside Collection
7k Construction of Railways	**6k** Manufacture/ Maintenance of Buses	**700** Municipal Waste Site Operation

Cape Town, South Africa

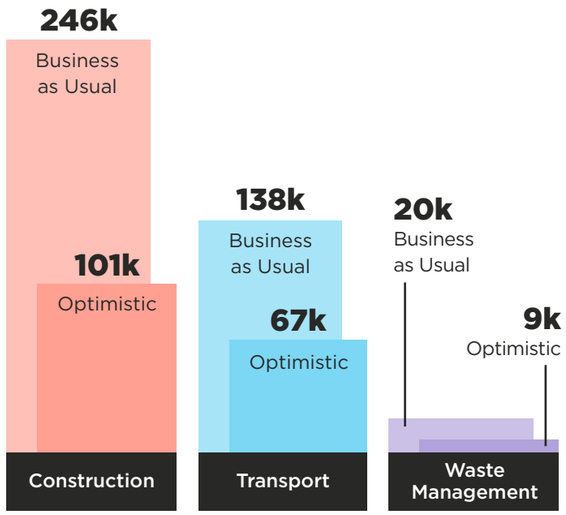
Cape Town is projected to experience **177,000 to 404,000** green job shortages by 2040. By addressing the shortages, Cape Town could see an additional **US$5B to US$11B** in economic activity, up to 7% of total city GDP.

Projected direct, green jobs by 2040. Key shortages refer to the Business as Usual scenario.

Green job demand and shortages

Over 658,000 green jobs are projected to exist in Cape Town by 2040 across the Construction, Transport, and Waste sectors if the city's Climate Action Plan and South Africa's NDC are delivered.

Yet high estimates of labour shortages across the three sectors are projected - **half of all shortages in these sectors are projected to be green jobs**. The role of workforce development as well as labour migration in addressing projected shortages is clear as shortages remain high even when workforce development investment increases in the optimistic scenario.



Key occupational shortages

Highlighting the role of local policies in driving green economic growth, Cape Town's ambitious and inclusive climate policies will generate demand for a variety of green jobs which are projected to have high shortage rates.

The city's focus on enhancing its public transportation and rail connectivity alongside investment in its water infrastructure for drainage and conservation, will drive significant demand for workers.

22k Potable Water Infrastructure	**13k** Station Operation	**2.7k** Kerbside Collection
19k Construction of Railways	**12k** Freight Rail Transport Operation	**2.4k** Municipal Waste Site Operation
15k Grey Water Infrastructure	**9k** Passenger Rail Operation	**1.2k** Waste Transportation

Chicago, USA

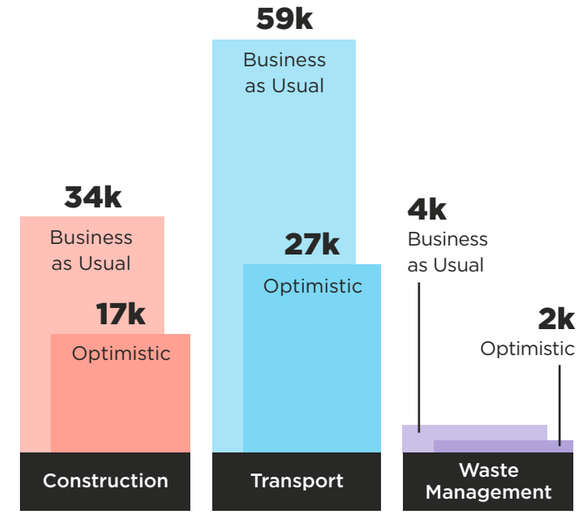
By 2040, Chicago may experience a green job shortage ranging from **47,000 to 97,000**. Addressing this could unlock an extra **US$14B to US$30B** in economic activity for the city, up to 5% of total city GDP.

Projected direct, green jobs by 2040. Key shortages refer to the Business as Usual scenario.

Green job demand and shortages

Approximately 250,000 green jobs are projected to exist in Chicago by 2040 across the Construction, Transport, and Waste sectors if the city's Climate Action Plan and the USA's NDC continue on their current trajectory.

Yet high estimates of labour shortages across the three sectors are projected - **over 40% of shortages in these sectors are projected to be green jobs**. The role of workforce development and labour migration in addressing projected shortages is clear, as shortages remain high even when workforce development investment increases in the optimistic scenario..



Key occupational shortages

Highlighting the role of local policies in driving green economic growth, Chicago's ambitious and inclusive climate policies will generate demand for a variety of green jobs that are projected to have high shortage rates. The city's focus on expanding its public transportation infrastructure, expanding the use of renewable energy, and improving water infrastructure will drive significant demand for workers. By equitably expanding job training opportunities now, Chicago is taking steps to ensure that more people will be equipped to fill these roles and thrive in a green economy.

8k Grey Water Infrastructure	**5k** Manufacture/ Maintenance of Trains	**600** Kerbside Collection
5k Potable Water Infrastructure	**4k** Manufacture/ Maintenance of Bicycles	**250** Waste Picking
2k Training (Construction)	**3.5k** Railway Maintenance	**240** Waste Transportation

Curitiba, Brazil

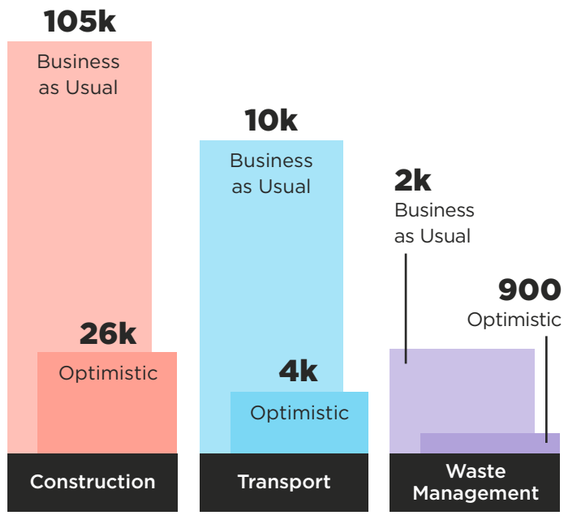
Curitiba is projected to experience **48,000 to 218,000** green job shortages by 2040. By addressing the shortages, Curitiba could see an additional **US$1.3B to US$5.7B** in economic activity, up to 7% of total city GDP.

Projected direct, green jobs by 2040. Key shortages refer to the Business as Usual scenario.

Green job demand and shortages

Over 398,000 green jobs are projected to be needed in Curitiba by 2040 across the Construction, Transport, and Waste sectors if the city's Climate Action Plan and Brazil's NDC are delivered.

Yet high estimates of labour shortages across the three sectors are projected - **48% of all shortages in these sectors are projected to be green jobs**. The role of workforce development as well as labour migration in addressing projected shortages is clear as shortages remain high even when workforce development investment increases in the optimistic scenario.



Key occupational shortages

Highlighting the role of local policies in driving green economic growth, Curitiba's ambitious and inclusive climate policies will generate demand for a variety of green jobs which are projected to have high shortage rates.

The city's strong bus network, and the country's drive to improve its rail networks, as well as the city's focus on sustainable urban drainage and increased sanitation, will drive significant demand for workers.

5k Construction of Railways

4k Passenger Rail Operation

3.5k Waste Picking

4k Potable Water Infrastructure

3k Bus Operation

580 Kerbside Collection

4k Installation of Heat Pumps

2k Station Operation

470 Municipal Waste Site Operation

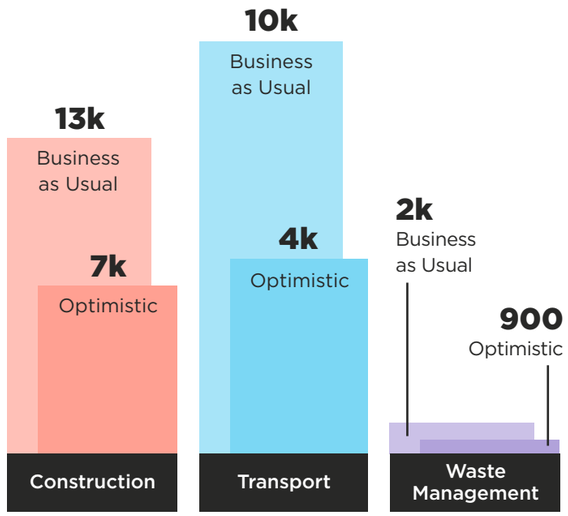
Denver, USA

Denver is projected to experience **15,000 to 31,000** green job shortages by 2040. By addressing the shortages, Denver could see an additional **US$4B to US$7.5B** in economic activity, up to 2% of total city GDP.

Projected direct, green jobs by 2040. Key shortages refer to the Business as Usual scenario.

Green job demand and shortages

Over 82,000 green jobs are projected to be needed in Denver by 2040 across the Construction, Transport, and Waste sectors if the city's Climate Action Plan and the USA's NDC are delivered. Yet high estimates of labour shortages across the three sectors are projected - **more than one-third (36%) of all shortages in these sectors are projected to be green jobs**. The role of workforce development as well as labour migration in addressing projected shortages is clear as shortages remain high even with the increased workforce development investment in the optimistic scenario.



Key occupational shortages

Denver's ambitious and inclusive climate policies are driving demand for a variety of green jobs, creating a varied landscape of workforce needs.

This report does not reflect the workforce development goals, programs, and initiatives of the City and County of Denver.

3k Potable Water Infrastructure

1.3k Manufacture/ Maintenance of Trains

175 Sewerage

2.5k Grey Water Infrastructure

1.2k Training (Transport)

170 Water Collection, Treatment & Supply

530 Training (Construction)

1.2k Freight Rail Transport Operation

90 Kerbside Collection

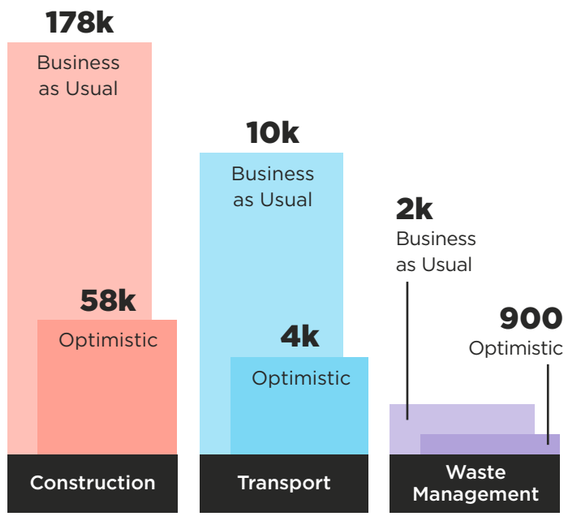
Durban, South Africa

By 2040, Durban may experience a green job shortage ranging from **108,000 to 331,000**. Addressing this could unlock an extra **US$3B to US$9B** in economic activity for the city, up to 6% of total city GDP.

Projected direct, green jobs by 2040. Key shortages refer to the Business as Usual scenario.

Green job demand and shortages

Over 560,000 green jobs are projected to be needed in Durban by 2040 across the Construction, Transport, and Waste sectors if the city's Climate Action Plan and South Africa's NDC are delivered. High labour shortages are projected across these three sectors, **with green jobs alone accounting for over half (55%) of total shortages**. The persistence of these shortages, even with the increased workforce development investment in the optimistic scenario, shows that both training existing workers and supporting new workers to access these opportunities will be necessary to meet demand.



Key occupational shortages

Durban's ambitious and inclusive city-led climate policies are set to fuel green economic growth and create high demand for a variety of green jobs, some of which are projected to face especially high shortages as demand increases.

The city's focus on strengthening and expanding its public transport network, as well as improving its water infrastructure, to both improve sustainability and reduce emissions, will drive significant demand for workers.

