

► **Jobs in a net-zero emissions future in Latin America and the Caribbean**



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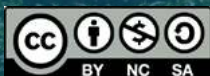
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A photograph of two men in silhouette, wearing caps and shirts, shaking hands against a bright sunset background. The sun is low on the horizon, creating a warm, golden glow. The men are positioned in the center of the frame, with their arms extended towards each other. The background shows some dark foliage in the foreground.

Foreword

The pandemic has cruelly exposed the vulnerability of our societies. The troubling levels of inequality have ensured the coronavirus has hit hard even the most prosperous countries in Latin America and the Caribbean. Informal workers, who represent 49 percent of employment, have been severely affected by lockdowns and social distancing measures, which have limited or temporarily halted their livelihoods. The region's deficits in terms of decent jobs and social protection make it acutely vulnerable to this situation.

Yet, as countries work to protect citizens from the pandemic, safeguard their economies and look towards the recovery phase, the transition to a green economy offers the promise of creating 15 million net new jobs in Latin America and the Caribbean.

A green and inclusive recovery is essential to help confront the climate crisis and build a better future. If we do not act now, the same vulnerabilities that exposed workers and enterprises to the pandemic will expose them to the climate crisis. The ILO estimates that 2.5 million Latin American and Caribbean jobs could

be lost to heat stress alone by 2030, affecting particularly outdoor workers in construction and agriculture, and street vendors. The IDB projects that by 2050, climate change damages could cost US\$ 100 billion annually to the region.

But the future is not set in stone. As the global economy gradually restarts following the COVID-19 lockdown, now is the time to craft a more inclusive, resilient, and sustainable future. Progress is already being made. The IDB is working with countries to create strategies to reach net-zero emissions by 2050. The ILO is also helping countries, their workers and enterprises prepare for the consequences on domestic labor markets. In recent years, with *Getting to Net-Zero Emissions and Greening with Jobs*, our institutions have shown that a green economy comes with job creation and other development benefits.

For this report, we have joined forces to identify where jobs can be created in Latin America and the Caribbean while transitioning to net-zero emissions. We have found impressive potential in sustainable agriculture, and in other sectors including forestry,

renewable energy, construction, and manufacturing. This collaborative effort is the first to document how shifting to healthier and more sustainable diets, which reduce meat consumption while increasing plant-based foods, would create jobs while reducing pressure on the region's unique biodiversity.

There can be little doubt that agriculture and forestry hold vast potential for new employment. Latin America and the Caribbean holds 40 percent of the world's biodiversity, almost 50 percent of tropical forests and is one of the world's leading food exporters. Progress in this area would allow for the restoration of ecosystems, sustainable agriculture, and, in the longer term, ecotourism, which in turn could create millions of jobs. This will complement those already being created in renewable energy, energy efficient buildings, electric mobility, public transport, manufacturing, and waste management.

As countries prepare expansive recovery plans, there is a compelling case for pursuing both decent job creation and a transition to net-zero emissions. Countries need to establish the right policies to help workers and businesses acquire new skills

through training and education and to create an enabling business environment to capitalize on opportunities and ensure decent working conditions.

The Paris Agreement offers a framework to move forward. All countries in the region have been invited to communicate multi-sector roadmaps towards net-zero emissions, while reaffirming the importance of ensuring a just transition for workers, firms, and consumers. Built in consultation with social partners, roadmaps to net-zero emissions can help governments anticipate and facilitate job creation and identify sectors, including fossil fuels and livestock, that can be negatively impacted. Affected workers, communities and enterprises will need social protection, reskilling programs, compensation mechanisms and other policies to bounce back.

The report shares timely lessons to help guide a post-coronavirus recovery that prioritizes the creation of decent jobs and a more inclusive, sustainable, and resilient future. This can be a path to creating a better world for workers and enterprises while also tackling the climate crisis.



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Contents

Foreword	04
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Acknowledgements	06
------------------	----



Executive Summary	10
-------------------	----



Chapter

1



Achieving Net-Zero Carbon Emissions: Why and How?	17
--	-----------

The Labor Market in Latin America and the Caribbean: A Work in Progress	18
Climate Change: Casting Another Shadow on the World of Work	24
Net-Zero Carbon Emissions: A Doable Goal	28
Decarbonization: Good for the Environment, the Economy, and People	32
Barriers to Decarbonization	35
Box 1.1 Stranded Assets and Stranded Jobs in Oil and Gas Power Plants	38
Long-Term Strategies to Net-Zero Emissions	39
References	41

Chapter

2



Wanted: Workers in Net-Zero Economies	45
--	-----------

A Word on Methods	46
Building a Decarbonization Scenario for Latin America and the Caribbean	50
Labor Market Risks and Opportunities	56
Box 2.1 Green Jobs: a Specific Definition	57
References	63



Chapter 3	
Policy Options for a Just Transition	65
Defining a Just Transition	66
Developing the Right Skills for a Net-Zero Emissions Future	67
Jobs for Low- and Medium-Skill Workers	69
Job Reallocation: A Challenge for Gender Equality	70
Reskilling and Upskilling for Decarbonization	72
Protecting Poor Households: The Challenge for Reforming Energy Subsidies	76
Public Employment Programs in the Time of COVID	79
A Human-Centered Approach: Linking Social, Environmental, and Economic Goals.....	80
Support for Enterprises	81
The Workplace: Ground Zero for a Greener Economy	85
Social Dialogue for Inclusivity	89
Environmental Sustainability: A Shared Responsibility	92
References	93



Chapter 4	
Making a Just Transition, Sector by Sector	95
Energy: The Heart of a Just Transition	96
Box: 4.1 Lessons Learned from a Just Transition in Coal Mining	97
Box 4.2 Local Content Requirements in Renewable Energy Supply Chains in Uruguay and Brazil	101
Box 4.3 Skills Training for Green Jobs in Argentina and Guyana	102
The Challenge in Agriculture: Cultivating Decent Work	106
Box 4.4 Brazil's Low Carbon Agriculture Plan	109
Enhancing Decent Work in Forestry	111
Box 4.5 Payment for Ecosystem Services Schemes with Social Objectives	112
Box 4.6 The Impact of Forest Certification in Chile and Argentina	114
Waste Management: A New Model of Decent Work for Vulnerable Workers	115
Box 4.7 Decent Work Policies for Informal Waste Pickers	116
Diversifying the Economy with Ecotourism	117
Box 4.8 The Social Impacts of Ecotourism in Costa Rica	119
Driving Social Benefits and Better Energy Use in the Transport Sector	120
Box 4.9 BRT Development and Informal Transport Workers in Bogotá, Colombia	121
Construction: The Need to Reduce Informality and Build Skills	123
Coherent Policies: The Key to a Just Transition	124
References	126

Executive Summary



The devastation of COVID-19 has forced households, businesses, and governments to rethink how the natural environment connects with their economies and societies. Today, prevailing decent work deficits, inequalities, and dependence on fossil fuel exports make Latin America and the Caribbean particularly susceptible to the social and economic impacts of the pandemic. These same issues will make the region vulnerable to the impacts of climate change tomorrow. In response to the pandemic, a just transition to net-zero emissions can redress the adverse economic and social impacts of the global crisis and at the same time provide an opportunity to create employment, tackle inequality, and boost inclusive growth.

International commitments provide a framework to build a future with better jobs, greater equity, and a healthy environment. The parties to the Paris Agreement have been invited to design and communicate a strategy to progressively transition towards net-zero carbon emissions. This report highlights the potential to create 15 million net jobs in sectors such as sustainable agriculture, forestry, solar and wind power, manufacturing, and construction during such a transition. With adequately designed measures to ensure that these jobs are decent and that those who lose out in the transition are protected and supported, recovery plans can stop the climate emergency while also boosting growth, tackling inequality, and making progress towards the Sustainable Development Goals.

A Brighter Future with Net-Zero Emissions

The Need

Stabilizing climate change below 2°C and as close to 1.5°C as possible, the objective set in the Paris Agreement, requires getting to net-zero carbon emissions by around 2050 (IPCC, 2018). Reaching net-zero carbon emissions, or decarbonizing the economy, means reducing man-made emissions of carbon due to human activities, such as fossil fuel combustion, and balancing out remaining emissions, for instance by planting trees at scale.

The Feasibility

Latin America and the Caribbean can achieve carbon-free prosperity through immediate and parallel actions around five pillars (IDB and DDPLAC, 2019): (i) phasing out fossil fuel electricity generation and replacing it with carbon-free sources such as wind and solar power; (ii) using electricity instead of fossil fuels for transportation, cooking, and heating; (iii) increasing public and nonmotorized transportation; (iv) halting deforestation and planting trees, which will require shifting diets away from animal-based foods towards more plant-based food, and; (v) reducing waste in all sectors, recycling materials, and switching to sustainable construction materials, such as wood or bamboo. The required transformations go further than the first round of Nationally Determined Contributions (NDC) that countries presented after the Paris Agreement.

NDCs are widely acknowledged to be insufficient to achieve net-zero emissions by 2050 and the overall goal of the Paris Agreement: limiting global warming between 1.5°C and 2°C above preindustrial levels.

The Economic Opportunity

Thanks to its rich resources and relatively low level of population pressure, the region is well-endowed to make a transition to net-zero. The cost of key technologies, such as renewable power or electric vehicles, has dropped dramatically, to the point where zero-carbon solutions are often cheaper than incumbent fossil fuel-based technologies. Decarbonization also comes with immediate benefits. Already, renewable electricity is often cheaper than fossil fuel alternatives and is a solution for electrifying remote rural areas and serving poor and marginalized populations. Efficient public transport can improve worker productivity and reduce the health and socioeconomic impact of air pollution, noise, and accidents. Diets that rely relatively less on meats and dairy can be healthier.

The Challenge

The road to a net-zero carbon world is littered with obstacles. One challenge is to ensure a just transition by making the shift as equitable as possible based on a participatory approach (ILO, 2018). Despite more than a decade of steady progress, the region is still struggling with gender and ethnic inequalities, skills gaps, insufficient social protection, and a large informal sector (Alaimo et al., 2015). Advancing social and environmental goals together means ensuring that workers and enterprises have the skills

needed for a net-zero carbon future and enjoy decent work conditions. A just transition also means supporting workers, firms, and communities that will be negatively affected by downsizing the most polluting industries such as fossil fuel extraction or livestock herding. Social dialogue—from the simple exchange of information between the private sector, trade unions, and governments to negotiating solutions—can help design climate-friendly solutions that are aligned with sustainable development goals and widely accepted by local stakeholders. Education and public information are essential to achieve a net-zero emissions economy.

Jobs in a Net-Zero Economy

Decarbonization need not come at the expense of jobs and growth. By 2030, structural changes in production and consumption patterns can result in 15 million more jobs in Latin America and the Caribbean compared with a business-as-usual scenario. The gain in employment will largely be the result of changes in diets, and to a lesser extent of decarbonizing the energy system.

Winners and Losers from Decarbonization

In the transition to a net-zero carbon economy, 7.5 million jobs are destroyed in fossil fuel electricity, fossil fuel extraction, and animal-based food production. However, these lost jobs are more than compensated by new employment opportunities, as 22.5 million jobs are created in agriculture and plant-based food production, renewable electricity, forestry, construction, and



manufacturing. To ensure a just transition, efforts to promote decarbonizing must be accompanied by policies that facilitate the reallocation of workers, promote decent work in rural areas, offer new business models, and support displaced workers and their communities.

Shakeups in the Food and Energy Sectors

Dietary changes turn out to be the main driver of the labor impact of decarbonization, affecting one of the largest employers in the region: the agri-food sector. Shifts in diets create 19 million more full-time equivalent jobs in plant-based agriculture in 2030, but 4.3 million fewer jobs in livestock herding, poultry, dairy, and fishing. Job creation and destruction in the power sector are modest in terms of the total number of jobs in the economy, but important as a share of total employment in the

sector. The transition results in 60,000 fewer jobs in fossil fuel power plants and 100,000 more renewable electricity jobs. Construction, manufacturing, and forestry also enjoy net job creation.

Taking Care of Unfinished Business

Reskilling Workers and Enterprises

More than half of the 22.5 million jobs created are in the medium-skill category (13.5 million), one-third in the low-skill category (8 million), and 1 million in the high-skill category. These new low- and medium-skill jobs will benefit part of the 66 million people who are being underutilized in the labor market, including 9 million unemployed youth (ILO, 2020).¹ Many people who lose their jobs in carbon-intensive sectors may find

¹Labor underutilization includes the unemployed, those who are employed but want to work more hours, and those unemployed but not currently available or looking for a job.

a new one that makes use of their skills in new industries after brief retraining or on-the-job training. Enterprises also need to acquire new skills to cope with climate change impacts. Training can strengthen entrepreneurial management skills to foster the adoption of innovative, environmentally friendly technology, human resource development, and better productivity. Updating curriculums is also key to make sure future workers receive an education that allows them to take part in the transition.

Furthering Gender Equality

More than 80 percent of the new jobs created by the decarbonization agenda will be in today's male-dominated sectors. Women will not benefit from job creation unless the current gender segregation by occupation is addressed.

Ensuring New Jobs Are Decent Jobs

Policies must ensure that new jobs created in emerging sectors such as plant-based agriculture and renewable energy are decent jobs. Agricultural workers, and more generally workers in rural areas, often lack access to social protection; strategies to extend both contributory and noncontributory social protection coverage in rural areas need to be strengthened. Rural workers can also benefit from strategies to improve risk management in agriculture such as drought insurance. Occupational safety and health measures can help enhance the quality of jobs in agriculture. On a broader level, decarbonization can improve food security and bring better jobs if it embraces rural

development objectives. This may require strengthening public services such as rural infrastructure service provision. It is also important for producers to have access to markets and to be integrated into supply chains so that they benefit from changes in market demand. The quality of jobs created in sustainable tourism and waste management also needs careful monitoring.

Making Social Protection More Effective

Social protection systems need to be adapted and made more responsive to climate and other adverse shocks to protect people from the impacts of both climate change and climate-related policies. Necessary measures include, but are not limited to, unemployment benefits, pensions for old-age workers, and universal health care access. The COVID-19 pandemic further underlines the importance of an inclusive and efficient health-care and social protection system as countries with effective health coverage and social protection are better equipped to protect their populations from threats to their lives and livelihoods. These measures are extremely important to support and protect vulnerable workers, firms, and communities as they cope with short-term shocks.

Firms and Workers as Agents of Change

New business models, certification processes, and enterprise-level initiatives can facilitate a just transition in the workplace by firms and workers. Green finance can spur environmentally sustainable efforts, especially in the

context of micro, small, and medium-sized enterprises. Other sustainable practices—including green public procurement, education, teleworking, economic incentives to change consumption and production patterns, and the promotion of environmental rights at work—can improve resource efficiency, reduce waste, and promote responsible workplaces. The positive environmental impacts of the COVID-19 pandemic will be short-lived, but they point to the potential long-term effects that behavioral changes and effective measures can have. Teleworking, virtual meetings, e-commerce, sustainable modes of transport, and the promotion of local products have gained popularity with the pandemic. These measures should be kept and combined with efforts to ensure decent work conditions and reduce inequality, once the economy returns to normal.