- **18k** Grey Water Infrastructure
- **7k** Station Operation
- **4k** Kerbside Collection
- **8k** Installation of Solar Panels
- **6k** Freight Rail Transport Operation
- **1.4k** Waste Transportation
- **8k** Construction of Railways
- **6k** Manufacture/ Maintenance of Trains
- **1.2k** Waste Picking

Ekurhuleni, South Africa

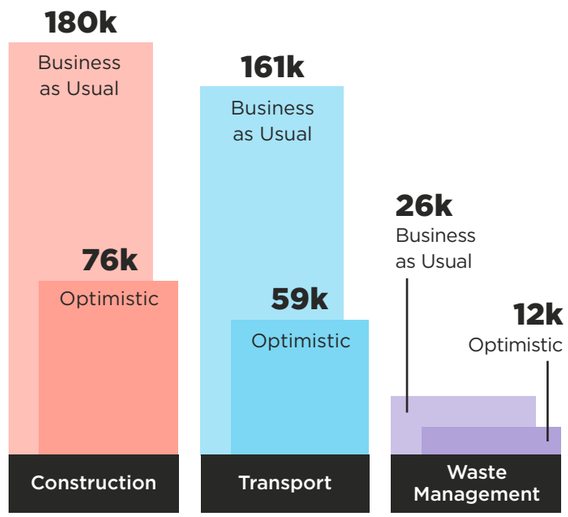
Ekurhuleni is projected to experience **146,000 to 367,000** green job shortages by 2040. By addressing the shortages, Ekurhuleni could see an additional **US$4B to US$10B** in economic activity, up to 7% of total city GDP.

Projected direct, green jobs by 2040. Key shortages refer to the Business as Usual scenario.

Green job demand and shortages

Over 589,000 green jobs are projected to be needed in Ekurhuleni by 2040 across the Construction, Transport, and Waste sectors if the city's Climate Action Plan and South Africa's NDC are delivered.

Yet high estimates of labour shortages across the three sectors are projected - **49% of all shortages in these sectors are projected to be green jobs**. The role of workforce development as well as labour migration in addressing projected shortages is clear as shortages remain high even when workforce development investment increases in the optimistic scenario.



Key occupational shortages

Highlighting the role of local policies in driving green economic growth, Ekurhuleni's ambitious and inclusive climate policies will generate demand for a variety of green jobs which are projected to have high shortage rates.

The city's efforts to improve water security, reduce heat stress via ventilation, and to enhance its large, existing rail network - as a regional rail hub - are expected to spur a high demand for talent.

- **18k** Grey Water Infrastructure
- **9k** Freight Rail Transport Operation
- **4k** Kerbside Collection
- **13k** Installation of Heat Pumps
- **8.5k** Manufacture/ Maintenance of Equipment
- **3k** Waste Picking
- **12k** Potable Water Infrastructure
- **8k** Railway Maintenance
- **2k** Waste Transportation

Fortaleza, Brazil

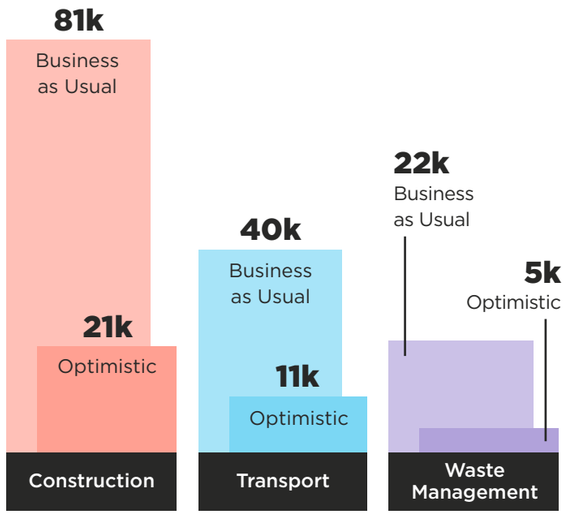
Projected green job shortages in Fortaleza range from **37,000 to 143,000** by 2040. Addressing those shortages could generate from **US$970M to US$3.8B** in additional economic activity in the city, up to 6% of total city GDP

Projected direct, green jobs by 2040. Key shortages refer to the Business as Usual scenario.

Green job demand and shortages

Approximately 267,000 green jobs are projected to exist in Fortaleza by 2040 across the Construction, Transport, and Waste sectors if the city's Climate Action Plan and Brazil's NDC are delivered.

Yet high estimates of labour shortages across the three sectors are projected - **nearly half of all shortages in these sectors are projected to be green jobs**. The persistence of high shortages, even in the optimistic scenario where training investment increases, highlights the need to support new workers to access these opportunities to fill projected shortages.



Key occupational shortages

Fortaleza is leveraging its ambitious and inclusive climate policies to fuel green economic growth. These policies will create a strong demand for key green jobs, which are projected to face high shortage rates.

The city's focus on building resilience against droughts via investment in water infrastructure, alongside a focus on increasing electromobility in public transport, will drive significant demand for workers.

4k Grey Water Infrastructure

1.5k Manufacture/ Maintenance of Buses

3.5k Waste Picking

3.8k Installation of Air Conditioning /Heat Pumps

1.4k Passenger Rail Operation

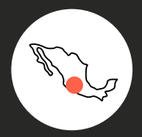
390 Kerbside Collection

3.7k Potable Water Infrastructure

1.3k Bus Operation

350 Municipal Waste Site Operation

Guadalajara, Mexico

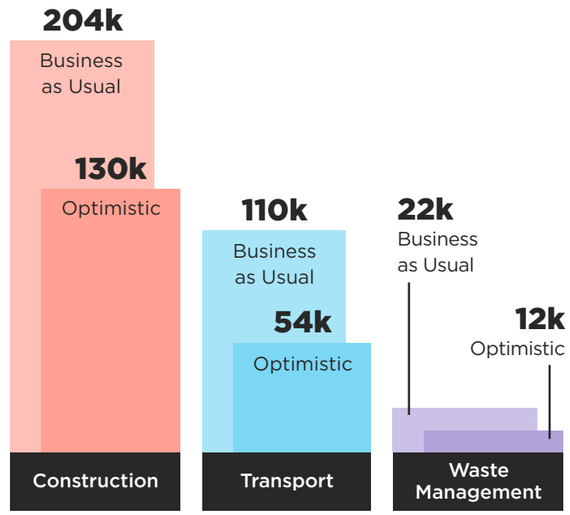


Guadalajara is projected to experience **196,000 to 335,000** green job shortages by 2040. By addressing the shortages, Guadalajara could see an additional **US$13B to US$22B** in economic activity, up to 10% of total city GDP.

Projected direct, green jobs by 2040. Key shortages refer to the Business as Usual scenario.

Green job demand and shortages

Over 780,000 green jobs are projected to exist in Guadalajara by 2040 across the Construction, Transport, and Waste sectors if the city's Climate Action Plan and Mexico's NDC are delivered. High labour shortages are projected across these three sectors, with **green jobs alone accounting for one third of total shortages.** The persistence of these shortages, even with optimistic workforce development investment, shows that both training existing workers and supporting new workers to access these opportunities will be necessary in order to meet demand.



Key occupational shortages

Guadalajara's ambitious and inclusive city-led climate policies are set to fuel green economic growth and create high demand for a variety of green jobs, some of which are projected to face especially high shortages as demand increases.

The city's focus on its strong public transportation network, with buses and new rail projects, as well as on improving its water infrastructure and recycling efforts, will drive significant demand for workers.

60k Construction of Railways

16k Station Operation

4k Waste Picking

24k Solar Farms

11k Bus Operation

3k Municipal Waste Site Operation

12k Grey Water Infrastructure

11k Freight Rail Transport Operation

2.5k Waste Transportation

Johannesburg,
South Africa

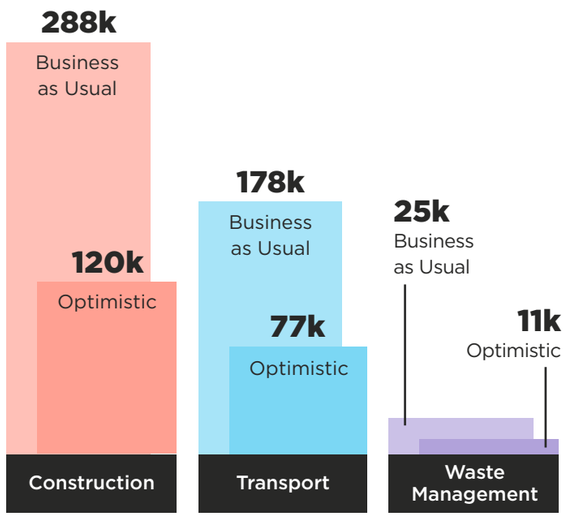
By 2040, Johannesburg may experience a green job shortage ranging from **209,000 to 491,000**. Addressing this could unlock an extra **US$6B to US$14B** in economic activity for the city, up to 5% of total city GDP.

Projected direct, green jobs by 2040. Key shortages refer to the Business as Usual scenario.

Green job demand and shortages

Over 780,000 green jobs are projected to exist in Johannesburg by 2040 across the Construction, Transport, and Waste sectors if the city's Climate Action Plan and South Africa's NDC are delivered.

High labour shortages are projected across these three sectors, with **green jobs alone accounting for half of total shortages**. The persistence of these shortages, even with optimistic workforce development investment, shows that both training existing workers and supporting new workers to access these opportunities will be necessary to meet demand.



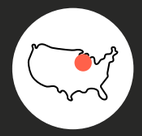
Key occupational shortages

Johannesburg's ambitious and inclusive city-led climate policies are set to fuel green economic growth and create high demand for a variety of green jobs, some of which are projected to face especially high shortages as demand increases.

The city's focus on expanding its rail network, as well as increasing the use of renewables to power the city, and strengthening its recycling efforts, will drive significant demand for workers.

- **22k** Construction of Railways
- **22k** Freight Rail Transport Operation
- **3k** Waste Transportation
- **21k** Installation of Solar Panels
- **9k** Manufacture/ Maintenance of Equipment
- **2.7k** Municipal Waste Site Operation
- **21k** Grey Water Infrastructure
- **8.5k** Bus Operation
- **2.7k** Kerbside Collection

Madison,
USA



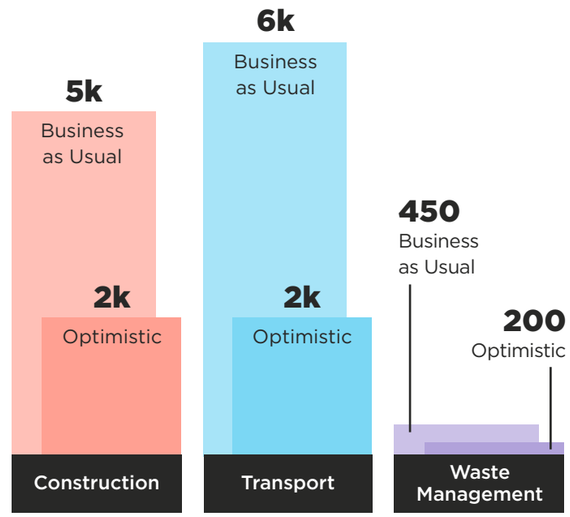
Madison is projected to experience from **4,000 to 11,000** green job shortages by 2040. By addressing the shortages, Madison could see an additional **US$1B to US$2.7B** in economic activity, up to 3% of total city GDP.

Projected direct, green jobs by 2040. Key shortages refer to the Business as Usual scenario.

Green job demand and shortages

Over 30,000 green jobs are projected to exist in Madison by 2040 across the Construction, Transport, and Waste sectors if the city's Climate Action Plan and the US' NDC are delivered.

Yet high estimates of labour shortages across the three sectors are projected - **one quarter all shortages in these sectors are projected to be green jobs**. The role of workforce development as well as labour migration in addressing projected shortages is clear as shortages remain high even when workforce development investment increases in the optimistic scenario.



Key occupational shortages

Highlighting the role of local policies in driving green economic growth, Madison's ambitious and inclusive climate policies will generate demand for a variety of green jobs which are projected to have high shortage rates.

The city's focus on lowering emissions via investment in public transportation and future rail projects, as well as on increasing its use of renewable energy will drive significant demand for workers.

- **610** Grey Water Infrastructure
- **410** Freight Rail Transport Operation
- **90** Sewerage
- **530** Education (Construction)
- **370** Railway Maintenance
- **70** Water Collection, Treatment & Supply
- **460** Potable Water Infrastructure
- **280** Training (Transport)
- **15** Municipal Waste Site Operation

Medellín, Colombia

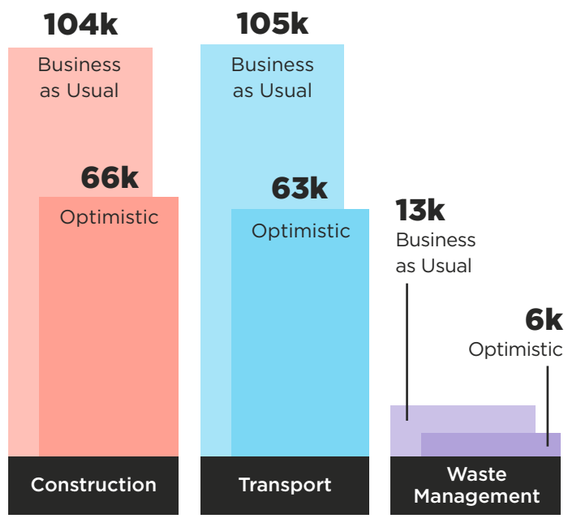
By 2040, Medellín may experience a green job shortage ranging from **136,000 to 222,000**. Addressing this could unlock an extra **US$1.8B to US$3B** in economic activity for the city, up to 2% of total city GDP.

Projected direct, green jobs by 2040. Key shortages refer to the Business as Usual scenario.

Green job demand and shortages

Over half a million green jobs are projected to be needed in Medellín by 2040 across the Construction, Transport, and Waste sectors if the city's Climate Action Plan and Colombia's NDC are delivered.

High labour shortages are projected across these three sectors, with **green jobs alone accounting for over half of total shortages**. The persistence of these shortages, even with optimistic workforce development investment, shows that both training existing workers and supporting new workers to access these opportunities will be necessary to meet demand.



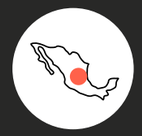
Key occupational shortages

Medellín's ambitious and inclusive city-led climate policies are set to fuel green economic growth and create high demand for a variety of green jobs, some of which are projected to face especially high shortages as demand increases.

The city's focus on reducing emissions by enhancing its existing solar energy sources, alongside expanding its public transport network, with bus and rail, will drive significant demand for workers.

19k Installation of Solar Panels	**16k** Railway Maintenance	**2k** Municipal Waste Site Operation
18k Construction of Railways	**11k** Station Operation	**1.5k** Kerbside Collection
10k Grey Water Infrastructure	**10k** Passenger Rail Operation	**1.2k** Waste Transportation

Mexico City, Mexico



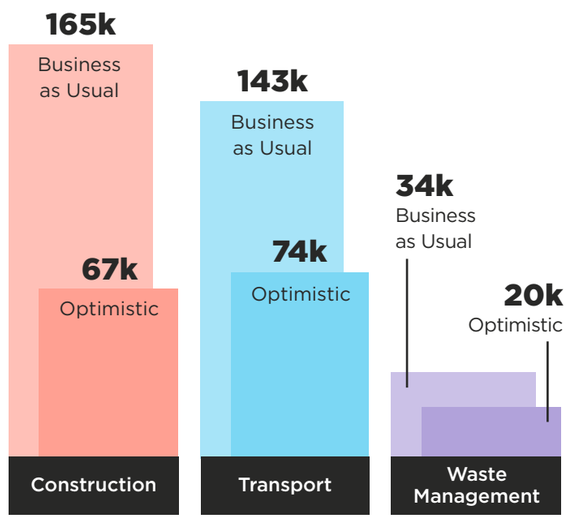
Projected green job shortages in Mexico City range from **162,000 to 342,000** by 2040. Addressing those shortages could generate from **US$12B to US$24B** in additional economic activity in the city, up to 6% of total city GDP.

Projected direct, green jobs by 2040. Key shortages refer to the Business as Usual scenario.

Green job demand and shortages

Over 920,000 green jobs are projected to exist in Mexico City by 2040 across the Construction, Transport, and Waste sectors if the city's Climate Action Plan and Mexico's NDC are delivered.

Yet high estimates of labour shortages across the three sectors are projected - **34% of all shortages in these sectors are projected to be green jobs**. The persistence of high shortages, even in the optimistic scenario where training investment increases, highlights the need to support new workers so they can access these opportunities to fill projected shortages.



Key occupational shortages

Mexico City is leveraging its ambitious and inclusive climate policies to fuel green economic growth. These policies will create a strong demand for key green jobs, which are projected to face high shortage rates.

The city's focus on building resilience and increasing sustainability through the modernisation of its water infrastructure as well as the expansion of its public transport system will drive significant demand for workers.

28k Grey Water Infrastructure	**16k** Passenger Rail Operation	**10k** Waste Picking
14k Education (Construction)	**15k** Railway Maintenance	**3k** Kerbside Collection
12k Solar Farms	**8k** Manufacture/ Maintenance of Other Equipment	**2k** Waste Transportation

Milan,
Italy

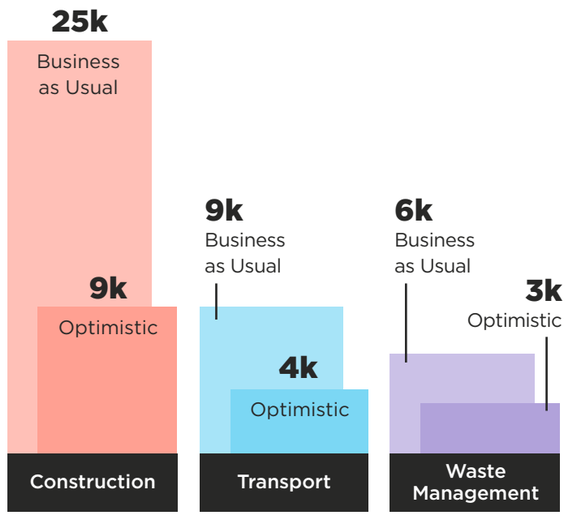
Projected green job shortages in the Metropolitan Area of Milan range from **16,000 to 40,000** by 2040. Addressing those shortages could generate **US$4B to US$9B** in additional economic activity in the city, up to 5% of total city GDP.

Projected direct, green jobs by 2040. Key shortages refer to the Business as Usual scenario.

Green job demand and shortages

Over 130,000 green jobs are projected to exist in the Metropolitan Area of Milan by 2040 across the Construction, Transport, and Waste sectors if the city's Climate Action Plan and Italy's NDC are delivered.

High estimates of labour shortages across the three sectors are projected - **one third of all shortages in these sectors are projected to be green jobs**. The role of workforce development as well as labour migration in addressing projected shortages is clear as shortages remain high even when workforce development investment increases in the optimistic scenario.



Key occupational shortages

Highlighting the role of local policies in driving green economic growth, Milan's ambitious and inclusive climate policies, sustained by increased private sector investments and strong public-private partnerships, will generate demand for a variety of green jobs which already show a lack of workers and are projected to have higher shortage rates. The city's focus on enhancing its public transportation, with investment in its bus, metro, and tram infrastructure, alongside investment in its circular economy initiatives and infrastructure, will drive significant demand for workers.

Estimates were not developed by the Municipality of Milan or its in-house and partner companies, nor were produced from official data provided by them.

- **3k** Grey Water Infrastructure
- **1k** Passenger Rail Operation
- **1.3k** Kerbside Collection
- **2k** Potable Water Infrastructure
- **700** Manufacture/ Maintenance of Bicycles
- **1k** Municipal Waste Site Operation
- **1k** Solar Farms
- **600** Bus Operation
- **330** Municipal Transportation

Nairobi,
Kenya

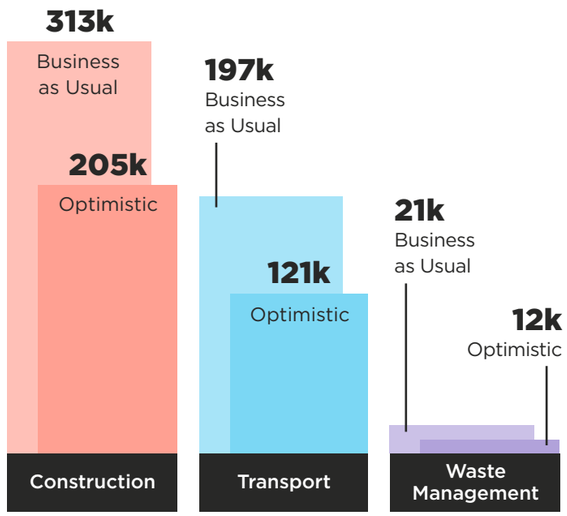
By 2040, Nairobi may experience a green job shortage ranging from **339,000 to 531,000**. Addressing this could unlock an extra **US$9B to US$14B** in economic activity for the city, up to 7% of total city GDP.

Projected direct, green jobs by 2040. Key shortages refer to the Business as Usual scenario.

Green job demand and shortages

Over 1 million green jobs are projected to exist in Nairobi by 2040 across the Construction, Transport, and Waste sectors if the city's Climate Action Plan and Kenya's NDC are delivered.

Yet high estimates of labour shortages across the three sectors are projected - **over 40% of all shortages in these sectors are projected to be green jobs**. The persistence of high shortages, even in the optimistic scenario where training investment increases, highlights the need to support new workers to access these opportunities to fill projected shortages.

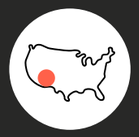


Key occupational shortages

Nairobi is leveraging its ambitious and inclusive climate policies to fuel green economic growth. These policies will create a strong demand for key green jobs, which are projected to face high shortage rates. The city's initiatives, including investments in public bus and rail transportation, improved water management in the face of recent floods, and a strengthened waste sector, will be the primary drivers of this increased need for a skilled workforce.

- **76k** Construction of Railways
- **36k** Railway Maintenance
- **4k** Waste Picking
- **31k** Potable Water Infrastructure
- **16k** Manufacture/ Maintenance of Buses
- **2k** Municipal Waste Site Operation
- **27k** Wind
- **15k** Passenger Rail Operation
- **1.5k** Waste Transportation

Phoenix,
USA



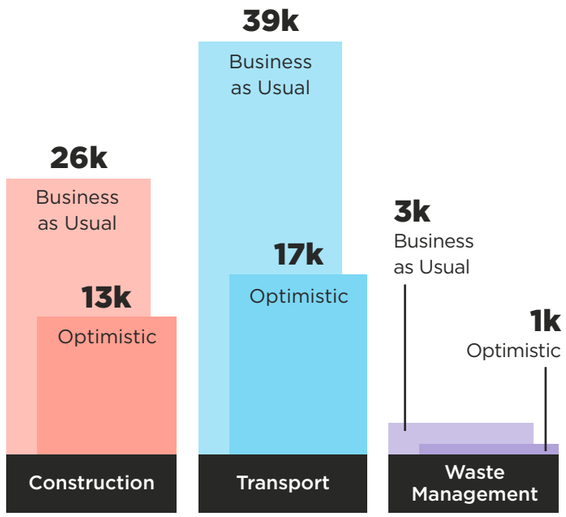
Projected green job shortages in Phoenix range from **31,000 to 68,000** by 2040. Addressing those shortages could generate **US$7B to US$16B** in additional economic activity in the city, up to 6% of total city GDP.

Projected direct, green jobs by 2040. Key shortages refer to the Business as Usual scenario.

Green job demand and shortages

Over 180,000 green jobs are projected to be in demand in Phoenix by 2040 across the Construction, Transport, and Waste sectors if the city's Climate Action Plan and the US' NDC are delivered.