Coherent Environmental, Labor, and Sector Policies

More can be done to articulate environmental, industrial, and labor policy, and to promote changes at the sector level. All countries in the region have ratified the Paris Agreement and must now develop strategies to

drastically reduce emissions by 2050. Such strategies should be designed with all relevant stakeholders, including social partners. A shared approach will allow all stakeholders to anticipate the impact of decarbonization strategies on jobs, skills, and gender equality, and ensure a just transition in both the subsectors that need to be downsized and those with the potential for job creation. Such strategies are also key to ensuring that short-term policies to reduce emissions are aligned with the need to reach net-zero carbon emissions.

It is time for a transition to a net-zero future that leaves no one behind. Many options such as renewable energy are not only cheaper than current sources, they also create more jobs and can provide better service, especially to poor and remote communities. Government policies, such as skilling and reskilling, are needed to help people transition to the growing sectors while social programs must support those who may be negatively affected. Social dialogue and co-construction with all stakeholders can help governments coordinate social, environmental, and sector development goals and ensure that workers, firms, and communities are prepared to thrive in a net-zero economy.

References

- Alaimo, V., Bosch, M., Kaplan, D.S., Pages, C., Ripani, L., 2015. Jobs for Growth. Inter-American Development Bank, Washington, D.C.
- IDB, DDPLAC, 2019. Getting to Net-Zero Emissions: Lessons from Latin America and the Caribbean. Inter-American Development Bank and Deep Decarbonization Pathways for Latin America and the Caribbean, Washington, D.C.
- ILO, 2020. World Employment and Social Outlook: Trends 2020. International Labor Organization, Geneva.
- ILO, 2018. World Employment and Social Outlook 2018: Greening with Jobs. International Labour Organization, Geneva.
- IPCC, 2018. Summary for Policymakers, in: Global Warming of 1.5°C: An IPCC Special Report on the Impacts of Global Warming of 1.5°C above Pre-Industrial Levels and Related Global Greenhouse Gas Emission Pathways, in the Context of Strengthening the Global Response to the Threat of Climate Change, Sustainable Development, and Efforts to Eradicate Poverty. Cambridge, United Kingdom and New York, NY, USA.

Chapter

1

Achieving Net-Zero Carbon Emissions: Why and How?



Latin American and Caribbean workers suffer from socioeconomic inequities, and climate change and environmental degradation will only worsen their plight. Labor markets need to better prepare to adapt to changing climatic conditions. They also have to better contribute to reaching the net-zero carbon emissions goal, as workers migrate to better and more environmentally friendly jobs and enterprises adopt new business models. The good news is that achieving net-zero carbon emissions is technically feasible and offers ample social and economic opportunities. A few countries are already paving the way, making the most out of the framework provided by the Paris Agreement. Many enterprises are also transitioning to net-zero and experiencing the benefits of a green economy.

Certainly, the road to a net-zero economy is not without challenges in terms of planning, updating the policy environment, and managing the political economy of the transition. This chapter argues that a coherent, multi-sector vision of a net-zero carbon future built in consultation with all stakeholders, including workers and firms, can provide governments a compass and a map in their journey to a net-zero future. Subsequent chapters explore in greater detail the labor market implications of the transition, the just transition concept, international and regional initiatives, and recommendations for governments to ensure such a just transition takes place in their countries.

The Labor Market in Latin America and the Caribbean: A Work in Progress

Latin America and the Caribbean is the region with the highest income inequality in the world (UNDP, 2016). In 2018, just 7 percent of the population held 80 percent of the region's income (World Bank, 2020). Fortunately, income inequality has been declining since the late 1990s, driven by a fall in wage inequality since 2002 (ILO, Forthcoming b; Messina and Silva, 2019). In several countries, the reduction in wage inequality resulted from a sharp rise in wages at the bottom decile of the distribution, including for ethnic minorities and rural workers (Rodríguez-Castelán et al., 2016). Labor market policies, including integrating jobs into the formal economy (Messina and Silva, 2019) and stronger minimum wage policies in some countries (ILO, Forthcoming a), contributed to this process.

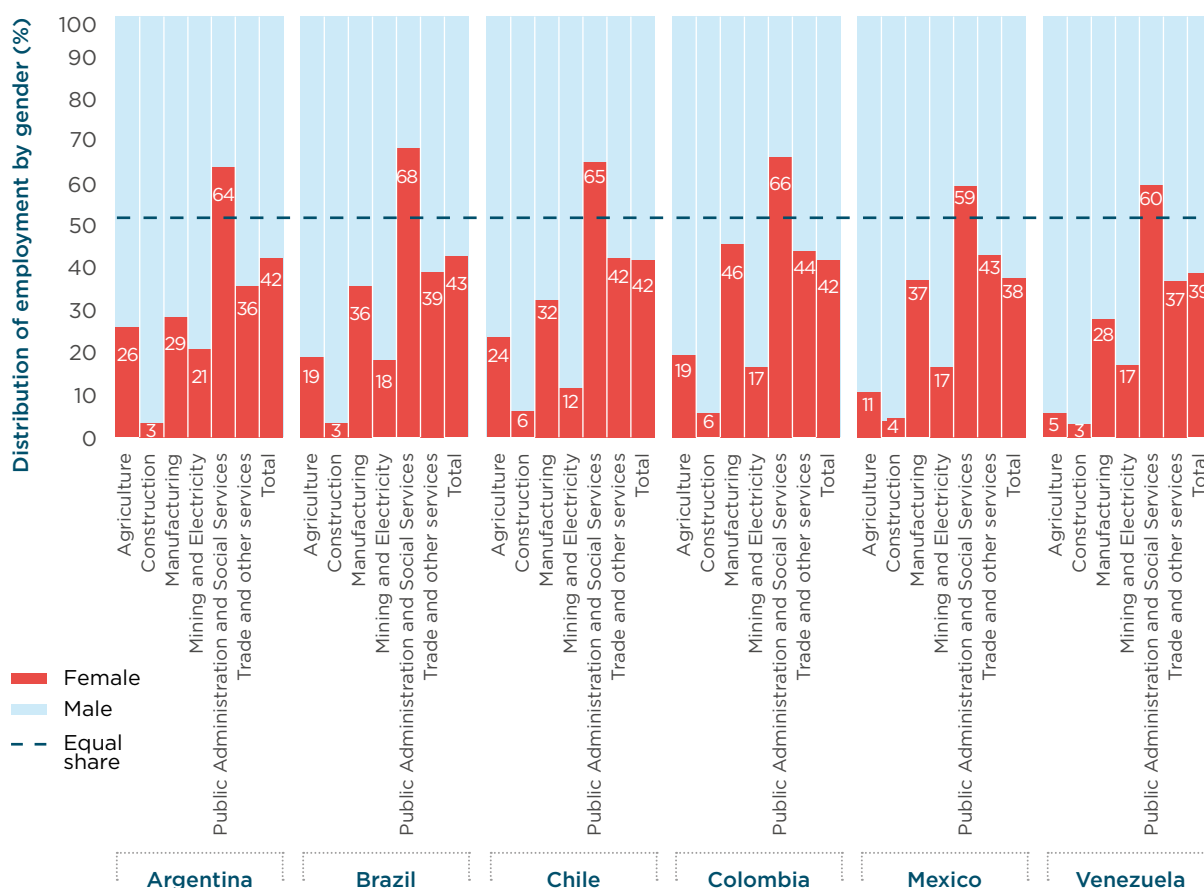
Despite the advances, inequality persists in the labor market, affecting particularly indigenous peoples and women. Indigenous peoples are more likely to be poor; they face poverty rates that are on average twice as high as for other Latin Americans (World Bank, 2015). Indigenous groups also have lower levels of education and academic performance than non-indigenous groups. When

entering the labor market, their lack of training combined with discrimination lead to lower compensation. In addition, indigenous people's livelihoods are tightly linked to the natural environment so actions toward climate change mitigation will affect them both directly and indirectly. While they are also vulnerable to climate risks, their traditional knowledge is crucial in addressing climate change impacts (ILO, 2019a).

Inequality also exists along gender lines. In Latin America and the Caribbean, women's labor force participation rates are 20 percentage points lower than men's (ILO, 2019b). For each hour

worked, women earn on average 17 percent less than men, and the gender wage gap is widest among workers with the lowest income (ILO, 2020a). In construction, agriculture, livestock, and mining, more than two-thirds of the labor force are men; women frequently work in agriculture as family members and are thus more likely to be unpaid, or as informal laborers whose contribution to the sector is underreported. Jobs in sectors such as manufacturing and mining are overwhelmingly done by men, while jobs in public administration and social services are overwhelmingly done by women (Figure 1.1).

Figure 1.1 / Distribution of Employment by Gender, Selected Countries and Sectors, 2018



Source: ILOStat.

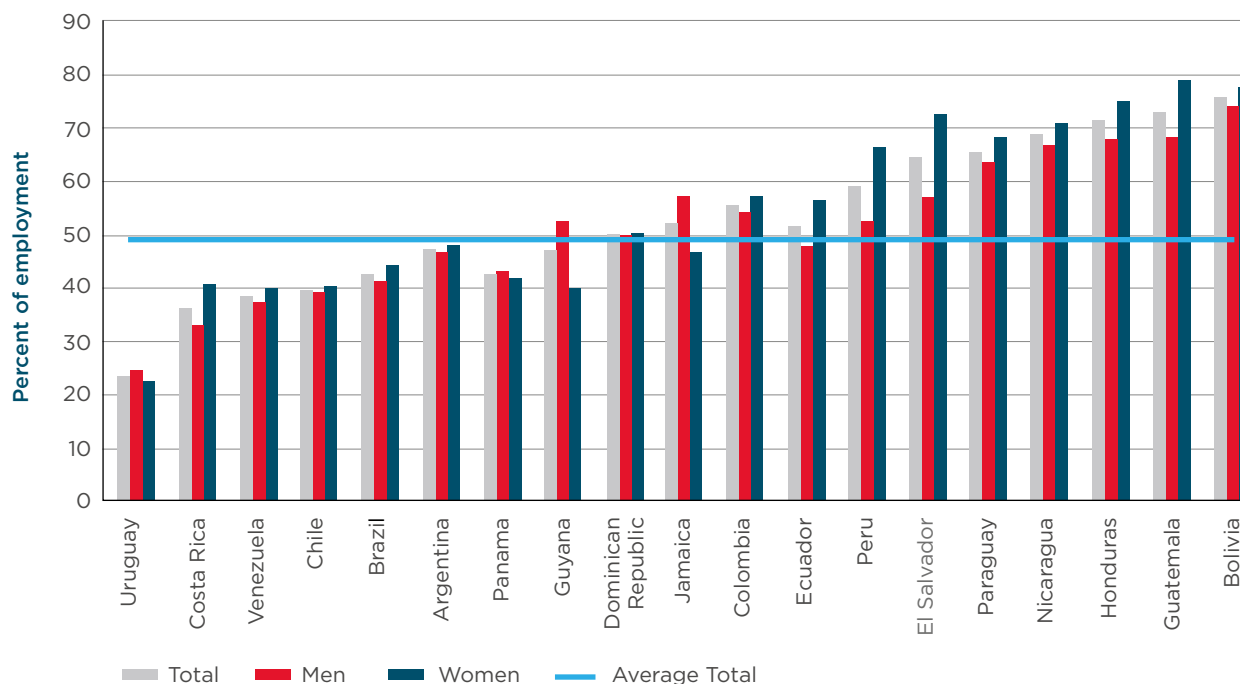


Skills gaps are prevalent while training systems often face challenges. The percentage of workers who receive some form of training averages around 15 percent in Latin America and the Caribbean, which is much lower than the 56 percent average in OECD countries (Alaimo et al., 2015). In addition, training is often geared towards people with higher initial education levels and those in formal and full-time employment. This perpetuates and amplifies the inequities in initial skills and can generate a vicious cycle of low investment in training, inadequate skills, and low productivity (Alaimo et al., 2015; González-Velosa et al., 2016; Huneus et al., 2013).

Informality is pervasive in the region (Figure 1.2). The share of informal employment excluding the agriculture sector is still over 49 percent on average and close to 80 percent in several lower-middle-income countries such as Bolivia,

Guatemala, Honduras, and Nicaragua. Informality rates among women are even higher (ILO, 2019c). Moreover, informal employment is higher when the agriculture sector is included, ranging from 24 percent of total employment in Uruguay in 2018 to 82 percent in Bolivia in 2017 (ibid.). In agriculture, child labor is also widespread; 71 percent of child labor globally occurs in agriculture (ILO, 2017a). The proportion of working children aged 5-17 in 2014-15 exceeded 10 percent in a few countries, including El Salvador, Guyana, Peru, and Paraguay (ibid.). Progress is being made in formalizing labor markets. Formal non-agricultural employment grew from 48 percent in 2005 to 53 percent in 2015 driven by the promotion of productivity, stronger regulatory mechanisms (information, simplification, social dialogue, monitoring compliance), and incentives for enterprises to formalize (Salazar-Xirinachs and Chacaltana, 2018).

Figure 1.2 / Share of Informal Employment by Gender (not including agriculture), 2018 or Latest Available Year, Selected Countries



Note

ILO calculations based on labor force surveys. Data are from 2018 (Argentina, Chile, Ecuador, Uruguay), 2017 (Bolivia, Costa Rica, El Salvador, Guyana,

Honduras, Panama, Paraguay, Peru), 2016 (Brazil, Dominican Republic, Guatemala, Jamaica), 2015 (Colombia), 2014 (Nicaragua), or 2012 (Venezuela).