Yet high estimates of labour shortages across the three sectors are projected - **over 40% of all shortages in these sectors are projected to be green jobs**. The persistence of high shortages, even in the optimistic scenario where training investment increases, highlights the need to support new workers to access these opportunities to fill projected shortages.



Key occupational shortages

Phoenix is leveraging its ambitious and inclusive climate policies to fuel green economic growth. These policies will create a strong demand for key green jobs, which are projected to face high shortage rates.

The city's initiatives, including investments in public and freight transportation as well as improved water management in the face of continuing drought will be the primary drivers of this increased need for a skilled workforce.

- **3.5k** Education (Construction)
- **4.3k** Passenger Rail Operation
- **360** Kerbside Collection
- **3.3k** Grey Water Infrastructure
- **3.8k** Railway Maintenance
- **230** Water Collection, Treatment & Supply
- **2.4k** Training (Construction)
- **2.4k** Freight Rail Transport Operation
- **180** Waste Transportation

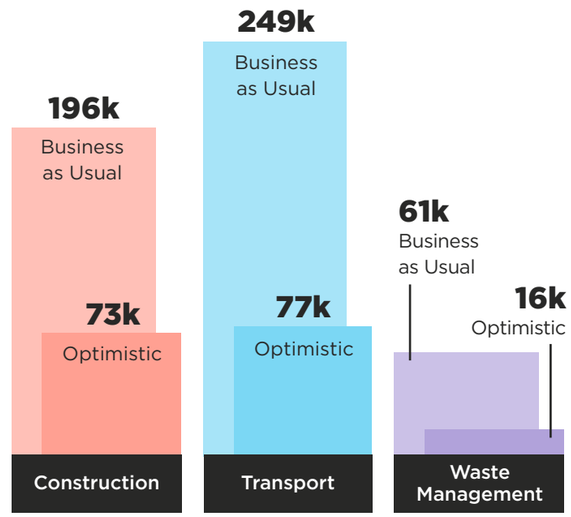
Rio de Janeiro,
Brazil

By 2040, Rio may experience a green job shortage ranging from **165,000 to 506,000**. Addressing this could unlock an extra **US$4B to US$12B** in economic activity for the city, up to 6% of total city GDP.

Projected direct, green jobs by 2040. Key shortages refer to the Business as Usual scenario.

Green job demand and shortages

Over 840,000 green jobs are projected to be needed in Rio by 2040 across the Construction, Transport, and Waste sectors if the city's Climate Action Plan and Brazil's NDC are delivered. High labour shortages are projected across these three sectors, with **green jobs alone accounting for nearly half of total shortages**. The persistence of these shortages, even with optimistic workforce development investment, shows that both training existing workers and supporting new workers so they can access these opportunities will be necessary to meet demand.



Key occupational shortages

Rio's ambitious and inclusive city-led climate policies are set to fuel green economic growth and create high demand for a variety of green jobs, some of which are projected to face especially high shortages as demand increases.

The city's focus on its strong public transportation network, with bus and rail, as well as on improving energy efficiency through electrification and strengthening its recycling efforts, will drive significant demand for workers.

- **12k** Potable Water Infrastructure
- **17k** Bus Operation
- **4k** Waste Picking
- **12k** Grey Water Infrastructure
- **16k** Manufacture/ Maintenance of Buses
- **3.4k** Municipal Waste Site Operation
- **11k** Installation of EV Charge Points
- **12k** Manufacture/ Maintenance of Equipment
- **2.7k** Kerbside Collection

Rome, Italy

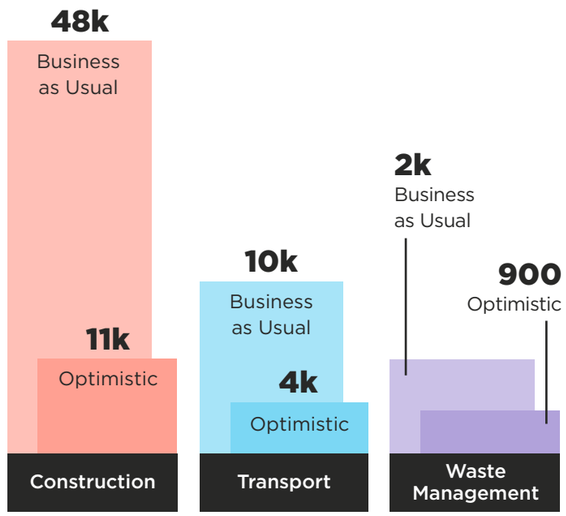
Rome is projected to experience **22,000 to 80,000** green job shortages by 2040. By addressing the shortages, Rome could see an additional **US$5B to US$19B** in economic activity, up to 6% of total city GDP.

Projected direct, green jobs by 2040. Key shortages refer to the Business as Usual scenario.

Green job demand and shortages

Over 220,000 green jobs are projected to be needed in Rome by 2040 across the Construction, Transport, and Waste sectors if the city's Climate Action Plan and Italy's NDC are delivered.

Yet high estimates of labour shortages across the three sectors are projected - **27% of all shortages in these sectors are projected to be green jobs**. The role of workforce development as well as labour migration in addressing projected shortages is clear as shortages remain high even when workforce development investment increases in the optimistic scenario.



Key occupational shortages

Highlighting the role of local policies in driving green economic growth, Rome's ambitious and inclusive climate policies will generate demand for a variety of green jobs which are projected to have high shortage rates.

The city's focus on expanding its bus infrastructure and broader sustainable mobility, alongside upgrades to its solar and water infrastructure, will generate substantial labour demand.

- **2k** Solar Farms
- **2k** Bus Operation
- **1.3k** Kerbside Collection
- **1.6k** Installation of Solar Panels
- **1k** Manufacture/ Maintenance of Buses
- **1.2k** Municipal Waste Site Operation
- **1.5k** Grey Water Infrastructure
- **1k** Manufacture/ Maintenance of Bicycles
- **1k** Waste Transportation

Salvador, Brazil

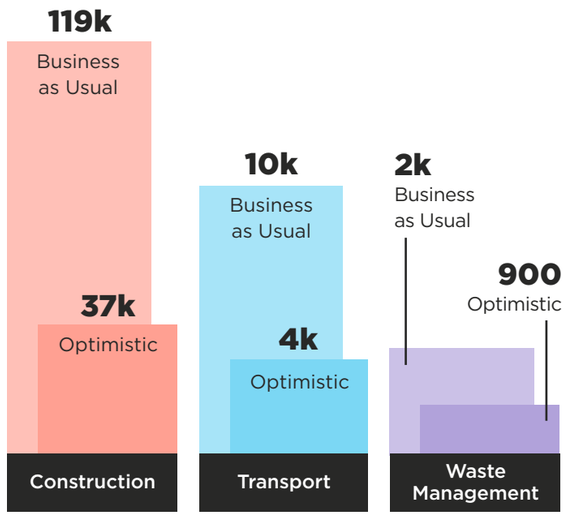
By 2040, Salvador may experience a green job shortage ranging from **79,000 to 227,000**. Addressing this could unlock an extra **US$2B to US$6B** in economic activity for the city, up to 12% of total city GDP.

Projected direct, green jobs by 2040. Key shortages refer to the Business as Usual scenario.

Green job demand and shortages

Over 390,000 green jobs are projected to be needed in Salvador by 2040 across the Construction, Transport, and Waste sectors if the city's Climate Action Plan and Brazil's NDC are delivered.

High labour shortages are projected across these three sectors, with **green jobs alone accounting for nearly half of total shortages**. The persistence of these shortages, even with optimistic workforce development investment, shows that both training existing workers and supporting new workers to access these opportunities will be necessary to meet demand.



Key occupational shortages

Salvador's ambitious and inclusive city-led climate policies are set to fuel green economic growth and create high demand for a variety of green jobs, some of which are projected to face especially high shortages as demand increases.

The city's efforts to drive increased electrification in transport via EV chargers and solar energy, as well as cooling and ventilation due to the city's warm climate, alongside the expansion of its bus fleet, will spur high demand for talent.

- **7k** Grey Water Infrastructure
- **12k** Bus Operation
- **8k** Waste Picking
- **6.8k** Potable Water Infrastructure
- **5k** Manufacture/ Maintenance of Buses
- **2k** Municipal Waste Site Operation
- **5k** Installation of Solar Panels
- **2k** Passenger Rail Operation
- **1.5k** Kerbside Collection

São Paulo,
Brazil

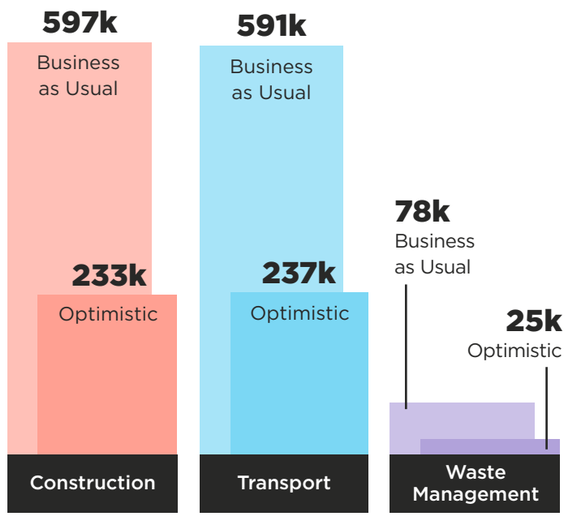
Projected green job shortages in São Paulo range from **495,000 to 1.3 million** by 2040. Addressing those shortages could generate **US$13B to US$33B** in additional economic activity in the city, up to 5% of total city GDP.

Projected direct, green jobs by 2040. Key shortages refer to the Business as Usual scenario.

Green job demand and shortages

2 million green jobs are projected to exist in São Paulo by 2040 across the Construction, Transport, and Waste sectors if the city's Climate Action Plan and Brazil's NDC are delivered.

Yet high estimates of labour shortages across the three sectors are projected - **nearly half of all shortages in these sectors are projected to be green jobs**. The persistence of high shortages, even in the optimistic scenario where training investment increases, highlights the need to support new workers so they can access these opportunities to fill projected shortages.



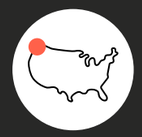
Key occupational shortages

São Paulo is leveraging its ambitious and inclusive climate policies to fuel green economic growth. These policies will create a strong demand for key green jobs, which are projected to face high shortage rates.

The city's initiatives, including investments in public transportation, improved water quality, and a strengthened circular economy, will be the primary drivers of this increased need for a skilled workforce.

52k Construction of Railways	**52k** Bus Operation	**11k** Waste Picking
38k Potable Water Infrastructure	**42k** Manufacture/ Maintenance of Buses	**4k** Municipal Waste Site Operation
30k Installation of EV Charge Points	**32k** Freight Rail Transport Operation	**2.6k** Kerbside Collection

Seattle,
USA



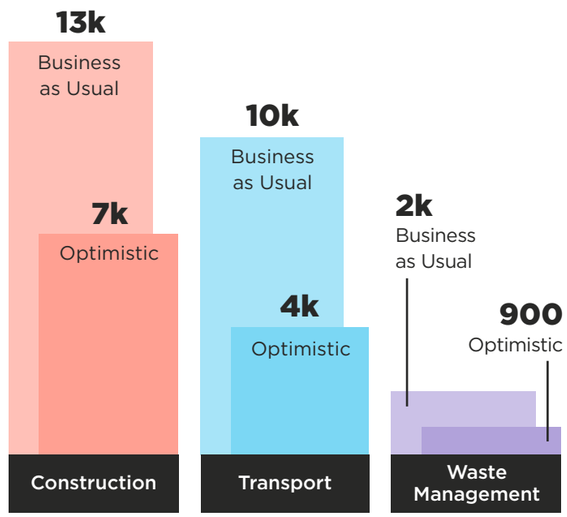
Projected green job shortages in Seattle range from **12,000 to 26,000** by 2040. Addressing those shortages could generate from **US$3B to US$7B** in additional economic activity in the city, up to 3% of total city GDP.

Projected direct, green jobs by 2040. Key shortages refer to the Business as Usual scenario.

Green job demand and shortages

Over 71,000 green jobs are projected to exist in Seattle by 2040 across the Construction, Transport, and Waste sectors if the city's Climate Action Plan and the USA's NDC are delivered.

Yet high estimates of labour shortages across the three sectors are projected - **32% of all shortages in these sectors are projected to be green jobs**. The persistence of high shortages, even in the optimistic scenario where training investment increases, highlights the need to support new workers to access these opportunities to fill projected shortages.

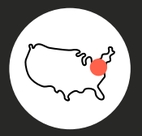


Key occupational shortages

Seattle is leveraging its ambitious and inclusive climate policies to fuel green economic growth. These policies will create a strong demand for key green jobs, which are projected to face high shortage rates. The city's recent investments into water resilience and sustainability, including on wastewater treatment, and planned rail expansions in the region and city given the city's role as a regional transit hub, will drive significant demand for workers.

2.3k Education (Construction)	**1k** Freight Rail Transport Operation	**300** Kerbside Collection
1.7k Potable Water Infrastructure	**770** Passenger Maritime Transport	**180** Sewerage
1.2k Grey Water Infrastructure	**675** Training (Transport)	**100** Municipal Waste Site Operation

Washington DC,
USA

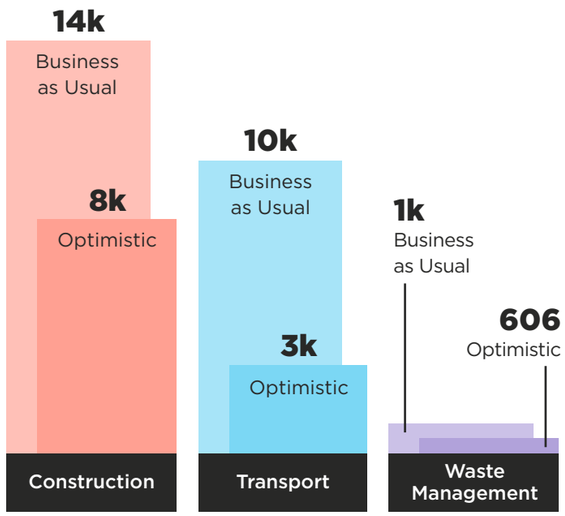


Washington DC is projected to experience from **12,000 to 25,000** green job shortages by 2040. By addressing the shortages, DC could see an additional **US$3B to US$7B** in economic activity, up to 5% of total city GDP.

Projected direct, green jobs by 2040. Key shortages refer to the Business as Usual scenario.

Green job demand and shortages

Nearly 70,000 green jobs will exist in Washington DC by 2040 across the Construction, Transport, and Waste sectors if the city's Climate Action Plan and the USA's NDC are delivered. Yet high estimates of labour shortages across the three sectors are projected - **nearly one third of all shortages in these sectors are projected to be green jobs**. The role of workforce development as well as labour migration in addressing projected shortages is clear as shortages remain high even when workforce development investment increases in the optimistic scenario.



Key occupational shortages

Highlighting the role of local policies in driving green economic growth, Washington DC's ambitious and inclusive climate policies will generate demand for a variety of green jobs which are projected to have high shortage rates.

The city's focus on enhancing its position as a leader in public transportation, with investment in its rail and bus infrastructure, alongside investment in its water infrastructure, will drive significant demand for workers.

2k Grey Water Infrastructure

650 Passenger Rail Operation

180 Kerbside Collection

1.6k Training (Construction)

570 Station Operation

140 Sewerage

1.5k Potable Water Infrastructure

555 Training (Transport)

80 Water Collection, Treatment & Supply

Credit: Ray Raimiundi

4. Recommendations

Credit: Natalia Gormalova

Building on both the global and city-level findings in this report, this section identifies five priority areas for scaled-up action to harness the job-creation potential of climate investments, prepare a green and diverse workforce, and harness the economic contribution of migrants and migration in the context of a just transition. As the research demonstrates, meeting this challenge is essential to maximising the opportunities presented by locally-led and inclusive solutions on climate and migration, delivering better economic and social outcomes for all.

It is important to recognise that while mayors and cities continue to highlight the need for integrated and inclusive responses, many of the required policy and finance levers lay elsewhere. Ensuring a cohesive approach between mayors and national governments, international finance processes, international organisations, the private sector and donor community will therefore be critical in creating good, green jobs within urban centres. To this end, the recommendations outlined in this report outline how national and international partners can support an acceleration of progress at the city level, through multilevel governance and collaboration.

In view of this, preconditions for successful policy action will include:

- **Consulting, partnering with, and supporting mayors** on the development of integrated policy solutions, across the climate, workforce development, and migration spheres.
- **Increasing climate and development finance**, which is needed to mitigate and adapt to climate change, and ensuring that resources are directly accessible by cities and local communities.
- **Investing in localised and disaggregated data** that focuses both on the opportunities of inclusive climate action and on the unintended consequences of inaction.

In the context of a green and just transition, it is also important that multi-level responses do not overlook global injustices and the deeper inequalities that underpin these trends, at all scales of governance. In particular:

- Efforts to economically include migrant workers must go hand in hand with measures to protect and support the existing local workforce – especially those frontline workers who are more likely to be affected by the green transition.
- Solutions to leverage labour migration must not perpetuate dependencies, by eroding the human capital of Global South countries' and fuelling brain drain.

With this in mind, and based on both quantitative evidence and in-depth consultations with cities involved in the research, the following recommendations are designed to ensure that responses effectively address the projected gaps, while ensuring the transition is just and equitable, and it harnesses the economic contribution of migration.

Getting it right in cities and urban areas, successfully replicating and taking to scale existing city-led solutions, has significant potential to benefit people, the economy and the planet.

1. Invest in city-led climate action that creates good, green jobs in cities of origin, transit, and destination.

National governments
Inter-governmental organisations
MDBs
Private philanthropies

Invest in city-led climate action that creates good, green jobs in cities of origin, transit, and destination. As the research shows, climate action is a major driver of job creation and increased resilience in cities, with over 4 out of 10 jobs projected to be green by 2040 in the cities studied. Cities are major economic and employment hubs, and, by investing in city-led climate action, national and international actors can ensure that the employment-creation potential of climate intervention is amplified, delivering maximum return on investment and development goals for all.

National and international actors should deliver against their localisation commitments, specifically:

- **Ensuring that climate finance supports good, green job creation in cities and is directly accessible to local governments**, thereby facilitating decent livelihood opportunities for all, including people on the move[15], climate finance flows to cities (US$831 billion between 2017-2022) fall far short of the estimated $6 trillion needed by 2050[16].

- **Investing in instruments that go directly to cities, such as the Mayors Migration Council's Global Cities Fund for Migrants and Refugees and C40's Inclusive Climate Action Fund**, to support innovative solutions, demonstrate proof of concept, and build the case for fiscal feasibility. Evidence from these funds confirms that migrant workers are already contributing to employment sectors that are key for urban green transitions, as this research highlights. These sectors include transportation, construction and waste management, nature-based solutions and food systems, among others.

- **Accelerating the localisation of development and humanitarian funding, with a focus on good, green job creation.** This is proving instrumental both in accommodating rural–urban mobility and in tackling economic drivers of migration. In 2023, Grand Bargain signatories only provided 4.4% of their direct and indirect funding to Local and National Actors, with a mere 0.6% delivered directly - against a commitment of 25% made in 2016[17].

Cities Leading in Action

Case study: Freetown, Sierra Leone

Freetown leveraged international funding to promote good, green jobs and green entrepreneurship opportunities for rural migrants and vulnerable young people in waste management. Through the Waste Management Micro-Enterprise Programme, the city established 40 micro-enterprises employing 240 young people to collect waste from households and public spaces. The programme increased citywide waste collection rates to 34%, closed three illegal dumpsites, created a waste collectors' union, and registered over 2,600 households for collection services.

Using this success as proof of concept, Freetown unlocked an additional US$1.5 million, highlighting how investing in climate action can create sustainable employment opportunities for migrant populations.

Case study: Amman, Jordan

Amman used funding from the German Federal Ministry for Economic Cooperation and Development to promote green infrastructure rehabilitation through cash-for-work programmes, contributing to biodiversity conservation and climate adaptation while creating recreational spaces that enhance social cohesion. Over 5,000 workers were engaged in the programme, half of which were vulnerable Jordanians, while the other half were Syrian refugees. By centering inclusion in its climate action, Amman provided its residents, whether displaced or local, with economic and environmental benefits, strengthening its urban resilience.

Credit: Sudipto Das

2. Ramp up urban workforce development programmes in cities, ensuring that a growing demand for green labour is met with a qualified, inclusive, and diverse workforce.

National governments
MDBs
Private sector

This research shows that a 50% increase in public investment in Technical and Vocational Education and Training (TVET) has the potential to reduce labour shortages from 6 million to 3 million in cities, in the construction, transport, and waste management sectors. With 65% of shortages projected to be low to medium-skill level jobs, green upskilling, reskilling and training programmes are a crucial component of a successful green and just transition.

This approach ensures not only that climate investments are met with adequate workforce readiness, but also that new good, green jobs are equally accessible for all, including newcomers to the workforce. Cities are the primary destination for people on the move, both within and between countries. Ensuring these programmes are inclusive of migrants and refugees is key to both facilitating economic inclusion and harnessing this talent to meet labour shortages.

Working hand-in-hand with the private sector, national governments and multilateral development banks should:

- **Drastically increase investment in education and training** that prioritises workers in non-green sectors, women, young people, migrants, and other marginalised groups, in line with the principles of a green and just transition.
- **Develop national workforce development plans and directly support local governments in their implementation,** focusing on those sectors where skill shortages are felt the most. As of 2024, only half of NDCs (53%) recognised the importance of skills development policy measures, with lower-middle-income and low-income countries emphasising skills development more strongly[18]. There remains considerable room for more substantive and targeted inclusion of workforce development within NDCs.
- **Work with cities to acquire a coherent and data-informed understanding of skill composition and skill needs** for different green sectors and demographic groups. This would help generate the information and technical assistance needed to localise and operationalise workforce planning.

Cities Leading in Action

Case study: London, UK

In 2022, London expanded access to its adult learning opportunities, providing additional support for under-represented groups, including refugees, to access skills training, advancing the city's efforts to meet growing labour demands and enable more Londoners to move into good jobs. As part of these efforts, the city removed a three-year residency requirement for residents to become eligible to access the programme; as a result, over 400,000 Londoners were newly eligible for funded learning opportunities.

The city has also invested in its No Wrong Door Programme, coordinating employment and skills support with a focus on under-represented groups including refugees, disabled people, and those over 50.

Case study: São Paulo, Brazil

São Paulo is tackling urban unemployment through its Programa Operação Trabalho (Work Operation Programme). The programme offers unemployed residents with training opportunities to support their reentry into the labor market. Capacity-building is a central focus of the programme, as well as promoting a sustainable approach to several of its projects, such as: POT Agriculture and Guardian Mothers: Vegetable Gardens and Agents of Sustainable Development.

Through this programme, participants develop new skills while simultaneously greening the city, promoting urban sustainability and socioeconomic development.

Credit: Alastair Johnstone

3. Improve training, employment access, and skills development for newcomers, prioritising green urban sectors where shortages of labour and skills are most acutely felt.

National governments
Inter-governmental organizations
Private sector

In a context of projected labour and skill gaps, restrictive employment policies often compound the challenges that already obstruct both the green transition and economic growth. Improving skills and development opportunities for existing workers as well as removing barriers to migrants within the green workforce – particularly in cities and urban areas - will be key to delivering on both.