Source: ILO Women and men in the informal economy data (updated), available from the following link: https://www.ilo.org/re-Search/informality/map1_en.html

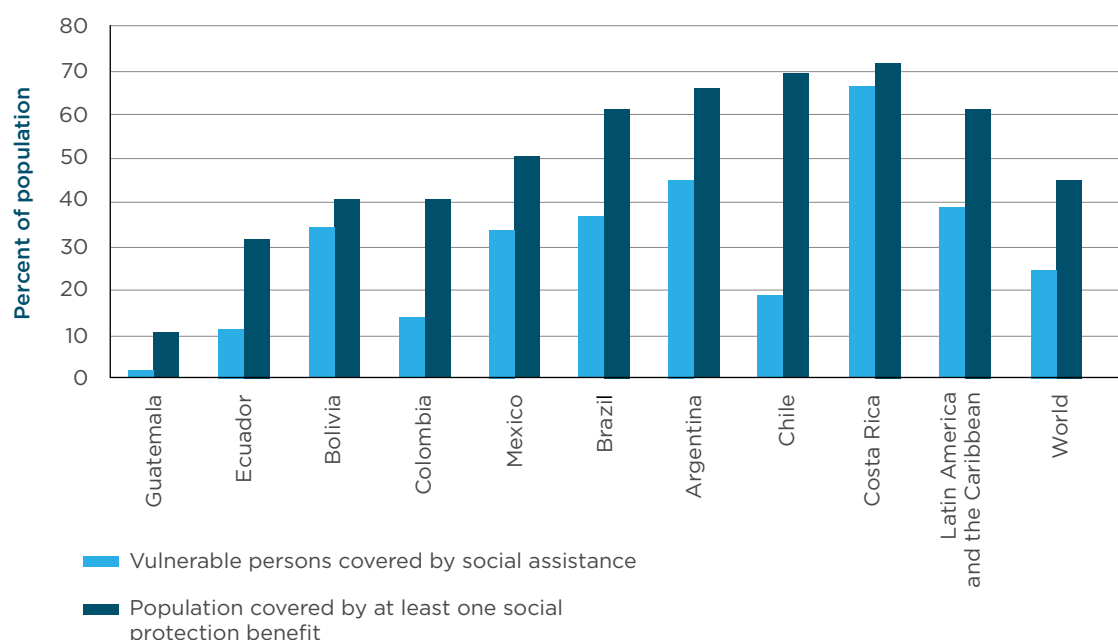
Social security coverage remains insufficient (ILO, 2017b). More than half of the workers in the region do not participate in any contributory social security system against risks related to illness, unemployment, and old age (ILO, 2018a). On average, only 40 percent of vulnerable people received some form of social assistance, and only around 60 percent of the population are covered

by at least one social protection benefit (Figure 1.3). However, during the last 15 years, countries in Latin America and the Caribbean have expanded the coverage of both contributory (financed by wages) and noncontributory (financed by taxes) social protection schemes (ILO, 2017b). Several countries in the region have tried to achieve universal social health insurance; in particular, they

aim to protect vulnerable populations from excessive out-of-pocket payments for health-care expenditures with policies that ensure health-care access for disadvantaged groups or people

with low-income or high-health risks (Lorenzoni et al., 2019). Despite these advances, gaps in social protection remain.

Figure 1.3 / Social Protection Coverage, 2017 or Latest Available Year



Note

“Vulnerable persons covered by social assistance” is the ratio of social assistance recipients to the total number of vulnerable persons (defined as all children plus adults not covered by contributory benefits and persons above retirement age not receiving contributory benefits [pensions]). “Population covered by at least one social protection benefit” is the proportion of the total population receiving at least one contributory

or noncontributory cash benefit, or actively contributing to at least one social security scheme (ILO, 2017b). Data are from 2017 (Guatemala), or 2016 (Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Ecuador, and Mexico). The averages for Latin America and the Caribbean, the Americas, and the world were calculated using data from 2015 or the latest available year.

Source: ILO (2017b).

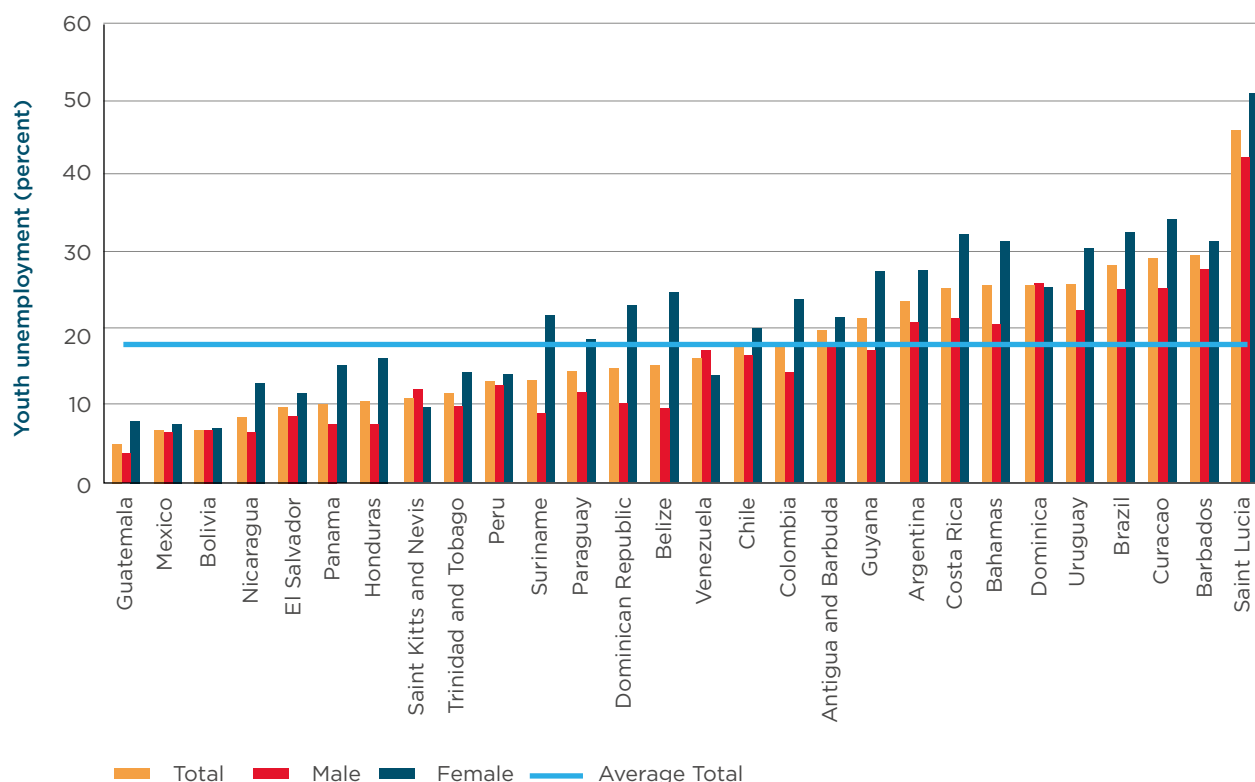
Unemployment benefits are inadequate in the region; only 12 percent of unemployed workers received such benefits in 2015 (ILO, 2017b). Even where they exist on paper (Argentina, Brazil, Chile, Colombia, Ecuador, Mexico, and Uruguay), unemployment insurance schemes often cover only a small proportion of workers and exclude workers who are underemployed, those in informal sectors, indigenous and tribal peoples, aging populations, and small-scale farmers. Public expenditure on social security is limited, in part because of fiscal constraints (ILO, 2018a).

Despite existing challenges, social security coverage shows positive trends. Since the beginning of the 21st century, countries have increasingly moved beyond the privatization that characterized the 1980s and 1990s to policies that restore the objectives of social policy universalization and expand contributory and noncontributory social protection schemes (ECLAC, 2019). Universal pensions have been implemented in Bolivia (the noncontributory old-age pension Renta Dignidad started in 2007 and was financed by revenues from natural hydrocarbon resources), Brazil (integrating both contributory and noncontributory social protection and reaching around 90 percent of those aged 65 and above), and Trinidad and Tobago (consisting of contributory and noncontributory schemes, including universal health access through public health facilities; 80 percent of people aged 65 and above receive noncontributory pensions). Argentina now has universal maternity protection and social protection for children and adolescents.

Uruguay provides an example of achieving comprehensive social protection coverage (ILO, 2019d). The country adopted a national social emergency response plan (*Plan de Atención Nacional a la Emergencia Social*, PANES) to combat extreme poverty following the 2002 banking and economic crisis. At that time, the level of cash transfers was low and some population groups were not covered by social protection. Subsequently, a new program called *Plan de Equidad* (Plan for Social Equity) replaced PANES. It provides universal coverage as well as longer and more efficient employment policies, including training and employment subsidies. This kind of protection is useful as it is automatically responsive to economic shocks (Hallegatte et al., 2017).

In 2019, 26 million people (8 percent) in the region were unemployed, while 66 million people, or 20 percent, of the labor force were underutilized (ILO, 2020a). The youth unemployment rate was much higher, at 18 percent in 2019 and affecting 9 million people (Figure 1.4). Young people who do find jobs often have to work in precarious conditions marked by informality (62 percent of total youth employment was informal), low wages, lack of job security, and limited job training. In addition, more than one in five youths, or 23 million individuals, two-thirds of whom were young women, were not employed, in school, or in training in 2019 (ILO, 2019e). Clearly, women and men will be affected differently in the transition towards environmental sustainability if no policy actions are taken.

Figure 1.4 / Youth Unemployment by Gender (15-24 years old), 2018 or Latest Available Year (percent)



Note

Data are from 2018 (Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Curacao, Dominican Republic, El Salvador, Honduras, Mexico, Panama, Paraguay, Uruguay), 2017 (Belize, Guatemala, Guyana),

2016 (The Bahamas, Barbados, Saint Lucia), 2015 (Suriname), 2013 (Nicaragua), 2009 (Trinidad and Tobago), or 2001 (Antigua and Barbuda, Dominica, Peru, Saint Kitts and Nevis, Venezuela).

Source: ILOStat.

Climate Change: Casting Another Shadow on the World of Work

Climate change threatens development, economic prosperity, decent work, and efforts to reduce inequality, particularly in developing countries (Hallegatte et al.,

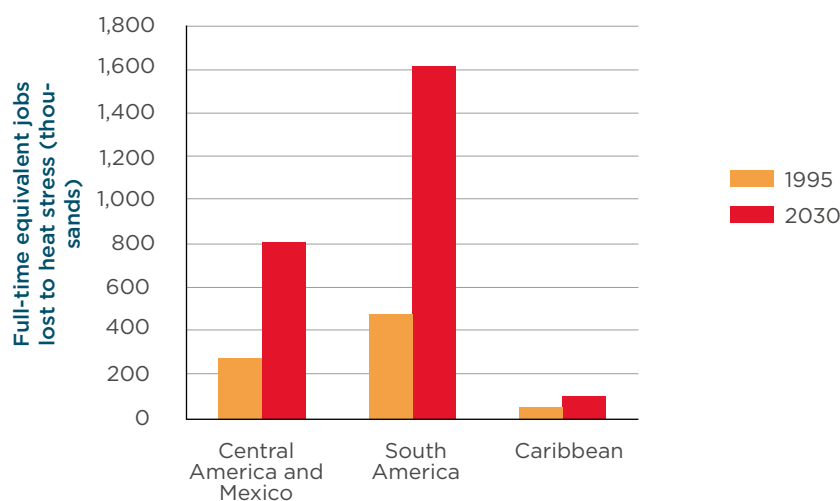
2015; ILO, 2018b). It will extend the risk of water-borne and vector-borne diseases, cause more intense and frequent natural disasters (such as tropical cyclones, floods, droughts, forest fires, and heat waves), and increase the frequency and severity of food crises (IPCC, 2018). Together, these effects will profoundly impact people in several ways.

Labor markets are tightly linked to the environment and will be heavily impacted by climate change (ILO, 2018b). People in agriculture, livestock and fishery industries are especially at risk: in many places, water availability will diminish, animal and plant diseases will become more prevalent, land suitable for agricultural production will shrink, and fish populations will continue migrating towards the poles due to ocean warming (IPCC, 2018). Agricultural challenges will affect rural areas especially, exacerbating the existing high poverty and informal female and child labor rates that are common in the fields.

Rising temperatures and heat waves alone are already a threat to working conditions. By 2030, more than 2 percent of total working hours worldwide could be lost because it is too hot to work or

because workers have to work more slowly (Kjellstrom et al., 2019). This reduction in productivity is equivalent to 2.5 million full-time jobs in Latin America and the Caribbean (Figure 1.5). Due to its relatively large population, South America will suffer the largest decline in terms of equivalent full-time workers, losing about 1.6 million jobs, while Central America and Mexico will lose about 800,000 jobs, and the Caribbean, 100,000. Heat stress—that is heat in excess of what the body can tolerate without suffering any physiological impairment—is expected to have a larger negative impact on outdoor workers (i.e., agriculture and livestock, construction, and street vending) and the most vulnerable—those working in the informal sector, who already face mounting challenges in occupational safety and health and have limited social protection coverage.

Figure 1.5 / Impact of Heat Stress on Productivity, 1995 and 2030 (projected)

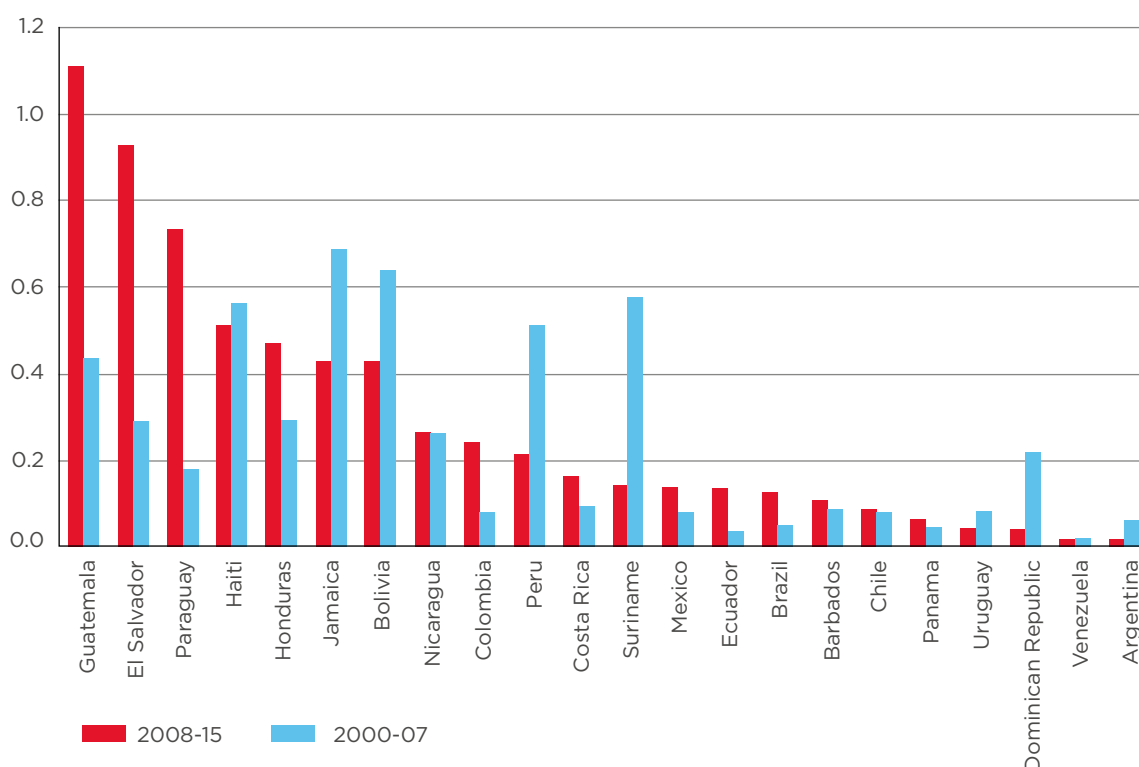


Source: Kjellstrom et al. (2019).

An increase in the frequency and intensity of natural disasters will also lead to job and productivity losses. Every year, about 23 million working-life years are lost globally as a result of natural hazards caused or exacerbated by human activities (ILO, 2018b). In Latin

America and the Caribbean, working-life years lost from environment-related hazards increased from 138 to 197 per 100,000 workers from 2000-07 to 2008-15, illustrating how natural disasters increasingly disrupt work (Figure 1.6).

Figure 1.6 / Working-life Years Lost Due to Natural Disasters, 2000-15



Note

The estimates take into consideration casualties, persons affected and damage caused by weather events (storms, fog, extreme temperatures), hydrological events (floods, landslides, wave action), climate events (drought, glacial lake outbursts, wildfires), and biological events (insect infestations). Estimates do not include casualties, persons affected, or damage caused by geophysical events

(earthquakes, volcanic activity), biological events (viral, bacterial, parasitic, and fungal epidemics or prion diseases and animal-related accidents), extraterrestrial events (impact, space weather), or certain technological threats (transport accidents). The methods are based on Noy (2015), with adjustments for retirement age and the employment-to-population ratio.

Source: ILO calculations based on Noy (2015); EM-DAT International Disaster Database; Global Health Observatory; United Nations population statistics; World Development Indicators, World Economic Outlook database; and ILOSTAT database

Jobs depend on a healthy environment and on ecosystem services (ILO, 2018b). Ecosystem services provided by biodiversity, such as crop pollination, water purification, flood protection, and carbon sequestration, are valued at US\$125-140 trillion per year globally (OECD, 2019). The region is home to one-fifth of the world's forest area and is described as a "biodiversity superpower," with key environmental services and an astonishing number of species (Bovarnick et al., 2010). Latin America and the Caribbean has an estimated 31 percent of the earth's freshwater resources (UNEP, 2010) and a quarter of

the world's medium- to high-potential farmland. It is also the world's largest net food exporting region (Truitt Nakata and Zeigler, 2014). About 64 million jobs, 19 percent of employment, are reliant on such ecosystem services. Agriculture and livestock and the processing of food, drinks, and tobacco are the sectors with the highest number of workers that rely on ecosystem services (more than 40 million and 10 million workers, respectively). Other sectors that also depend on the natural environment are the manufacture of textiles, chemicals, and paper as well as environment-related tourism (Table 1.1).

Table 1.1 / Jobs Dependent on Ecosystem Services in Latin America and the Caribbean, 2014

Sectors	Examples of ecosystem services	Number of jobs (thousands)
Almost all the sector's activities are related to biodiversity and ecosystem services		
Agriculture	Genetic resources and stock availability, freshwater, pollination, seed dispersal	40,821
Forestry		689
Fishing		1,935
Food, drink, and tobacco	Food, fiber and freshwater	8,203
Wood and paper	Fiber, water purification and waste control	2,647
Renewable energy	Fiber for biofuels	91
Water	Availability of freshwater, recycling, regulation, purification and natural risk management	345
The sector's activities depend on biodiversity and ecosystem services, but do not determine the nature of the sector		
Textile	Fiber, water purification and waste control	4,741
Chemicals	Genetic resources, biochemical diversity, freshwater	904
Tourism	Food, freshwater, air quality, education, aesthetic and cultural value	3,542
Regional total		63,918 (19% of total employment)

Source: ECLAC and ILO (2018).

A healthy environment is needed to ensure decent jobs—that is, jobs that provide a fair income and security in the workplace, labor rights, social protection, and social dialogue (ILO, 2020b).

For instance, workers on sugar cane plantations across Central America are exposed to heat stress and heat-related illnesses by working long hours under direct sunlight and amidst high humidity with only short breaks and limited access to clean drinking water (Campese, 2016; Nerbass et al., 2017). Rising temperatures due to climate change and the growing demand for sugar cane exports exacerbate the situation.

Air pollution, biodiversity loss, and natural resource depletion also negatively impact the health of workers and worsen their working conditions. Air pollution reduces productivity and working hours by harming the health of workers. It also affects women in their role as caregivers of dependent children and the elderly, thus increasing gender inequality in the labor market (Montt, 2018). Natural disasters such as storm surges, sea-level rise, and invasions of alien species degrade the ecosystem services that many industries, such as tourism, rely on. In the Caribbean, for example, 30 percent of major resort properties would be partially or fully inundated by a 1-metre sea level rise (UN-OHRLLS, 2015). Working conditions, the safety and health of workers, their productivity, and the physical workplace itself will be negatively affected by such environmental degradation.

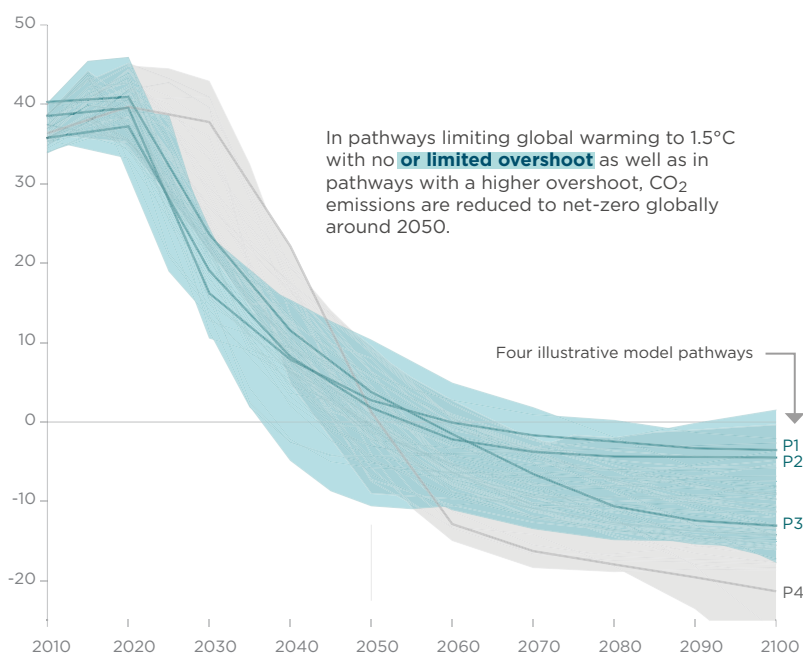
Part of the solution lies in adapting to climate change impacts. In the world

of work, for instance, countries can use social dialogue to promote occupational safety and health and improve working conditions, especially for the most vulnerable groups. But there are limits to what adaptation can do if climate change itself is not kept in check. Stopping global warming is indispensable to ensure that its impacts on development, prosperity, and the world of work are manageable.

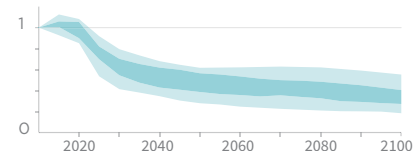
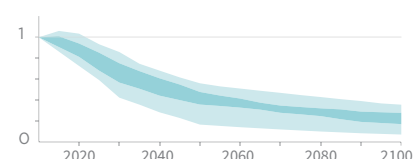
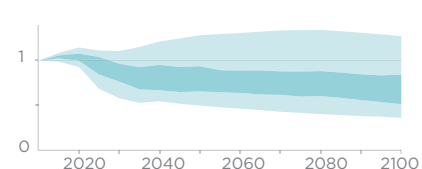
Net-Zero Carbon Emissions: A Doable Goal

All governments in the region have pledged through the Paris Agreement to make efforts to stabilize the increase in global temperature at well below 2°C, and as close to 1.5°C as possible (United Nations, 2015). This ambitious goal requires reaching net-zero emissions of carbon dioxide (CO₂) by 2050, and drastically reducing emissions of other greenhouse gases (GHGs) before the end of the century (Figure 1.7). Carbon dioxide has a special role to play because it is the main GHG and has a long lifetime: once emitted, it stays in the atmosphere for centuries.

Reaching net-zero CO₂ emissions means both reducing sources of emissions such as the combustion of fossil fuels, and increasing carbon sinks by, for example, expanding forests, since trees capture carbon from the atmosphere as they grow. The salient message of climate research is that as long as the global economy releases more CO₂ into the atmosphere than it removes through carbon sinks the climate will continue warming (IPCC, 2018).

Figure 1.7 / Scenarios of Carbon Emissions over Time**Global total net CO₂ emissions**Billion tonnes of CO₂ / year**Non-CO₂ emissions relative to 2010**

Emissions of non-CO₂ forcers are also reduced or limited in pathways limiting global warming to 1.5°C with no or limited overshoot, but they do not reach zero globally.

Methane emissions**Black carbon emissions****Nitrous oxide emissions****Note**

Scenarios are grouped by their long-term impact on global temperatures. Left: The picture shows that all the scenarios reviewed by the Intergovernmental Panel on Climate Change (IPCC) that are consistent with a 1.5°C temperature increase reach net-zero CO₂ emissions globally around 2050. Trajectories of no or limited overshoot, in blue, keep global warming consistently below 1.5°C throughout the 21st century or allow a limited overshoot of 0.1°C at most, thereby limiting global warming to no more than 1.6°C throughout the 21st century. High-overshoot pathways, in grey, imply temperature increases

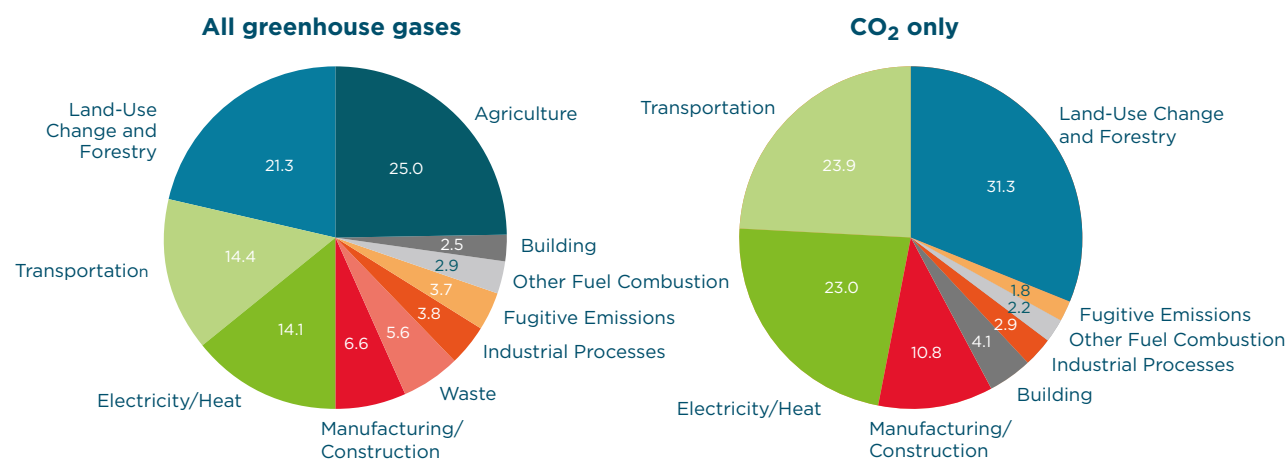
higher than 1.5°C (but lower than 2°C) for a while. The overshoot is subsequently lowered with the help of geoengineering technologies that remove CO₂ from the atmosphere at unprecedented scales and store it underground or in the deep oceans. The IPCC warns that overshooting trajectories would lead to irreversible impacts on human societies and ecosystems, and that massive geoengineering is likely to be infeasible. Right: Emissions of other GHGs will decrease substantially over the century in scenarios that reach the 1.5°C target, but these emissions are not reduced to zero.

Source: IPCC (2018).

Per capita GHG emissions in Latin America and the Caribbean are aligned with global averages – At 6.6tCO₂eq per capita in the region against 6.9 globally in 2014 (WRI, 2018). Both globally and in the region, the two leading causes of GHG emissions are (i) the provision of energy services, as fossil fuels used for electricity, heating and cooling, and transportation emit carbon dioxide when burned; and (ii) the provision of food, as livestock and rice crops emit methane, synthetic fertilizers emit nitrous oxide, and deforestation and the transformation of ecosystems into croplands result in carbon dioxide emissions.¹

Land-use changes (mainly deforestation) and fossil fuel combustion (mainly for transport and energy) represent almost one-third, and almost two-thirds of CO₂ emissions in the region, respectively (Figure 1.8). While deforestation is historically the largest driver of carbon emissions in the region, the relative contribution of transport and electricity production has increased over time; together, these sectors are now bigger emitters than land-use changes. Fossil fuel energy is thus the main carbon emitter in the region.

Figure 1.8 / Distribution of Emissions of GHGs per Sector in Latin America and the Caribbean, 2016, percent



Note

Greenhouse gas emissions are counted in terms of CO₂ equivalent (left) and CO₂ alone (right). Virtually all CO₂ emissions except those listed under Land-Use Change and Forestry and Industrial Processes originate from burning fossil fuels.

Source: WRI (2018).

¹In climate science and climate policy, it is common to aggregate different greenhouse gases by considering their peak warming potential, expressed in terms of equivalent CO₂ emissions. This is how Figure 1.8, left, is able to sum all GHGs together. However, as shown in Figure 1.7, CO₂ plays a special role in climate stabilization; it is the only GHG for which emissions become net-negative in the IPCC scenarios.

Is a zero-carbon world possible?

Academics, think tanks, governments, and international agencies have studied this question for decades and agree that the answer is yes, with immediate and simultaneous actions on the five pillars of decarbonization (Fay et al., 2015; IDB and DDPLAC, 2019; IPCC, 2014a; Vergara et al., 2015):

1. Decarbonizing the production of electricity (e.g., using renewable energy).
2. Undertaking massive electrification (e.g., using electric vehicles and electric boilers) and, where this is not possible, switching to cleaner fuels (e.g., hydrogen or sustainably produced biofuels).
3. Drastically improving public transport and enabling nonmotorized transportation such as cycling or walking.
4. Preserving and increasing natural carbon sinks, notably forests and other high-carbon ecosystems such as mangroves and seaweeds. Plants capture carbon from the atmosphere as they grow, helping offset emissions from difficult-to-abate sources, and making it possible to reach net negative emissions after 2050.
5. Improving efficiency and reducing waste in all sectors, particularly in energy and food consumption, and switching to less carbon-intensive building materials (e.g., using recycled materials or sustainably produced wood instead of cement) and

changing diets (e.g., reducing beef consumption). Waste management through a circular economic approach (produce-use-service-reuse) can help reduce emissions in all sectors.

For a few sectors, such as long-distance air transport, feasible technological pathways to net-zero emissions are still uncertain. Decarbonization in these sectors, which represent a small fraction of emissions, will depend on technological breakthroughs and the compensation of emissions through carbon sinks, most notably reforestation.