Working in close collaboration with the private sector, national governments and intergovernmental organisations should take action to:

- **Reduce the legal barriers for newcomers to obtain work permits to make the process of entering the green workforce faster.** This will facilitate pathways towards self-reliance and economic inclusion, while also reducing pressure on local and regional governments responsible for delivering social assistance and related welcoming services.

- **Improve international recognition of educational qualifications - including through bilateral migration agreements on skilled migrants.** This can tackle "brain waste" among migrant workers, including the prevalence of over-qualification. For instance, foreign residents residing in the EU consistently hold the highest over-qualification rates (39.6%)[19]. Often, these skills are relevant to green sectors where shortages of skills are already faced.

- **Strengthen local governments' technical and financial capacity to deliver those services that are critically relied upon for the economic inclusion of newcomers.** These include both programmes aimed at facilitating labour market integration (e.g. language courses, training, paid apprenticeships) as well as a broader set of urban services (e.g. housing, transportation) that are critical to support the self-reliance and economic inclusion of newcomers.

Cities Leading in Action

Case study: Nairobi, Kenya

Nairobi is removing barriers for migrants, refugees, and internally displaced persons to access green employment through its CHOICE Innovation Hub. As part of this initiative, the city partnered with refugee-led organisations to conduct skills surveys, identifying employment barriers and creating targeted pathways into green sectors where demand for workers is highest. The centre is advancing Nairobi's inclusive and just green transition through training of over 100 youth in green job readiness and incubating sustainability-oriented start-ups made up of 80% migrants and refugees. This demonstrates how cities can strengthen access to employment and the economic inclusion of migrants, refugees, and marginalised communities while supporting a green economy and improving the city's public spaces and waterways.

Case study: Philadelphia, USA

By removing employment barriers for historically disadvantaged groups, Philadelphia's REBUILD programme, which invests in community infrastructure improvements, is simultaneously advancing the city's equity goals and meeting critical workforce demands in key industries. The city works with trade unions to provide apprenticeships for historically disadvantaged groups in high-demand construction sectors including electrical work, ventilation, and plumbing. Funded by a local beverage tax, REBUILD prioritises workforce development in high-need communities facing poverty and health risks, creating permanent jobs.

Case study: New York City, USA

New York City is working to help migrants access employment, conducting in-depth, in-person surveys with nearly 40,000 adult asylum seekers in the city's care, to identify and support individuals who are eligible to apply for work authorisation.

The programme aims to help asylum seekers navigate complex federal timelines and identify options for workforce access. In addition, through the city's Asylum Application Help Centre, the city helped over 3,000 asylum seekers complete applications, enabling access to the federally mandated pathway to work authorisation.

By systematically identifying eligible individuals and providing application assistance, the city is showcasing how cities can proactively address bureaucratic barriers that prevent migrants from accessing employment opportunities.

Credit: Alastair Johnstone

4. Establish labour pathways focused on green skills and urban sectors with high demand for labour, unlocking benefits for both countries of origin and of destination, including for climate migrants.

National governments
Inter-governmental organizations
Businesses

Investments in climate action are already driving the demand for labour in the green sectors, especially in urban areas[20]. As this research projects, even a significant increase in public investment in green upskilling, re-skilling and training would still leave a 3 million shortfall in labour supply by 2040, across the cities studied, in the construction, transport, and waste management sectors.

This suggests that - if combined with inclusive and ambitious workforce development programmes - green labour pathways can be a critical complementary policy tool to address green skills and labour gaps. This would have the potential to unlock significant benefits for both countries of origin and destination, and especially in cities.

By improving the alignment between immigration and green transition policies, national governments should work with businesses and intergovernmental organisations to:

- **Develop green skill mobility partnerships and talent pools that are connected to local shortage occupation lists and developed in partnership with cities and businesses.** For instance, India and Germany signed an agreement to increase green-skilled migration and support integration of skilled workers from India into the German solar industry. This partnership recognises shortages and surpluses of solar panel installers in Germany and India respectively. The European Commission's new Talent Pool also presents a positive step in this direction, aiming to attract non-EU workers to fill shortages of green skills, but it should also strengthen the inclusion of regional and local governments to assess needs and support labour market insertion. Similarly, the Coalition for Green Skills Pathways - a global initiative bringing together philanthropic actors, non-governmental organisations and private sector leaders - is working with partner countries and private employers to connect displaced talent with labour market needs in green sectors. Launched in 2024, the initiative plans to equip 10,000 displaced workers with critical green skills training over a period of three years, benefitting both refugees' economic inclusion and national workers in host countries.

- **Develop safe pathways for climate-vulnerable communities,** working in partnership with local governments to ensure people-centred and rights-based movement before and after climate-related disasters. For instance, Australia and Tuvalu's world first visa agreement, operational in 2025, allows several hundred Tuvaluans to move to Australia each year to permanently live, work and study, recognising the threat of climate change to Tuvalu. With the Pacific Islander community in Australia concentrated in several municipalities within metropolitan centres, including Melbourne, and strongly represented in the manufacturing and construction sectors that are undergoing transformation to green and net-zero technologies, municipal governments are well placed to advocate for essential programmes and support services.

- **Partner with cities and businesses to pilot circular mobility programmes** that can harness the potential of green skill transfers and green remittances. For instance, an IOM programme in Morocco promotes sustainable rural development by favouring the investments of diaspora members in agroecology. The Talent Beyond Borders initiative Coalition for Green Skills Pathways brings together governments, cities, the private sector and training providers to integrate refugee talent into labour markets focused on the green transition, benefitting both refugees and national workers in host countries. Similar city-led programmes such as MENTOR II offer examples for replicability in the context of green mobility partnership schemes.

Cities Leading in Action

Case study: Milan, Italy

Through the 'MENTOR: Mediterranean Network for Training Orientation to Regular Migration' programme, Milan is engaged in an international city-to-city partnership on skills and circular mobility with Turin (Italy) and local actors in Morocco and Tunisia, as part of EU Mobility Partnerships. The collaboration creates circular mobility opportunities by training workers in countries of origin for urban sectors experiencing labour shortages in destination cities. By aligning skills development with green transition demands in Italian cities, while providing economic opportunities in origin countries, MENTOR demonstrates how coordinated international partnerships can establish regular migration pathways that benefit both sending and receiving communities. The programme aims to shift the general perception of migration, by embracing it as an opportunity for multilateral development and growth.

Case study: Andalucia, Spain

Andalusia established the MOVE_GREEN project, a 36-month circular mobility scheme allowing for cross-border cooperation between businesses and targeting renewable energy and green economy sectors between Spain and Morocco. The initiative provided tailored professional training to young Moroccan graduates, followed by a comprehensive training programme in Spain, to equip them with the necessary skills needed to work in the renewable energy and green economy sector. Participants gain practical experience and networking opportunities with Andalusian companies which enhance their employability or ability to start up their own business in Morocco. The programme seeks to foster a cross-border network of stakeholders that can deepen trade relations and support the green economy.

Credit: Marc A Hermann

5. Work with cities to promote decent working conditions, social protection, and dialogue, starting by driving recognition of informal workers – including migrant workers.

National governments
Inter-governmental organizations
Private sector
Unions

Evidence from city-led solutions shows that green transition policies have the potential to either advance the economic inclusion of marginalised groups, including migrants, or further entrench their marginalisation, if not properly informed by equity considerations[21]. This is particularly the case in the informal economy, which in many cities represents a high share of employment within certain sectors[22], including those covered in this research, such as construction, transportation, and waste management, and where migrant workers often happen to be overrepresented[23].

Acknowledging these structural inequities, national governments – especially ministries with responsibility for labour and social protection – and relevant intergovernmental organisations should:

- **Recognise the informal sector as an essential contributor to local and national green transition processes.** Cities have a solid track record of driving these shifts from the bottom-up, shaping a culture of respect for informal workers, and expanding access to social protection in collaboration with national counterparts. This has been particularly the case in Global South cities such as Accra (Ghana), Lagos (Nigeria), or Rio de Janeiro (Brazil), where forward-looking climate action plans are offering concrete examples of how the public administration can build and strengthen partnerships with the informal sector, delivering millions of good, green jobs and leaving no one behind.
- **Establish social dialogue and inclusive participatory processes that engage businesses, union, and informal workers** – including migrants and displaced people – to co-design and -deliver inclusive climate action and just transition plans. Mayors have a positive track record of playing a convening role with both the private sector and trade unions in the context of good, green jobs creation, and can critically support these processes from the bottom-up. For instance, the city of Ekurhuleni has launched South Africa's first local Just Transition Commission, which serves as a platform for multi-stakeholder dialogue, ensuring all voices – including communities, workers, businesses, government, young people, and academia – are considered in local just transition planning.
- **Strengthen the protection, ethical recruitment, and safeguarding of all workers,** including migrant workers - including, but not limited to, workers in sectors relevant to the green transition and migrant corridors impacted by climate change. This requires a comprehensive approach, recognising that irregular migration can increase the risks of exploitation.

Cities Leading in Action

Case study: Accra, Ghana

Through 'CLEAN: Creating Livelihood and Environmentalism in Accra Now', Accra has integrated over 450 migrant waste workers into the formal economy and facilitated their access to healthcare, childcare, and financial inclusion services.

Through Global Cities Fund support, the city surveyed waste workers to collect disaggregated data on economic status and healthcare access, formalised engagements between city authorities and the waste sector by convening multi-stakeholder platforms composed of migrant and non-migrant waste workers and community leaders, then facilitated registration into formal waste cooperatives and national health insurance.

Case study: Bengaluru, India

BENGALURU (INDIA): Bengaluru is promoting decent working conditions and social protection for informal workers through its participatory assessment of its waste management system.

The city conducted comprehensive stakeholder engagement with over 900 waste workers, including internally displaced workers, migrants, and refugees, using focus group discussions and vulnerability assessments to identify barriers to formal recognition and access to services. The city was able to document migrant workers' specific needs and identify suboptimal working conditions. In response, the city then developed recommendations for comprehensive solutions such as building capacity of key stakeholders, improving visibility and inclusivity for vulnerable workers, and including legal recognition for migrant workers.

Credit: Matjaz Krivic

5. Conclusions

Credit: Jes

This report has presented new projections on green labour and skills shortages by 2040; showcasing the potential of climate action to drive job creation in cities, while also highlighting the need for a two-part solution to ensure that demand for green labour can be met: training existing workers with new skills and supporting migrant workers to access these opportunities.

In doing so, this research aims to establish the huge potential of cities as engines of urban green transitions. These transitions will transform urban centres, with significant projected growth of green local economies. This research addresses previously limited understanding[24] - at the local, national and international level - of what this transformation will look like for the demand and supply of green labour, of the need for urgent upskilling of existing and new workers, and the central role of well-managed migration to urban areas in unlocking its significant economic benefits and delivering a just green transition for all.

In doing so, this report contributes to wider efforts to shift the global narrative on climate justice and social and economic justice; connecting the climate and economic opportunities of the urban green transition with social inclusion - including marginalised communities, migrants and refugees. The new data within this report - covering 25 cities across seven countries - aims to precisely address gaps within global dialogue, providing local-level research to build greater understanding of the opportunities offered by complementary climate and social policies.

This report demonstrates that city-led climate action drives job creation, with millions of good, green jobs projected within the 25 cities covered by the research.

This report demonstrates that city-led climate action drives job creation, with millions of good, green jobs projected within the 25 cities covered by the research. This climate action has the potential to deliver over US$280 billion of economic growth, with major benefits for city residents, existing and new workers and local economies. The opportunities for cities are real, but capitalising on this opportunity will require a two-part solution: a significant increase in financial investment to upskill local workforces through inclusive training programmes; and the removal of barriers for migrant workers - including those displaced by climate impacts - to fully meet the labour demand of the green transition.