Latin America loses more tree cover every year than any region in the world. This deforestation contributes significantly to carbon dioxide emissions, loss of biodiverse habitat, and destruction of ecosystem services. Forest is cleared to make space for crops, notably soybean used to feed cattle, or pastures, notably for cattle (FAO, 2016; Rocha et al., 2019). Changes that can help reduce land conversion pressures include enforcing existing laws and regulations that prohibit deforestation, increasing food productivity, minimizing the food loss and waste that account for about a third of food produced globally, limiting competition for land from bioenergy crops, restricting crop expansion to lands that produce lower ecosystem services, and switching to diets that rely less on animal-based foods and more on plant-based foods (Searchinger et al., 2019). Global and regional dietary changes are important options for reducing pressure on deforestation and associated carbon emissions. They can also directly reduce

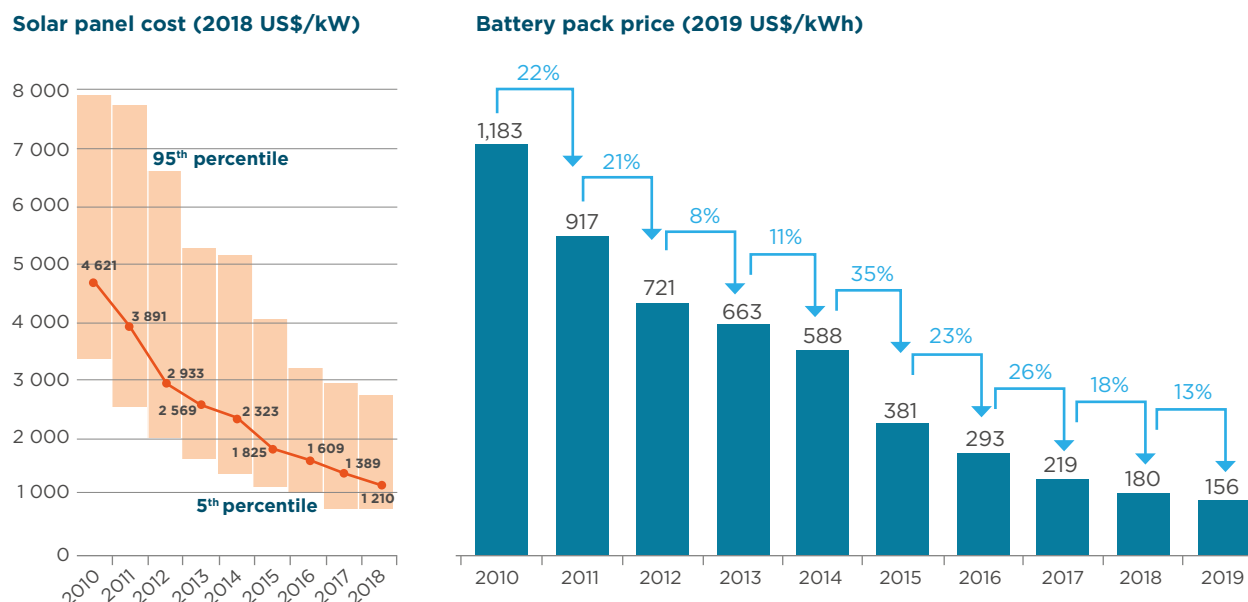


emissions of nitrous oxide from fertilizers and methane from livestock.

To decarbonize by 2050, countries need to act on the five pillars of decarbonization in parallel, starting in all sectors immediately. For instance, it makes sense to promote electromobility even in countries where doing so will momentarily increase the use of coal power plants, as long as the country simultaneously moves to decarbonize power generation (Audoly et al., 2018). It also makes sense to try to decarbonize sectors that are difficult to decarbonize, such as transportation, even though easier opportunities, for instance in electricity production, have not been exhausted. That is because the transformation required will take decades to implement in all sectors (Vogt-Schilb et al., 2018, 2015). What is important is not the immediate effect of any policy on emissions, but the long-term transformation towards a net-zero carbon economy.

Decarbonization: Good for the Environment, the Economy, and People

Decarbonizing the region comes with many opportunities to improve the business environment, the economy, and the lives of ordinary citizens (NCE, 2018, 2014). Between 2010 and 2017, the global average cost of generating electricity with new photovoltaic plants was cut by 75 percent (Figure 1.9). In many parts of the world today, renewables are already the lowest-cost source of new power generation (IRENA, 2020). Utilities in Mexico, Peru, and Chile are already procuring solar and wind-based electricity for as low as 3 cents per kilowatt-hour (kWh). That is the lowest cost globally for power generation from any source – for reference, producing electricity with coal, oil, or gas costs between 5 and 18 cents per kWh (ibid.).

Figure 1.9 / The Decline in Renewable Electricity and Battery Costs**Note**

Left: average cost of new photovoltaic power generation capacity globally 2010–18, in US\$ per installed kilowatt (IRENA, 2019). Right: global

average cost of battery packs, 2010–19, in US\$ per installed kilowatt-hour (BNEF, 2019).

Source: left: IRENA (2019); right: BNEF (2019).

It is technically and economically feasible to scale up renewable power in Latin America and the Caribbean. The International Renewable Energy Agency's scenario of a global energy system consistent with the Paris Agreement objectives sees 93 percent of electricity coming from renewable energy in the region by 2050 (IRENA, 2020). Grid stability issues are important but manageable with existing technology (ibid.). Latin America and the Caribbean could get up to 80 percent renewable electricity in an affordable way, making use of the abundant wind and solar resources as their cost continues to

decrease, and using thermal power and existing large hydropower (provided that hydrometric conditions remain favorable) as a means to balance the system (Paredes, 2017). With regard to job creation, a scenario of global transition towards environmental sustainability in the energy sector, which would limit global warming to 2°C, would result in a net job creation of 18 million jobs worldwide by 2030, of which 3 million would be realized in the Americas (ILO, 2018b).

Two parallel changes in the transportation system will bring great opportunities for

the region: the move to more efficient public transport systems and greater electromobility. In Costa Rica, it is estimated that time lost in traffic, as well as accidents and the health impacts of local air pollution, cost the country 3.8 percent of GDP (EN, 2018). This is in line with global estimates that put time and fuel wasted as a result of urban congestion between 2 and 5 percent of GDP (Lefèvre et al., 2016). In addition, the cost of electric transportation is decreasing fast: lithium-ion battery prices were cut by 80 percent between 2010 and 2017 and are expected to continue falling (Figure 1.9). Decarbonizing the transport sector in Costa Rica (improving public transit and increasing electromobility) will bring net benefits of about US\$20 billion to the country by 2050 (IDB and DDPLAC, 2019). Lower operational costs, time saved thanks to less congestion, better health, and fewer accidents will compensate for the initially higher investment costs required to build the stock of electric vehicles and charging infrastructure (IDB and DDPLAC, 2019). Moreover, public transport can directly improve accessibility to jobs for the populations they cater to (Oviedo et al., 2019; Venter et al., 2018). If they make it safer for women to use public transport, public transportation lines can also help reduce gender gaps in the labor market (Martinez et al., 2020).

A transition to sustainable transport can also create employment in the transport sector and the industries that supply it. Doubling public investment in the 56 countries of North America, Europe, the Caucasus and Central Asia that are members of the UNECE would create at least 2.5 million additional jobs in the transport sector worldwide

and 5 million direct and indirect jobs by 2030 (ILO and UNECE, 2020). Factors that support job creation outside the transport sector include increased spending on goods and services as households reduce spending on oil, and measures related to the production and use of energy. The production of energy from renewable sources uses more labor and less capital than energy from non-renewable sources. Almost half of these jobs would be created outside the ECE region. Ensuring that 50 percent of all new vehicles built are electric would add another net total of almost 10 million jobs to world employment across all sectors, of which 7.1 million would be outside the ECE region. A ban on internal combustion engines for light commercial vehicles would lead to as many as 8.5 million new jobs if the indirect and induced impact on other sectors is considered. However, employment would contract in the motor vehicle and petroleum industries. Moreover, local and national authorities can take various measures that lead to policy-induced modal shifts, for example congestion taxing and changes in land-use (walkable cities) (ILO, Forthcoming b). With the appropriate industrial strategy, Latin America and the Caribbean could create decent jobs in the sustainable transport sector (Chapter 4).

Finally, dietary changes present major opportunities for reducing GHG emissions while reducing malnourishment and improving health outcomes (EAT-Lancet Commission, 2019; Searchinger et al., 2019). A healthy and sustainable diet would be high in coarse grains, beans, fruits and vegetables, as well as nuts and seeds; low in sugars and animal-based foods; and moderate in terms of carbohydrate intake. And because plant-

based food systems require less land, water, and inputs over their life cycle than animal-based foods (since ultimately feeding animals requires growing plants), dietary changes would also reduce land degradation and biodiversity loss, and improve food security.

Considering the local benefits, the overall costs to decarbonize are low. The IPCC (2014b) estimates that the cost of reaching the 2°C target would be about 2 percent of GDP in 2030 and about 4.5 percent in 2100 (whether measured globally or in Latin America and the Caribbean). A World Bank report finds that decarbonizing the economy will not require more investment and maintenance expenditures in developing countries than what is currently needed to bridge the infrastructure service gap (Rozenberg and Fay, 2019). And importantly, these numbers do not account for the main benefit of moving to a net-zero carbon economy: avoiding the prohibitively expensive impacts of the climate change crisis. However, these benefits may not fully materialize if current barriers to decarbonization are not addressed.

Barriers to Decarbonization

Some steps to reduce carbon emissions have been undertaken by large enterprises in Latin America and the Caribbean, but more can be done to incentivize and support firms'

transition to net-zero carbon emissions. Multinational companies in Latin America surveyed by the Carbon Disclosure Project (CDP)² indicate their willingness to integrate emissions reduction efforts in their operations, but the lack of an adequate regulatory framework prevents them from doing so. When asked whether "climate change is integrated into [their] business strategy," a large share (86 percent) of multinational companies in the region respond in the affirmative, a proportion similar to the rest of the world (92 percent). In particular, one in five companies report using an internal price of carbon; again, the percentage of companies is close to the global average. Almost one-third of companies in the region report originating or acquiring project-based carbon credits (31 percent versus 20 percent globally).

In addition to large firms, micro-, small, and medium enterprises (MSMEs) are particularly relevant to advancing environmental sustainability and promoting formal employment in rural economies, but they also face a variety of obstacles in greening their businesses (ILO, 2018b). These obstacles include additional costs from adapting new technologies, limited access to information and capital, voluntary practices that do not result in direct business benefits and firms' perception that consumers are not interested in their environmental impact, among others. Measures to support MSMEs reaping the benefits brought about by decarbonization and to reduce the

²The Carbon Disclosure Project (CDP) is a voluntary survey in which companies disclose their GHG emissions and relate their opinions and experience with policies and their specific efforts and targets to mitigate emissions. CDP covers firms from a variety of sectors including consumer staples, consumer discretionary, energy, financial, health care, industrial, IT, materials, telecommunications, and utilities. In 2015, a total of 1,997 firms responded to the questionnaire globally. CDP questionnaires and data are available at www.cdp.net.



adverse impacts of climate change and climate-related policies, for instance regulations to support cooperatives, green finance, and greening the supply chains will be discussed in more detail in Chapter 3.

Indeed, current regulations can undermine the implementation of low-carbon options by the private sector. The prevailing market organization of entire sectors may be intrinsically linked to incumbent technologies, practices, and business models. For example, the public transport sector tends to rely on small-scale operators that may struggle to bear the higher upfront cost of electric buses, even if these make greater financial sense over their lifetime. To encourage the adoption of zero-carbon solutions and maximize the potential of increasing decent work in doing so, governments will need to enact comprehensive policy reform packages that change the rules of the game and let new business models emerge. For instance, Chile has created new business models in the public transport sector to enable the introduction of electric buses: local

electricity utilities can now leverage their large financial capacity to buy electric buses, and then rent them out to bus drivers, who benefit from manageable leasing costs (Ramírez Cartagena et al., 2020).

Current prices may discourage the adoption of low-carbon solutions by businesses and households. The IMF estimates that, at the global level, various forms of energy subsidies stood at US\$5.2 trillion (6.5 percent of GDP) in 2017 (Coady et al., 2019). Low energy prices remove the incentive to invest in energy efficiency or electric transport. If well managed, eliminating or reducing energy subsidies would increase economic efficiency and provide businesses and consumers with incentives to switch to zero-carbon options, thereby improving environmental and health outcomes.

On the other hand, the transition to net-zero emissions potentially creates winners and losers, making the political economy of the transition more difficult (Vogt-Schilb and Hallegatte, 2017).

Consumers can be hurt by the impact of removing energy subsidies or introducing environmental taxes on food and basic services (Coady et al., 2015; Schaffitzel et al., 2020; Vogt-Schilb et al., 2019).

Any significant price change needs to be phased in gradually and accompanied by measures to help the most affected groups manage the transition (see Chapter 3 for more detail on social assistance measures to price change due to the removal of energy subsidies or implementation of environmental taxes). Businesses, workers, and communities can be adversely affected by the downsizing or phasing out of economic activities that are inconsistent with net-zero emissions, such as the production of fossil fuels or raising cattle. These impacts need to be anticipated, minimized, and compensated by targeted policies and complementary measures to align decarbonization with sustainable development goals and make it socially acceptable. Examples of managing the reform of energy subsidies without hurting the vulnerable population are provided in Chapter 3.

Furthermore, the fiscal sustainability of governments can be affected if they rely extensively on taxes on fossil fuel consumption or fossil fuel royalties (IEA, 2019; Solano-Rodriguez et al., 2019). Using electric vehicles will reduce revenues from gasoline and diesel taxes, which represent more than 10 percent of fiscal revenues in countries such as Costa Rica or Uruguay (OECD et al., 2020). For countries such as Ecuador and Venezuela, where oil production and exports are a key source of government funding through royalties and state-owned

enterprises, the global energy transition is a risk. Ministries of finance need to understand this transition risk and take measures to mitigate it.

Finally, current emissions reduction plans are insufficient. The Paris Agreement requires that countries periodically communicate their efforts to reduce emissions and advance towards the achievement of the agreement's goals via their Nationally Determined Contributions (NDCs). In the region, 24 countries have submitted a first round of NDCs, which contain plans to reduce GHG emissions by 2030. However, the NDCs submitted in the months leading up to the Paris Agreement in 2015 are known to be insufficient, as they collectively fail to put economies and societies on track to limiting global warming to well below 2°C (UNEP, 2019). Globally, the NDCs allow emissions of 52-58 GtCO_{2eq} in 2030, which could lead to more than 4°C global warming; staying on track to the 1.5°C target would require reducing emissions to 25-30 GtCO_{2eq} by 2030 (IPCC, 2018). In Latin America and the Caribbean, current NDCs allow the share of zero-carbon electricity in the region to remain below 55 percent by 2030. Decarbonizing in time to reach the 1.5°C target would require getting at least 70 percent of electricity from zero-carbon sources by 2030 (Binsted et al., 2019). Implementing existing NDCs as they stand could lock in high-emissions pathways and create new technical and economic barriers to decarbonization, in particular in the form of stranded assets in the energy sector (Box 1.1). NDCs need to be updated and aligned with long-term decarbonization goals.