As this report emphasises, cities and mayors are already leading by action, despite often limited mandates and resources. Bold local-led climate interventions are today delivering good, green jobs for local workers, paired with well-managed migration policies to create economically inclusive, climate resilient cities[25]. The inclusive climate and migration policies of cities such as São Paulo and Nairobi detailed in this research demonstrate how mutually supportive these policy aims can be. They set a clear example of the significant benefits - economically, socially and environmentally - that tackling these challenges head on can provide, especially for cities, in the context of a necessary green transition, and which are also equitable and just for all.

Cities, of course, cannot deliver these transitions alone. Maximising the opportunities of the transition to green, resilient and inclusive cities will require concerted and cohesive efforts across climate investment and policy interventions between cities and partners. The recommendations included in this report clearly call on national governments and international actors, including finance bodies, businesses and the private sector to do more to scale-up necessary investment in cities, ramp-up urban workforce development programmes for existing workforces, remove barriers for migrants to access employment, create labour pathways for green sectors and work with cities to promote decent working conditions, social protection, and dialogue – including migrant workers.

This report is presented to inform and better equip local leaders, mayors and cities with targeted data necessary to support their climate and migration interventions within just, equitable and green transitions, and drive substantive change within national and international level policy processes.

Annexes

Annex A: Jobs and economic sectors included in this research

Sector	Sector	Activity	Occupation
Waste management	**Waste Collection**	**Waste Transportation (Manufacture & Maintenance)**	The manufacture and/or maintenance of waste transportation trucks. These activities can be for city-based trucks or services provided for out-of-city clients
		Kerbside Collection / Doorstep Waste Pickers (incl. Drivers)	The regular or irregular collection of household or commercial waste from residences, businesses or municipal premises. These services typically utilise trucks, drivers and waste collection operatives and are distinguishable from 'waste pickers' by the scheduled nature of collections, either by routine regular collection slots or collection via arrangement
		Municipal Waste Site Operation	The unloading of waste from collection trucks, including the operation of plant and equipment, e.g., heavy lifting equipment where necessary. Compliance and record keeping activities, weighing and loading of trucks. Public-facing waste sites also include the traffic management, public safety and assistance to the public with regards to waste sorting.
		Waste Picking	Salvage of reusable or recyclable materials (segregated or mixed) from residential or commercial waste bins, refuse dump sites or public spaces and streets to either reuse, repurpose or direct materials into recycling streams for income.

Sector	Sector	Activity	Occupation
Waste management	**Waste Handling**	**Waste Sorting Services**	The process of sorting waste into categories, according to materials or recyclability. It includes the inspection of waste materials, identification and removal of contaminant or non-recyclable items and ultimately sorting into relevant waste streams. This is often undertaken on a conveyor belt system and can include high-tech waste sorting robots or be undertaken entirely by hand. The waste is then either sent for re-use, recycling or disposal. Waste sorting can be performed multiple times, on different premises as part of municipal site operations, at specific waste sorting facilities (e.g. plastic from glass), and as part of the recycling process (e.g. different colours of glass), with each stage including additional sorting operations.
		Composting Operations	The recycling of biodegradable waste, such as vegetation, food waste, bio-soils, paper not suitable for recycling, wood or other organic materials. This can involve checking waste for contamination, sizing, shredding, mixing, forming into windrows and regularly turning to optimise the composting process. The end product is a soil conditioner /compost
	Water	**Water Collection, Treatment & Supply**	This includes the collection of water from various sources, including aquifers, reservoirs, lakes etc, treating it and distributing to end users (it does not include the construction or maintenance of the infrastructure, which is included in the construction sector)
		Sewerage	This includes the collection, treatment and disposal of human waste. Specifically, it includes the screening, sedimentation, biological treatment and disinfection of the resulting water for reuse or release. The resultant sludge waste is often further treated via anaerobic digestors or composting - any composting process is measured in the composting operations sub-sector. Alternatively it is sometimes disposed of in landfill, or used as fertiliser. Operation of the facilities includes system monitoring, environmental monitoring, maintenance work and desludging. (it does not include the construction or maintenance of the infrastructure, which is included in the construction sector).

Sector	Sector	Activity	Occupation
Waste management	**Ancillary Activities**	**Engineering & Equipment (Manufacture, Installation & Maintenance)**	Equipment for Waste treatment, manufacture, supply, installation and maintenance of bio filters, bio reactors, collection equipment, grease traps, oil interceptors, materials processing equipment, monitoring & control equipment and nightsoil & landfill leachate treatment.
		Technologies, Research & Development	R&D into subjects including metals recovery, pyrolysis, bio-based systems, new recyclable materials, new collection & processing technologies, incineration technologies, cleaner processing & treatment technologies, disposal of hazardous waste and other materials processing technologies.
	Training & Education	**Training (Waste Management)**	Training aims to develop specific, practical skills for jobs within the Waste Management Sector and is usually specific and short-term. 'Green' training refers to those elements which are either within the Green sub-sectors (e.g., all composting training), while 'Mixed' training refers to green training within sub-sectors not classified as 'Green' (e.g., sustainability courses in recycling and processing centres)
		Education (Waste Management)	Education refers to a broader understanding of a subject or field in Waste Management. 'Green' education refers to those elements which are either within the Green sub-sectors (e.g., further education courses in Environmental Science and Waste Management), while 'Mixed' refers to green education within sub-sectors not classified as 'Green' (e.g., Environmental Sciences used within the operation of landfills)

Sector	Sector	Activity	Occupation
Construction	**Construction of Utility Infrastructure Projects**	**Potable Water Infrastructure**	Construction of potable water treatment plants and pumping stations, including supply, installation and maintenance of equipment (except daily routine maintenance), supply and installation of communication pipes, including all trenching and making good after works, main pipe installation including all trenching and making good after works. This sub-sector includes all maintenance-related activities including water leak identification and correction, including replacement of pipework etc.
		Grey Water Infrastructure	Construction of grey/waste water treatment facilities and pumping stations, including supply, installation and maintenance of equipment (except daily routine maintenance e.g. desludging), supply and installation of all drain and sewer infrastructure, including all trenching and making good after works. This sub-sector also includes sustainable urban draining systems.
	Construction of Energy/ Heat Infrastructure Projects	**Wind**	Includes all groundworks, cabling, supply, installation and maintenance of towers, turbines, gearboxes, cowlings, blades, directional equipment, energy systems, central control systems and grid connections. This includes all ground works, construction services including landscaping
		Solar Farms	This includes solar farms and utility-scale large roof-top installations on commercial buildings. It includes site preparation, the supply and installation of cabling, inverters, solar frames, solar panels, substations and transformers and any associated finishing and landscaping activities.

Sector	Sector	Activity	Occupation
Construction	**Installation of Domestic Energy Solutions**	**Installation of Solar Panels**	The supply, installation and maintenance of Solar Panels for domestic use. This includes any roof strengthening, scaffolding, ancillary cabling, trenching and associated installation activities. They also include both roof-mounted and ground-based systems. Where connected to a grid system, it does not include grid-based management (communications etc). It also includes any associated battery equipment
		Installation of EV Charge Points	The supply, installation and maintenance of EV Charge points for domestic use. This includes any ancillary cabling, trenching and associated installation activities
	Installation of Domestic Plumbing, Heat and Air-conditioning	**Installation of Heat Pumps or central climate control**	The supply, installation and maintenance of Heat Pumps and associated plumbing, for domestic use. This includes any ancillary cabling, pipework, radiators etc, and associated installation activities. Where associated with a domestic geothermal system, the heat pump is included and the rest of the geothermal system is within 'other'. It does not include heat pumps associated with geothermal heat networks.
	Construction of Transport Infrastructure	**Construction of Railways**	Construction of railways including all ground works, tunnelling, bridges, track laying, installation of signalling, cabling, operating systems etc, along with the construction of stations, platforms, ancillary structure e.g. car parks, along with railway sidings, maintenance facilities etc. It does not include railway operation, passenger services or rolling stock purchase/maintenance. It does include heavy rail, light rail/trams, metro/subways and cable cars. It also includes rail freight facilities at ports. It does include electric systems and those for diesel and other fuel types (e.g., hydrogen). Maintenance is included in the Transport sector.

Sector	Sector	Activity	Occupation
Construction	**Training & Education**	**Training (Construction)**	Training aims to develop specific, practical skills for jobs within the Construction sector and is usually specific and short-term. 'Green' training refers to those elements which are either within the Green sub-sectors (e.g., all grey water infrastructure training including health and safety training), while 'Mixed' training refers to green training within sub-sectors not classified as 'Green' (e.g., sustainability training or energy reduction training in gas infrastructure).
		Education (Construction)	Education refers to a broader understanding of a subject or field in Construction. 'Green' education refers to those elements which are either within the Green sub-sectors (e.g., further education courses in engineering and technology for the construction of wind), while 'Mixed' refers to green education within sub-sectors not classified as 'Green' (e.g., Environmental Sciences used within the construction of roads)

Sector	Sector	Activity	Occupation
Transport	**Railways**	**Station Operation**	This involves administration (e.g., on demand ticketing), operations management (including compliance for health & safety), passenger coordination (barrier control), platform staff, signal management and train scheduling. Customer services, luggage re-direction, porter services, some catering activities (permanent venues are classed as direct, temporary kiosks as indirect) etc.
		Passenger Rail Operation	This involves administration (e.g., direct purchase of tickets from rail operators), operations management (including compliance for health & safety), train purchase and maintenance scheduling and rail operations (e.g. operation of rail services). This includes heavy rail, light rail/trams, metro/subway and cable cars. They also include electric, diesel and other fuels (e.g. hydrogen)
		Freight Rail Transport Operation	Administration (e.g. documentation, compliance), loading and unloading of cargo at terminals and customer locations, routing trains through yards for sorting and maintenance, other administration and management (e.g., freight forwarding activities).
		Railway Maintenance	Maintenance of railways including all tunnels, bridges, track, signalling, operating systems, cabling etc, along with the maintenance of stations, platforms, ancillary structure e.g. car parks, along with railway sidings, maintenance facilities etc. It does not include railway operation, passenger services or rolling stock purchase/maintenance. It does include heavy rail, light rail/trams, metro/subways and cable cars. It does include electric systems and those for diesel and other fuel types (e.g., hydrogen).
		Manufacture/ Maintenance of Railway Locomotives & Rolling Stock	The manufacture and/or maintenance of Railway locomotives and rolling stock. These activities can be for city-based rail services or provided for out-of-city clients and include all types of locomotive (electric, diesel, hydrogen etc)
		Manufacture/ Maintenance of Other Equipment (Rail, Electrification etc)	The manufacture and/or maintenance of other equipment for railways, this includes the rail tracks, sleepers, pins, electrification equipment etc. These activities can be for city-based rail services or provided for out-of-city clients
Transport	**Road Transport**	**Bus Operation**	This involves administration (e.g., ticketing), operations management (including compliance for health & safety), bus purchase and maintenance scheduling and bus operations (e.g. operation of bus routes). They also include electric, diesel and other fuels (e.g. hydrogen). Services also include bus station + depot operations such as customer services and luggage re-direction, porter services etc.
		Manufacture/ Maintenance of Buses	The manufacture and/or maintenance of buses. These activities can be for city-based buses or services provided for out-of-city clients and include all types of buses (electric, hybrid, diesel, hydrogen etc)
		Operation/ Installation of EV Charge Points	The supply, installation, maintenance and management of public EV Charge points. This includes any ancillary cabling, trenching and associated installation activities, along with apps and payment systems.
		Manufacture/ Maintenance of Bicycles	The manufacture and/or maintenance of Bicycles. These activities can be for city-based or out-of-city clients.
	Maritime	**Passenger Maritime Transport**	This involves administration (e.g., ticketing), operations management (including compliance for health & safety), vessel purchase and maintenance and vessel operations (e.g. public transport ferry services)
	Inland Waterways	**Passenger Inland Waterways Transport**	This involves administration (e.g., ticketing), operations management (including compliance for health & safety), vessel purchase and maintenance and vessel operations (e.g. public transport ferry services)