Box 1.1

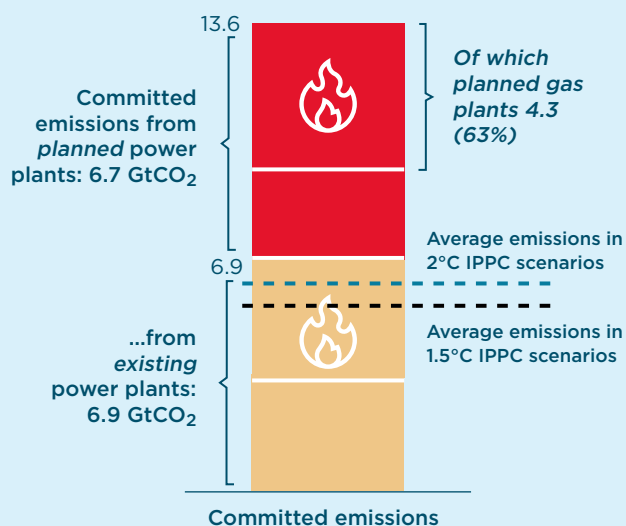
Stranded Assets and Stranded Jobs in Oil and Gas Power Plants

As a result of weak NDCs, governments and businesses are investing in activities that conflict with the Paris Agreement's long-term objectives (Binsted et al., 2019). For instance, Latin America and the Caribbean currently has the least carbon-intensive electricity sector in the world, thanks to the highest share of hydroelectricity (IEA 2018a). But that does not mean that the energy sector is ready for the transition to net-zero emissions. In fact, existing power plants and expansion plans—and the jobs they sustain—are inconsistent with the long-term objectives of the Paris Agreement.

The concept of committed carbon emissions has been used to assess the impact of long-lived infrastructure on climate change (Davis and Socolow, 2014). Fossil fuel power plants are typically used for 30 to 40 years. Committed

emissions are the carbon emissions that will result from the normal operation of existing fossil fueled power plants during that time. Globally, existing fossil-fuel energy infrastructure will already emit 30 percent more CO₂ over its lifetime than what would be consistent with the 1.5°C target (Tong et al., 2019). In Latin America and the Caribbean, committed emissions from existing power plants are also 30 percent greater than the average amount of carbon emissions from the Latin American and Caribbean power sector in global scenarios consistent with the 1.5°C target compiled by the IPCC (González-Mahecha et al., 2019). Building all planned and announced fossil fuel power plants in the region (most of them natural gas power plants) would make things worse, bringing committed emissions 150 percent greater than what is consistent with that target (Figure 1.1.1).

Figure 1.1.1 / Emissions from Existing and Planned Power Plants in Latin America and the Caribbean



Note

Committed emissions in existing and planned power plants, compared with average emissions from the Latin American and Caribbean

power sector in pathways consistent with Paris Agreement's targets.

The concept of committed emissions also applies to the upstream oil, gas, and coal industries. Fossil fuels contain carbon, which will necessarily be transformed into carbon dioxide when it burns; fossil fuel reserves thus directly translate into committed emissions. Globally, it is estimated that more than half the proven reserves of fossil fuels cannot be burned in a 2°C world, including 40 percent of oil and 50 percent of coal and gas in Latin America and the Caribbean (McGlade and Ekins, 2015). In Latin America and the Caribbean, between 50 and 70 percent of oil reserves will be unused by 2035 if global demand for fossil fuel falls to levels consistent with the 1.5°C target, reducing fiscal receipts for the region by up to US\$6 trillion and jeopardizing the jobs of fossil fuel workers (Solano-Rodriguez et al., 2019).

The coal phase-out plan in Chile shows that future emissions from energy infrastructure are not inevitable, but avoiding future emissions requires tackling negative social impacts, including the elimination of jobs. Chile's government has considered options to progressively retire coal power generation plants between 2030 and 2050. Replacing coal with renewable power would create a total of between 2,000 and 8,000 net jobs by 2030 (Vogt-Schilb and Feng, 2019). But the positive net impact on jobs masks gross negative impacts in the coal power sector (between 400 and 4,000 jobs in 2030). These numbers are negligible when compared to the Chilean job market as a whole, which can create more

than 40,000 jobs per trimester (INE, 2018), but they are substantial when compared to current employment in power generation (around 48,000 jobs in 2017).

The example of Chile reveals two key difficulties for managing the labor impacts of the transition, which is discussed more in depth in subsequent chapters of this report. One problem is that the communities where coal power plants are currently located can be significantly impacted by a phase down of coal power. In the most exposed communities, coal power represents almost 4 percent of local GDP and 7.1 percent of residents of these communities work in a coal power plant (Viteri Andrade, 2019). The other issue is that coal power plant jobs tend to pay above-average wages and come with many social benefits (e.g., health insurance, retirement benefits). Even if more jobs are created in the renewable energy sector, there is no guarantee that the jobs will be located in the same communities. Coal power plant workers employed by large electricity generators in Chile may benefit from agreements with their employers that allow them to keep their jobs and transition to other power plants in the country. This can be the case more generally for upstream fossil fuel workers employed by firms that diversify into renewable energy production. But at the territorial level, avoiding the negative impacts of the transition may require providing alternatives that translate into better working conditions in the affected communities.

Long-Term Strategies to Net-Zero Emissions

While there are many environmental, economic, and social benefits to decarbonization, Latin America and the Caribbean face common planning, regulatory, financial, and political economy

obstacles on the road to a net-zero carbon future.

The good news is that international commitments provide a framework for countries to lift these barriers. Existing NDCs are only a starting point. As part of the Paris Agreement, all countries are expected to submit updated NDCs in

the coming months, and are also invited to formulate and communicate long-term, low greenhouse gas emissions and resilient development strategies.³ Countries thus have an opportunity to align their NDCs with the long-term carbon neutrality goal in a way that maximizes domestic benefits and minimizes overall costs, while developing policy roadmaps that remove the barriers to an inclusive and politically acceptable transition to net-zero emissions (IDB and DDPLAC, 2019).

Lessons learned from experience and analysis of the design and implementation of such long-term decarbonization strategies highlight two key recommendations to ensure their relevance to local context, alignment with sustainable development goals, and buy-in from different stakeholders (IDB and DDPLAC, 2019; Pathak, 2017; Waisman et al., 2019). First, all relevant stakeholders should be involved in the elaboration of decarbonization strategies, including workers' and employers' organizations, sector associations, firms, researchers, indigenous communities, and civil society groups – hence highlighting the importance of social dialogue.

Second, a climate strategy should anticipate the details of the physical transformations needed to decarbonize by 2050. Strategies should aim to translate the carbon-neutrality goal and

socioeconomic aspirations into concrete technical and socioeconomic changes that could support these goals at the sector level. For instance, what share of electricity needs to be produced from renewable energy sources by 2030 or 2050, or what shifts in diets and food export strategies are consistent with reforestation goals? Comparing such a vision with current conditions allows building a timeline for behavioral changes (e.g., concerning diets or preferred mobility modes), infrastructure stocks (e.g., power plant mix and composition of the vehicle fleet), technology deployment (e.g., market share of electric cars), and a timeline for phasing out existing carbon-intensive assets (such as coal power plants).

Decarbonization could bring social, economic, and development benefits for the region but the right set of conditions need to be in place to realize this potential and to ensure the transition happens in a fair and inclusive way. As the following chapters show, identifying concrete sector changes also allows policymakers to anticipate the implications for jobs, required skills, and working conditions. This, in turn, allows all relevant stakeholders to participate in constructing a policy roadmap that removes barriers to the adoption of zero-carbon solutions while managing labor market impacts.

³The international climate change community had set 2020 as the date when updated NDCs and long-term strategies were expected. Due to COVID-19, many countries will likely experience delays; many updated NDCs and long-term strategies will be announced in 2021.

References

- Alaimo, V., Bosch, M., Kaplan, D.S., Pages, C., Ripani, L., 2015. Jobs for Growth. Inter-American Development Bank, Washington, D.C. <https://doi.org/10.18235/0000139>
- Audoly, R., Vogt-Schilb, A., Guivarch, C., Pfeiffer, A., 2018. Pathways toward zero-carbon electricity required for climate stabilization. *Applied Energy* 225, 884–901. <https://doi.org/10.1016/j.apenergy.2018.05.026>
- Binsted, M., Iyer, G.C., Edmonds, J., Vogt-Schilb, A., Arguello, R., Cadena, A., Delgado, R., Feijoo, F., Lucena, A.F.P., McJeon, H.C., Miralles-Wilhelm, F., Sharma, A., 2019. Stranded asset implications of the Paris Agreement in Latin America and the Caribbean. *Environ. Res. Lett.* <https://doi.org/10.1088/1748-9326/ab506d>
- BNEF, 2019. 2019 Battery Price Survey. Bloomberg New Energy Finance, New York.
- Bovarnick, A., Schnell, C., Alpizar, F., 2010. Importance of Biodiversity and Ecosystems in Economic Growth and Equity in Latin America and the Caribbean: An economic valuation of ecosystems. United Nations Development Programme, New York.
- Campese, V.M., 2016. The Mesoamerican nephropathy: a regional epidemic of chronic kidney disease? *Nephrol Dial Transplant* 31, 335–336. <https://doi.org/10.1093/ndt/gfv430>
- Coady, D., Parry, I., Le, N.-P., Shang, B., 2019. Global Fossil Fuel Subsidies Remain Large: An Update Based on Country-Level Estimates. International Monetary Fund.
- Coady, D.P., Flamini, V., Sears, L., 2015. The Unequal Benefits of Fuel Subsidies Revisited: Evidence for Developing Countries. IMF Working Paper No. 15/250.
- Davis, S.J., Socolow, R.H., 2014. Commitment accounting of CO2 emissions. *Environ. Res. Lett.* 9, 084018. <https://doi.org/10.1088/1748-9326/9/8/084018>
- EAT-Lancet Commission, 2019. Food Planet Health-Healthy Diets from Sustainable Food Systems. Retrieved February 26, 2019.
- ECLAC, 2019. Social Panorama of Latin America 2019. ECLAC, Santiago, Chile.
- ECLAC, ILO, 2018. Environmental sustainability and employment in Latin America and the Caribbean (No. 19), Employment Situation in Latin America and the Caribbean. Santiago.
- EN, 2018. Estado de la nación en desarrollo humano sostenible. Programa Estado de la Nación, San Jose, Costa Rica.
- FAO, 2016. State of the World Forests 2016. Forests and Agriculture: Land-use challenges and opportunities (No. I5588E/1/07.16). Food and Agricultural Organization of the United Nations, Rome, Italy.
- Fay, M., Hallegatte, S., Vogt-Schilb, A., Rozenberg, J., Narloch, U., Kerr, T., 2015. Decarbonizing Development: Three Steps to a Zero-Carbon Future. World Bank Publications, Washington DC, USA.
- González-Mahecha, R.E., Lecuyer, O., Hallack, M., Bazilian, M., Vogt-Schilb, A., 2019. Committed emissions and the risk of stranded assets from power plants in Latin America and the Caribbean. *Environ. Res. Lett.* <https://doi.org/10.1088/1748-9326/ab5476>
- González-Velosa, C., Rosas, D., Flores, R., 2016. On-the-Job Training in Latin America and the Caribbean: Recent Evidence, in: Inter-American Development Bank, Grazi, M., Pietrobelli, C. (Eds.), *Firm Innovation and Productivity in Latin America and the Caribbean: The Engine of Economic Development*. Palgrave Macmillan US, New York, pp. 137–166. https://doi.org/10.1057/978-1-349-58151-1_5
- Hallegatte, S., Bangalore, M., Bonzanigo, L., Fay, M., Kane, T., Narloch, U., Rozenberg, J., Treguer, D., Vogt-Schilb, A., 2015. Shock waves: managing the impacts of climate change on poverty. The World Bank.
- Hallegatte, S., Vogt-Schilb, A., Bangalore, M., Rozenberg, J., 2017. Unbreakable: Building the resilience of the poor in the face of natural disasters. Washington, DC: World Bank.
- Huneus, C., De Mendoza, C., Rucci, G., 2013. Una visión crítica sobre el financiamiento y la asignación de recursos públicos para la capacitación de trabajadores en América Latina y El Caribe. Washington, D.C.
- IDB, DDPLAC, 2019. Getting to Net-Zero Emissions: Lessons from Latin America and the Caribbean. Inter-American Development Bank and Deep Decarbonization Pathways for Latin America and the Caribbean. <https://doi.org/10.18235/0002024>
- IEA, 2019. Government revenue from taxation, in: *Global EV Outlook 2019*. International Energy Agency.
- IEA, 2018. Extended world energy balances. <https://doi.org/10.1787/4bcaa5-en>
- ILO, 2020a. World Employment and Social Outlook: Trends 2020 (Report). ILO, Geneva.

- ILO, 2020b. Decent work [WWW Document]. URL <https://www.ilo.org/global/topics/decent-work/lang--en/index.htm> (accessed 4.20.20).
- ILO, 2019a. Indigenous Peoples and Climate Change: Emerging Research on Traditional Knowledge and Livelihoods. International Labour Office, Geneva.
- ILO, 2019b. 2018 Labour Overview of Latin America and the Caribbean. Lima.
- ILO, 2019c. World Employment and Social Outlook: Trends 2019 (Report). Geneva.
- ILO, 2019d. What Works: Promoting Pathways to Decent Work (Report). Geneva.
- ILO, 2019e. Panorama Laboral 2019. América Latina y el Caribe. ILO Regional Office for Latin America and the Caribbean, Lima.
- ILO, 2018a. Presente y futuro de la protección social en América Latina y el Caribe. Lima.
- ILO, 2018b. World Employment and Social Outlook 2018: Greening with jobs (Report). International Labour Organization.
- ILO, 2017a. Global Estimates of Child Labour: Results and trends, 2012-2016 (Report). ILO, Geneva.
- ILO, 2017b. World Social Protection Report 2017-19: Universal social protection to achieve the Sustainable Development Goals. International Labour Organization, Geneva.
- ILO, Forthcoming a. Inequalities and the world of work, in: International Labour Conference, 109th Session, 2020, Report IV, Fourth Item on the Agenda. International Labour Office, Geneva.
- ILO, Forthcoming b. The future of decent and sustainable work in urban transport services. International Labour Office, Geneva.
- ILO, UNECE, 2020. Jobs in green and healthy transport: Making the green shift. UNECE, Geneva.
- INE, 2018. Empleo trimestrial (No. Edición no 240 / 31 de octubre de 2018). Instituto Nacional de Estadísticas, Santiago.
- IPCC, 2018. Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty. Intergovernmental Panel on Climate Change.
- IPCC, 2014a. Climate change 2014: Mitigation of climate change. Cambridge University Press, New York.
- IPCC, 2014b. Summary for Policymakers, Climate Change 2014, Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Intergovernmental Panel on Climate Change.
- IRENA, 2020. Global Renewables Outlook: Energy transformation 2050. International Renewable Energy Agency, Abu Dhabi.
- IRENA, 2019. Renewable power generation costs in 2018. International Renewable Energy Agency, Abu Dhabi.
- Kjellstrom, T., Maitre, N., Saget, C., Otto, M., Karimova, T., 2019. Working on a warmer planet: The effect of heat stress on productivity and decent work.
- Lefèvre, B., Eisenbeiß, K., Yadav, N., Enriquez, A., 2016. Save money and time by reducing greenhouse gas emissions from urban transport, LEDS in Practice. LEDS Global Partnership.
- Lorenzoni, L., Pinto, D., Guanais, F., Reneses, T.P., Daniel, F., Auraaen, A., 2019. Health Systems Characteristics: A Survey of 21 Latin American and Caribbean Countries (OECD Working Papers). OECD, Paris.
- Martinez, D.F., Mitnik, O.A., Salgado, E., Scholl, L., Yañez-Pagans, P., 2020. Connecting to Economic Opportunity: the Role of Public Transport in Promoting Women's Employment in Lima. J Econ Race Policy 3, 1-23. <https://doi.org/10.1007/s41996-019-00039-9>
- McGlade, C., Ekins, P., 2015. The geographical distribution of fossil fuels unused when limiting global warming to 2 °C. Nature 517, 187-190. <https://doi.org/10.1038/nature14016>
- Messina, J., Silva, J., 2019. Twenty Years of Wage Inequality in Latin America. Inter-American Development Bank. <https://doi.org/10.18235/0001806>
- Montt, G., 2018. The gendered effects of air pollution on labour supply. ILO Research Working Papers.
- NCE, 2018. Unlocking the inclusive growth story of the 21st century: accelerating climate action in urgent times, New Climate Economy. ed. Washington DC, USA.
- NCE, 2014. Better growth better climate: the new climate economy report, New Climate Economy. ed. Washington DC, USA.