Sector	Sector	Activity	Occupation
Transport	**Training & Education**	**Training (Transport)**	Training aims to develop specific, practical skills for jobs within the Transport sector and is usually specific and short-term. 'Green' training refers to those elements which are either within the Green sub-sectors (e.g., all passenger rail operation training including health and safety training), while 'Mixed' training refers to green training within sub-sectors not classified as 'Green' (e.g., sustainability training or energy reduction training in warehousing and storage).
		Education (Transport)	Education refers to a broader understanding of a subject or field in Transport. 'Green' education refers to those elements which are either within the Green sub-sectors (e.g., further education courses in engineering and technology for the manufacture of new buses), while 'Mixed' refers to green education within sub-sectors not classified as 'Green' (e.g., Environmental Sciences used within the operation of ports)

Annex B: Occupational categories and associated skill levels per the ILO's ISCO-8 categorization included in this research

Occupational Category	Occupation Definition	ILO ISCO Skill Level
Elementary	Involve the performance of simple and routine tasks which may require the use of hand-held tools and considerable physical effort.	Skill level 1 (Low Skill)
Clerical Support	Clerical support workers record, organise, store, compute and retrieve information, and perform a number of clerical duties in connection with money-handling operations, travel arrangements, requests for information, and appointments.	Skill level 2 (Medium Skill)
Service	Service and sales workers provide personal and protective services related to travel, housekeeping, catering, personal care, or protection against fire and unlawful acts, or demonstrate and sell goods in wholesale or retail shops and similar establishments, as well as at stalls and on markets.	
Plant	Plant and machine operators, and assemblers operate and monitor industrial and agricultural machinery and equipment on the spot or by remote control; drive and operate trains, motor vehicles and mobile machinery and equipment; or assemble products from component parts according to strict specifications and procedures.	
Technician	Technicians and associate professionals perform technical and related tasks connected with research and the application of scientific or artistic concepts and operational methods, and government or business regulations.	
Craft	Craft and related trades workers apply specific technical and practical knowledge and skills in the fields to construct and maintain buildings; form metal; erect metal structures; set machine tools or make, fit, maintain and repair machinery, equipment or tools; carry out printing work; and produce or process foodstuffs, textiles and wooden, metal and other articles, including handicraft goods.	Skill levels 3 and 4 (High Skill)
Manager	Managers plan, direct, coordinate and evaluate the overall activities of enterprises, governments and other organisations, or of organisational units within them, and formulate and review their policies, laws, rules and regulations.	
Professional	Professionals increase the existing stock of knowledge; apply scientific or artistic concepts and theories; teach about the foregoing in a systematic manner; or engage in any combination of these activities.	

Occupational categories not included in this research, given the sectoral focus of this research, are: Armed Forces Occupations and Skilled Agricultural, Forestry and Fishery Workers. For more information on the ILO's ISCO-08 categorization, please refer to their website.

Annex C: Definitions

- **Asylum Seekers:** People who flee their home country to seek sanctuary in another country. Upon arrival, they must officially apply for asylum in the host country; once granted, this affords them formal recognition as a refugee, along with legal protection and material assistance. An asylum seeker must demonstrate that their fear of persecution in their home country is well-founded in order to be granted refugee status (UNHCR).

- **Brain Drain:** Emigration of skilled persons from developing nations - brain drain - which can have dire consequences for sustainable development in the countries of origin, especially the least developed countries. (ILO)

- **Circular Economy:** A circular economy model encourages products to be designed for longevity, repairability, and eventually full recycling, creating a closed loop system. (C40)

- **Circular Mobility:** There is no universal definition of circular mobility. The United Nations Economic Commission for Europe defines it as a repetition of legal migration by the same persons between two or more countries, with an element of repetition, i.e., the person must migrate from country A at least twice. (UNECE)

- **Climate Action Plan (CAP):** A climate action plan (CAP) is a detailed and strategic framework for measuring, planning, and reducing greenhouse gas (GHG) emissions and related climatic impacts. The commitment should specifically endorse the Paris Agreement and set clear goals of achieving carbon-neutrality as quickly as possible, identifying an evidence-based interim target, and improving the city's resilience to climate hazards. (C40)

- **Climate Migration:** Refers to the movement of people who – predominantly for reasons of sudden or progressive alterations in the environment due to climate change – are obliged, or choose, to leave their habitual place of residence. This may either be a temporary or a permanent move, and either within a state or across an international border (IOM).

- **Climate Resiliency:** The capacity of a community, business, or natural environment to prevent, withstand, respond to, and recover (adapt, reorganise, and evolve) from a disruption related to climate change (C40).

- **Decent work/ employment:** Opportunities for work that is productive and delivers a fair income, providing safe and stable working conditions, social protections, and freedom of association and social dialogue, among other measures to ensure wellbeing and livelihood (ILO).

- **Economic inclusion:** The process of ensuring that all people have equal opportunities to participate in economic activities, regardless of their circumstances. This can include policies that increase access to jobs, education, and financial services for marginalised groups. (UN)

- **Equity:** Refers to fairness and justice. It is distinct from equality, which means "providing the same to all". In contrast, equity is about recognising that we do not all start from the same place – and that we must therefore acknowledge and make adjustments to these imbalances. The process of achieving equity is ongoing, requiring us to identify and overcome intentional and unintentional barriers arising from bias or systemic structures (C40)

- **Frontline workers:** Individuals who are critical in maintaining essential services, such as health care, emergency services, food supply, and public safety, particularly for migrant communities. They play a vital role in the daily lives of many individuals and families by serving as a link between these communities and host countries (IOM).

- **Gross Domestic Product (GDP):** The standard measure of the value added created through the production of goods and services in an area during a certain period. GDP also measures the income earned from that production, or the total amount spent on final goods and services (less imports). (OECD)

- **Good, green jobs:** There is no universal definition of a "green" job. For C40 good, green jobs include those that help reduce greenhouse gas emissions (GHG), protect nature, and improve wellbeing, while providing fair wages, safe working conditions, and stable employment. For more information, see here.

- **Green Economy:** A green economy is defined as low carbon, resource efficient and socially inclusive. In a green economy, growth in employment and income are driven by public and private investment into such economic activities, infrastructure and assets that allow reduced carbon emissions and pollution, enhanced energy and resource efficiency, and prevention of the loss of biodiversity and ecosystem services. (UNEP)

- **Inclusive Climate Action:** The consideration of how people and communities may be impacted by climate change and climate actions, given their wellbeing, prosperity and location in a city. Implementing innovative and transformational actions that tackle both climate change and social injustice. There are three pillars to achieving "Inclusive Climate Action" - embedding equity inclusion across Processes, Policies and Impacts. (C40)

- **Informality:** Refers to individuals, households, activities, or firms in terms of their relationship to the informal economy, typically with respect to production, employment, consumption, housing, land, or other services (WRI). The informal economy is the diversified set of economic activities, enterprises, jobs, and workers that are not regulated or protected by the state. The concept originally applied to self-employment in small, unregistered enterprises, but has expanded to include waged employment in unprotected jobs (WIEGO).

- **Internally displaced persons (IDPs):** Someone who has been forced to flee their home due to internal strife, natural disaster, and so on, but never crosses an international border. These individuals seek safety anywhere they can find it – in nearby towns, schools, settlements, internal camps, and the outdoors. IDPs are not protected by international law or eligible to receive many types of aid because they are legally under the protection of their own government (UNHCR).

- **Just Transition:** The economic and societal process needed to transform economies to be low carbon, resource efficient, socially inclusive, and equitable. It involves maximising the social and economic opportunities of climate action, while minimising and carefully managing any challenges – including through effective social dialogue among all groups impacted, and respect for fundamental labour principles and rights (ILO, 2024). For more information on how to achieve a just transition in cities, see C40's toolkit for city leaders, Achieving the Just Transition (C40, 2023).

- **Labour Demand:** the number of workers that firms wish to employ and the intensity of their utilisation, including variations based on demographic characteristics and skill levels. It encompasses how employers respond to changes in labour costs and the impact of regulations on employment levels and adjustments. (International Encyclopedia of the Social & Behavioral Sciences)

- **Labour Market Policies:** Government programmes that intervene in the labour market to improve the job-matching process and the market's overall functionality. Active labour market policies typically help people who are unemployed or inactive to find work, and support the underemployed as well as employees looking for better jobs. Passive labour market policies fund unemployment benefits and early retirement (ILO, 2023).

- **Labour Shortages:** Labour shortages arise when the demand for workers in an occupation exceeds the supply of workers available who possess the required skills. (Eurofound)

- **Labour mobility:** The movement of people for the purpose of employment, between sectors and occupations, but also between countries and cities (referred to as labour migration) (IOM, 2024).

- **Migrant:** Typically refers to the legal and immigration status of a person who changes their place of usual residence – whether within a country or across an international border, temporarily or permanently, and for a variety of reasons. Categories include expatriates, documented or undocumented migrants, refugees, and asylum seekers (IOM, 2019).

- **National Determined Contribution (NDC):** Nationally Determined Contributions, or NDCs, are national climate action plans by each country under the Paris Agreement. A country's NDC outlines how it plans to reduce greenhouse gas emissions to help meet the global goal of limiting temperature rise to 1.5ºC and adapt to the impacts of climate change. The Paris Agreement requires that NDCs are updated every five years with increasingly higher ambition, taking into consideration each country's capacity. (UN)

- **Refugee:** Someone who has been forced to flee their country because of persecution, war, or violence. A refugee has a well-founded fear of persecution for reasons of race, religion, nationality, political opinion, or membership in a particular social group (UNHCR).

- **Remittances:** Private funds, usually understood as money or goods that migrants send back to families and friends in origin countries, and are often the most direct and well-known link between migration and development (Migration Data Portal).

- **Reskilling:** Programmes provided by governments, non-governmental organisations, and/or industry bodies, working with employees who are already established within the workforce to equip them with new skills – typically to enhance their hireability in a new economy. Note that many organised labour entities and workers fear that reskilling will not lead to jobs with the same pay and benefits as those being replaced. (C40)

- **Skill Level:** Skill level is defined as a function of the complexity and range of tasks and duties to be performed in an occupation. Skill level is measured operationally by considering one or more of: the nature of the work performed in an occupation, the level of formal education required for competent performance, and the amount of informal on-the-job training and/or previous experience required for competent performance. (ILO) In this research, C40 refers to the ILO's ISCO-08 skill level categorisation in this research (more information in Annex B).

- **Social Dialogue:** All types of negotiation, consultation or simply exchange of information between, or among, representatives of governments, employers and workers, on issues of common interest relating to economic and social policy. (ILO)

- **Social Inclusion:** The process of improving the terms on which individuals and groups take part in society—improving the ability, opportunity, and dignity of those disadvantaged on the basis of their identity (World Bank).

- **Technical and Vocational Education and Training (TVET):** Formal, nationally accredited training, diploma courses and skills development across a wide range of occupational fields, including production, services, and livelihoods. The approach caters to children and youth as well as adults, offering professional development, upskilling, and reskilling opportunities (UNHCR).

- **Upskilling:** Training programmes provided by governments, non-governmental organisations, and/or industry bodies, designed to help employees update their skills in their existing vocations or professions and ensure their ability to compete in a changing economy. Many upskilling programmes also focus on workers whose positions are in jeopardy of being phased out due to automation and technology. (C40)

- **Workforce development:** The definition of workforce development varies, depending on perspective: governments, schools, and businesses all use this term to mean something slightly different. The common denominator is that workforce development improves workers' skills to facilitate long-term success. It includes activities such as job training, reskilling, and inter-personnel and management skills training with the aim of developing a highly skilled workforce in the long term. Reskilling, upskilling, and redeployment are all part of workforce development, but have shorter-term objectives (C40).

Endnotes

1 We acknowledge the impressive work of the Center for Global Development (*Linking Migration and Training to Meet the Green Transition: A Global Overview*) and ODI Global (*Migration for climate action: how labour mobility can help the green transition*) in this otherwise under-researched area.

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