- Nerbass, F.B., Pecoits-Filho, R., Clark, W.F., Sontrop, J.M., McIntyre, C.W., Moist, L., 2017. Occupational Heat Stress and Kidney Health: From Farms to Factories. *Kidney Int Rep* 2, 998-1008. <https://doi.org/10.1016/j.ekir.2017.08.012>
- Noy, I., 2015. A non-monetary global measure of the direct impact of natural disasters. SEF Working Paper No. 04/2015. Wellington, Victoria University of Wellington.
- OECD, 2019. Biodiversity: Finance and the Economic and Business Case for Action, report prepared for the G7 Environment Ministers' Meeting, 5-6 May 2019. OECD, Paris.
- OECD, Inter-American Center of Tax Administrations, United Nations Economic Commission for Latin America and the Caribbean, Inter-American Development Bank, 2020. Revenue Statistics in Latin America and the Caribbean 2020, OECD. <https://doi.org/10.1787/68739b9b-en-es>
- Oviedo, D., Scholl, L., Innao, M., Pedraza, L., 2019. Do Bus Rapid Transit Systems Improve Accessibility to Job Opportunities for the Poor? The Case of Lima, Peru. *Sustainability* 11, 2795. <https://doi.org/10.3390/su11102795>
- Paredes, J.R., 2017. La Red del Futuro: Desarrollo de una red eléctrica limpia y sostenible para América Latina. <https://doi.org/10.18235/0000937>
- Pathak, S., 2017. Why Develop 2050 Pathways? 2050 Pathways Platform.
- Ramírez Cartagena, F., Lefevre, B., Fernández-Baca, J., Capristán, R., 2020. Análisis y diseño de modelos de negocio y mecanismos de financiación para buses eléctricos en Lima, Perú. Inter-American Development Bank. <https://doi.org/10.18235/0002202>
- Rocha, J., Baraibar, M., Deutsch, L., de Bremond, A., Oestreicher, J.S., Rositano, F., Gelabert, C., 2019. Toward understanding the dynamics of land change in Latin America: potential utility of a resilience approach for building archetypes of land-systems change. *Ecology and Society* 24. <https://doi.org/10.5751/ES-10349-240117>
- Rodríguez-Castelán, C., Valderrama, D., López-Calva, L.F., Lustig, N., 2016. Understanding the Dynamics of Labor Income Inequality in Latin America. <https://doi.org/10.13140/RG.2.2.27342.25920>
- Rozenberg, J., Fay, M., 2019. Beyond the Gap: How Countries Can Afford the Infrastructure They Need while Protecting the Planet.
- Salazar-Xirinachs, J.M., Chacaltana, J., 2018. Políticas de formalización en América Latina: Avances y desafíos. Lima: Organización Internacional del Trabajo (OIT).
- Schaffitzel, F., Jakob, M., Soria, R., Vogt-Schilb, A., Ward, H., 2020. Can government transfers make energy subsidy reform socially acceptable? A case study on Ecuador. *Energy Policy* 137, 111120. <https://doi.org/10.1016/j.enpol.2019.111120>
- Searchinger, T., Waite, R., Hanson, C., Ranganathan, J., Dumas, P., Matthews, E., 2019. Creating a Sustainable Food Future: A Menu of Solutions to Feed Nearly 10 Billion People by 2050. World Resources Institute, Washington DC.
- Solano-Rodríguez, B., Pye, S., Li, P.-H., Ekins, P., Manzano, O., Vogt-Schilb, A., 2019. Implications of Climate Targets on Oil Production and Fiscal Revenues in Latin America and the Caribbean (Discussion Paper 701). Inter-American Development Bank. <https://doi.org/10.18235/0001802>
- Tong, D., Zhang, Q., Zheng, Y., Caldeira, K., Shearer, C., Hong, C., Qin, Y., Davis, S.J., 2019. Committed emissions from existing energy infrastructure jeopardize 1.5°C climate target. *Nature* 572, 373-377. <https://doi.org/10.1038/s41586-019-1364-3>
- Truitt Nakata, G., Zeigler, M., 2014. The Next Global Breadbasket: How Latin America Can Feed the World: A Call to Action for Addressing Challenges & Developing Solutions. Inter-American Development Bank, Washington DC.
- UNDP, 2016. Regional Human Development Report for Latin America and the Caribbean. Multidimensional progress: well-being beyond income. United Nations Development Programme, New York.
- UNEP, 2019. Emissions Gap Report 2018. United Nations Environment Programme, S.I.
- UNEP, 2010. Global Environment Outlook: Latin America and the Caribbean GEO LAC 3. United Nations Environment Programme Regional Office for Latin America and the Caribbean, Panama City.
- United Nations, 2015. Paris Agreement. United Nations Treaty Collection, New York, USA.
- UN-OHRLLS, 2015. Small Island Developing States in numbers: Climate change edition 2015. UN Office of the High Representative for the Least Developed Countries, Landlocked Developing Countries and Small Island Developing States, New York.

- Venter, C., Jennings, G., Hidalgo, D., Pineda, A.F.V., 2018. The equity impacts of bus rapid transit: A review of the evidence and implications for sustainable transport. *International Journal of Sustainable Transportation* 12, 140–152. <https://doi.org/10.1080/15568318.2017.1340528>
- Vergara, W., Fenhann, J., Scheltz, M.C., 2015. Zero Carbon Latin America: A Pathway for Net Decarbonisation of the Regional Economy by Mid-century : Vision Paper. UNEP DTU Partnership.
- Viteri Andrade, A., 2019. Impacto económico y laboral del retiro y/o reconversión de unidades a carbón en Chile (Estudio desarrollado para el Ministerio de Energía de Chile).
- Vogt-Schilb, A., Feng, K., 2019. The labor impact of coal phase down scenarios in Chile. *Inter-American Development Bank*. <https://doi.org/10.18235/0001961>
- Vogt-Schilb, A., Hallegatte, S., 2017. Climate Policies and Nationally Determined Contributions: Reconciling the Needed Ambition with the Political Economy. *WIREs Energy Environ* e256. <https://doi.org/10.1002/wene.256>
- Vogt-Schilb, A., Hallegatte, S., de Gouvello, C., 2015. Marginal abatement cost curves and the quality of emission reductions: a case study on Brazil. *Climate Policy* 15, 703–723. <https://doi.org/10.1080/14693062.2014.953908>
- Vogt-Schilb, A., Meunier, G., Hallegatte, S., 2018. When starting with the most expensive option makes sense: Optimal timing, cost and sectoral allocation of abatement investment. *Journal of Environmental Economics and Management* 88, 210–233. <https://doi.org/10.1016/j.jeem.2017.12.001>
- Vogt-Schilb, A., Walsh, B., Feng, K., Di Capua, L., Liu, Y., Zuluaga, D., Robles, M., Hubaceck, K., 2019. Cash transfers for pro-poor carbon taxes in Latin America and the Caribbean. *Nature Sustainability* 2, 941–948. <https://doi.org/10.1038/s41893-019-0385-0>
- Waisman, H., Bataille, C., Winkler, H., Jotzo, F., Shukla, P., Colombier, M., Buira, D., Criqui, P., Fischedick, M., Kainuma, M., Rovere, E.L., Pye, S., Safonov, G., Siagian, U., Teng, F., Virdis, M.-R., Williams, J., Young, S., Anandarajah, G., Boer, R., Cho, Y., Denis-Ryan, A., Dhar, S., Gaeta, M., Gesteira, C., Haley, B., Hourcade, J.-C., Liu, Q., Lugovoy, O., Masui, T., Mathy, S., Oshiro, K., Parrado, R., Pathak, M., Potashnikov, V., Samadi, S., Sawyer, D., Spencer, T., Tovilla, J., Trollip, H., 2019. A pathway design framework for national low greenhouse gas emission development strategies. *Nature Climate Change* 9, 261. <https://doi.org/10.1038/s41558-019-0442-8>
- World Bank, 2020. LAC Equity Lab: Income Distribution. World Bank. URL <https://www.worldbank.org/en/topic/poverty/lac-equity-lab1/income-inequality/income-distribution>.
- World Bank, 2015. Indigenous Latin America in the twenty-first century: the first decade. The World Bank, Washington, D.C.
- WRI, 2018. CAIT 2.0: WRI's climate data explorer. World Resources Institute <http://cait2.wri.org/wri/>. [https://doi.org/10.1016/S0301-4215\(02\)00192-1](https://doi.org/10.1016/S0301-4215(02)00192-1)

Chapter

2

Wanted: Workers in Net-Zero Economies



Chapter 1 established the need to investigate sector pathways towards net-zero emissions to identify the benefits of a decarbonized economy and anticipate challenges. This chapter presents numerical simulations of possible impacts of an emissions reduction strategy on labor markets in Latin America and the Caribbean. By 2030, structural changes in energy and food production and consumption patterns can result in 15 million more net jobs in Latin America and the Caribbean compared to a business-as-usual scenario. Jobs destroyed in fossil fuel electricity, fossil fuel extraction, and animal-based food production are more than compensated for by jobs created in plant-based agriculture and food production, renewable electricity, forestry, construction, and manufacturing. Subsequent chapters discuss the impact of this transition on skills, gender, and occupations. They illustrate, with examples from the region, how government policy can help reallocate workers, promote decent work in rural areas, offer new business models, and support displaced workers and their communities in implementing a just transition toward net-zero emissions across all sectors of the economy.

A Word on Methods

Labor Impacts across the Supply Chain

Achieving net-zero carbon emissions requires changes across countries and in several sectors. The energy, agriculture, livestock, and forestry industries play a key role in greenhouse gas (GHG) emissions and will need to undergo the most important changes (see Chapter

1). Domestic efforts to make progress towards net-zero emissions are important drivers of change. But international climate policy, global consumer preferences, business decisions, and technological changes can also affect the energy and food systems in the region through their impact on international trade. In particular, the global demand for fossil fuels and, to a lesser extent, meat-based agricultural goods would most likely have to decline if the world is to meet international climate targets.

When simulating the impacts on labor of structural changes in the energy and food systems, it is common to consider not only direct impacts but also indirect ones, such as those on global supply chains. For instance, if consumers in some countries decide to eat more vegetarian food and buy less meat, employees of local butcher shops may not be the only ones to lose their jobs (direct impact). People working in slaughterhouses, truck drivers, and people working on the farms where the animals are bred and fed, including on other continents, may also lose them (indirect impacts). At the same time, employment would increase not only in local shops selling vegetables, but also for truck drivers that transport those vegetables, workers who process the vegetables and turn them into a final product, and farmers who grow the crops, who again could be located on another continent. Businesses need to adapt their activities and workers have to adapt their skills. Labor relations, including collective agreements that establish wage levels and overall working conditions, also have to change accordingly.

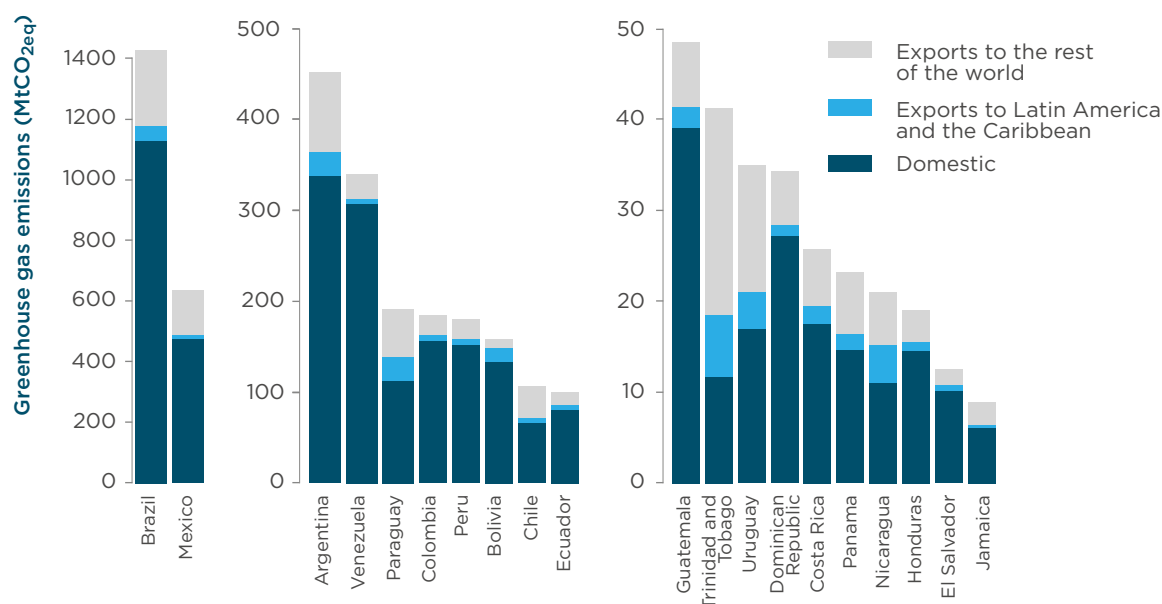
This report is based on an input-output analysis, a commonly employed tool for assessing the direct and indirect

environmental and socioeconomic impacts of decarbonization efforts.¹ The main data source is the Global Trade Analysis Project (GTAP) Power database. It furnishes standardized input-output tables that provide information on trade patterns between industries within and across countries for most of Latin America and the Caribbean (Aguilar et al., 2016; Peters, 2016). The Caribbean countries, however, are bundled together, with the exception of Trinidad and Tobago. GTAP Power splits the electricity production sector into multiple subsectors, providing an indication of the relative size of renewable electricity and fossil fuel electricity subsectors in most countries.

It's a Small World: The Role of Global Supply Chains

The data show that GHG emissions in the region are driven not only by domestic demand, but also regional and international trade. A significant share of the region's emissions, 18 percent on average, comes from exports to the rest of the world (Figure 2.1). This is particularly true for small and open economies, including those in the Caribbean, reaching 40 percent of GHG emissions in Uruguay and as much as 55 percent in Trinidad and Tobago.

Figure 2.1 / Embodied Greenhouse Gas Emissions in CO₂ Equivalent by Country, 2014



Note

In climate science and climate policy, it is common to aggregate different greenhouse gases by considering their peak warming potential, expressed in terms of equivalent CO₂ emissions.

Source: Authors' calculations based on GTAP

¹Input-output data describe the sale and purchase relationship across sectors of the economy and between countries; for example, how much input from the electronic sector is used by the chemical, rubber, and plastic sector in a given year, domestically and from abroad.

The region is an important food exporter, and this is reflected in GHG emissions data. An estimated 15 percent of GHG emissions from the food system in Latin America and the Caribbean corresponds to its global exports. Moreover, 21 percent of the land used for agriculture and livestock in the region, and 19 percent of the emissions from deforestation, correspond to exports. This relates mostly to plant-based products and feed (such as soybeans). By contrast, only 9 percent of livestock raised in the region is exported.

International demand is also important when it comes to fossil fuels: 45 percent of the oil and 58 percent of the coal produced in the region is exported to the rest of the world (only 8 percent of natural gas is exported outside the region). Note that greenhouse gases emitted in the rest of the world when the region's fossil fuels are burned there do not appear in Figure 2.1, which only shows the region's GHG emissions. However, if the rest of the world decarbonizes in a way consistent with the Paris Agreement, imports of fossil fuels will decline dramatically, which will depress global oil prices and have implications for labor in the fossil fuel sector. It will also significantly impact fiscal revenues in oil exporting countries (Solano-Rodriguez et al., 2019).

Insights, not Predictions

Several caveats and limitations to this chapter's approach should be mentioned. First, the latest version of the GTAP database provides data for 2014. This means that recent progress towards decarbonization in the region, notably the uptake of renewable electricity sources

in various countries and the beginning of the transition towards electric buses, is not fully captured. To mitigate this issue, the GTAP Power tables have been updated here with information from the ILO Labor Force Surveys (LFS), which provide more recent estimates of employment per sector in each country. All the data used and reported is in terms of full-time equivalent jobs. Changes in the distribution of total hours worked per person that could occur over time are not taken into consideration. One difficulty is that the ILO LFS do not provide information at the subsector level (for instance, jobs in renewable electricity production versus jobs in fossil-fuel electricity production). In these cases, labor numbers at the subsector level were scaled proportionally, ensuring that employment at the sector level matched. Information from the International Energy Agency (IEA) was also used to update the description of the energy system for each country (see below).

Second, as is common in analyses based on input-output tables, relative prices between products and countries and international trade are assumed to remain constant. As a result, the models ignore adjustment effects. Input-output analyses do, however, offer a clear picture of which sectors will be most affected under each scenario (Perrier and Quirion, 2018). In addition, the simulations here are based on the assumption that labor productivity grows similarly in all sectors, following projections from the OECD (Guillemette and Turner, 2018). Actually, future productivity growth may differ across sectors. In particular, it could be higher than average in the agriculture and livestock sectors, thanks to mechanization and digitalization, and



in the renewable energy sector, where unit costs may fall further as the industry expands and finds more efficient ways to assemble, deliver, and install power plants. Since the focus here is on specific decarbonization efforts, the estimates in this report do not account for other drivers of the future of work, notably other aspects of technological change—in particular the impact of revolutions in the transportation sector, or the effect of synthetic meats on diets—and demographic factors. Despite these limitations, the report’s approach provides a big picture of how the transition to net-zero emissions is likely to affect labor markets in the region.

The simulations presented below assess potential job creation and destruction in the most carbon-intensive sectors during the global transition to net-zero emissions. These numbers are not meant as predictions, but as a tool to guide public policy and decision-making. The report’s decarbonization scenario is not

a forecast of the impact of existing climate policies. It is an exploration of the potential impact of structural changes on the energy and food sectors that, if implemented by all countries, would put the global economy on track towards limiting climate change to 1.5°C to 2°C, the goal of the Paris Agreement (Chapter 1).

Ultimately, the net impact of decarbonization on the level and quality of employment will depend on how workers, firms, and governments react to the transition. For instance, the production of solar power can be more labor intensive than the production of fossil fuel power. But whether the jobs associated with the construction and installation of solar panels employ the same people that used to work in coal power plants, people from the domestic workforce, or the currently unemployed, depends largely on decisions that firms make in the coming years. This, in turn, depends on public policy decisions governments make today (Chapters 3 and 4).

Building a Decarbonization Scenario for Latin America and the Caribbean

To assess potential job creation and identify the jobs at risk of being lost in the transition to net-zero emissions, the report compares the current employment situation with employment in two contrasting scenarios: a high-emissions scenario that corresponds to current trends, and a decarbonization pathway aligned with the Paris Agreement's long-term objectives of limiting the rise in global temperature to "well below 2°C above preindustrial levels" (UNFCCC, 2015). As discussed in Chapter 1, countries cannot leap immediately to a world with net-zero emissions. Instead, they must alter their course today and progressively implement changes in energy and food consumption, as well as production patterns, both at the regional and global levels (IDB and DDPLAC, 2019).

The report first builds long-term pathways to net-zero emissions by 2050 for the region. Then, it looks at where countries could find themselves in 2030 in terms of sectoral transformations, having taken the first decisive steps in that direction. This provides information on how labor markets could be transformed across supply chains by 2030 if countries update their Nationally Determined Contributions (NDCs) to align them with the long-term decarbonization goal, and then implement the necessary

adjustments (see Chapter 1). The changes simulated in the report's long-term pathways are summarized in the following sections.

Decarbonizing Energy

To characterize the different energy scenarios, the report contemplates two possibilities for the long-term evolution of the electricity generation mix, energy efficiency, carbon capture and storage penetration, global demand for fossil fuels, and the share of biofuels and electric vehicles. The decarbonization scenario is based on the "Beyond 2°C Scenario"² that the IEA published in 2017 (OECD/IEA, 2017). It shows a technically feasible pathway for the energy system that would put the world on track towards net-zero carbon emissions by 2060 and lead to climate stabilization at around 1.75°C above pre-industrial levels, the midpoint of the Paris Agreement's ambition range (Chapter 1). The high-emissions scenario is based on the IEA "Reference Technology Scenario" (RTS) in the same publication, in which global carbon emissions, rather than decrease, increase 15 percent compared to current levels by 2040, reach a plateau, and stabilize there. Increasing carbon emissions would result in continued global warming, reaching 2.7°C by 2100 and continuing to worsen thereafter, thereby producing negative impacts on development beyond those highlighted in Chapter 1.

This set of scenarios was used because the IEA provides ample documentation and data for them, facilitating the

²The IEA calls their scenario "Beyond 2°C" to signal that it would require further changes, compared to current trends, *beyond* those contemplated in their 2°C scenario (which is presented in the same publication). The Beyond 2°C Scenario results in a temperature increase of about 1.75°C, which is *below* 2°C.

analysis. The IEA continues to offer energy scenarios and adapts them as technology and energy policy change globally. As of this writing, the IEA has shared projections that would achieve the 1.5°C target, and that use relatively more renewable energy, relatively less natural gas, and relatively less bioenergy than the projections that were available to produce the simulations in this report.

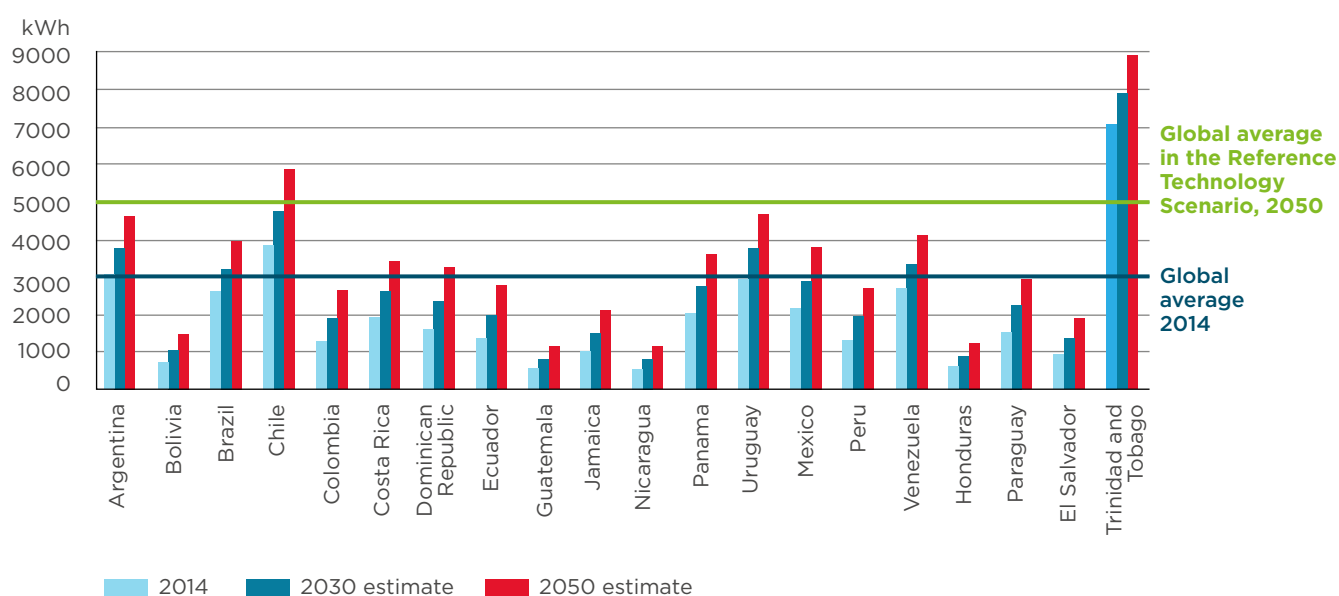
Power Generation

Globally, electricity consumption per capita increases more than 60 percent between 2014 and 2060, from 3 MWh to 5 MWh under the IEA's Reference Technology Scenario (the high-emissions scenario) (OECD/IEA, 2017, p. 278). In 2014, electricity consumption per capita in most countries of the region was below the global average (Figure 2.2). This report assumes that countries close to

the global energy consumption average (such as Argentina, Brazil, Chile, Uruguay, and Venezuela) grow with the global average, countries currently above the global average (such as Trinidad and Tobago) grow half as fast, and countries below global averages (such as Costa Rica, Mexico, and Panama) grow faster, depending on how far away they are from the global average (Figure 2.2).

In the IEA's Beyond 2°C Scenario (this report's decarbonization scenario), energy efficiency increases while energy demand undergoes increased electrification, that is, the replacement of other energy carriers with electricity (Chapter 1). For this reason, global electricity generation is only 6 percent lower in 2050 in the decarbonization scenario than in the high-emissions scenario.

Figure 2.2 / Electricity Consumption Per Capita in 2014 (in kWh) and Projected 2030 and 2050



Source: World Development Indicators (2019); IEA (2017); 2030 and 2050 estimates are authors calculations

Countries in Latin America and the Caribbean can be categorized roughly into two types based on their current electricity mix. Some rely heavily on hydropower, while others use oil as the primary source for electricity consumption. Coal power currently provides a small, or non-existent, share in total electricity production in most countries in the region excepting Chile and Guatemala. Only two countries in the region are specified in the IEA scenarios: Brazil and Mexico (Figure 2.3). The simulations for this report use the IEA scenarios for Brazil and Mexico as a guide to project electricity mixes in all other countries. In countries that currently rely largely on hydro, the report projects declines in fossil fuel power and increases in renewable power similar to what the IEA projects in Brazil. While many countries in the region have historically relied on hydropower, the potential for expansion is limited by conflicts over land use, including conservation of forests and indigenous land. As a result, the share of hydropower is expected to decrease after 2030, making room for solar, wind, and other renewables. In the countries that currently rely more heavily on natural gas, coal, or oil for power generation (including many Caribbean countries), the IEA's Mexican scenarios are used as a guide (assuming fossil fuel power evolves in these countries as it does in Mexico).

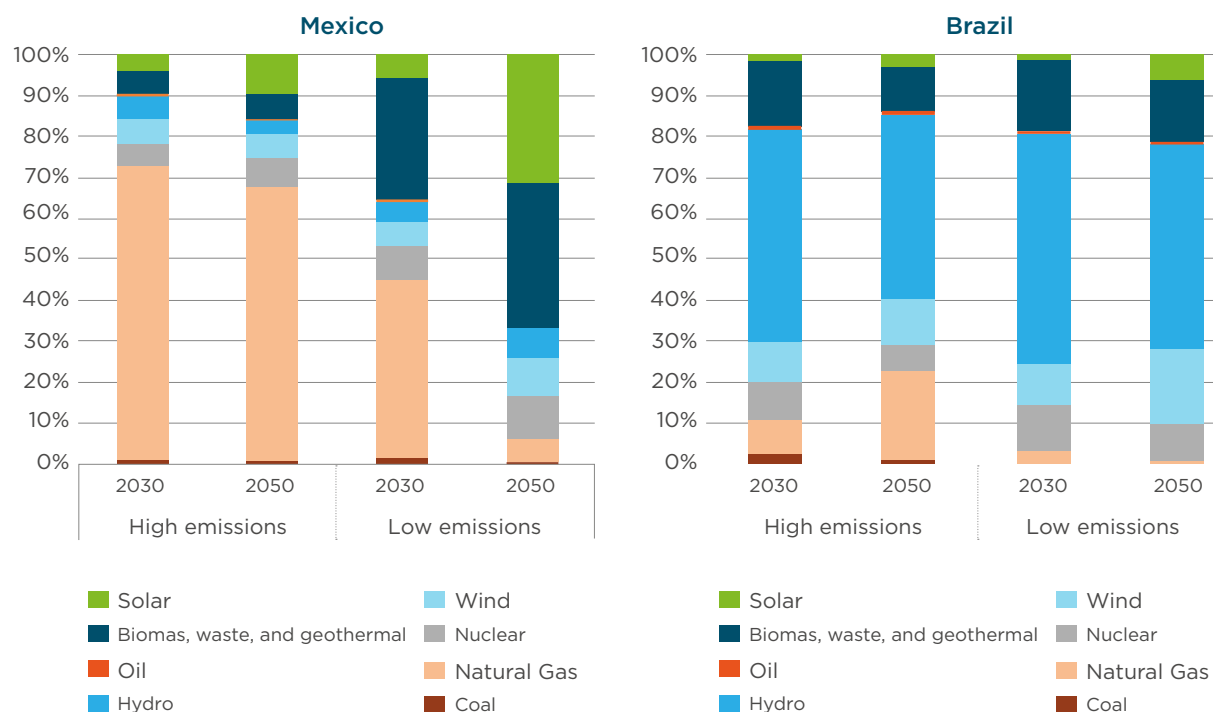
This report makes another adjustment regarding nuclear energy. The IEA Beyond 2°C Scenario considers 10 percent electricity generation from nuclear in both Brazil and Mexico in 2050. However, many countries in the region do not have any nuclear capacity today, and no foreseeable plan to invest in the institutions and technical capacity

required to handle that technology safely. This report assumes that countries currently without nuclear capacity will stay away from nuclear power in the future, and simply scale up their contributions to all other technologies in the mix.

Compared to fossil fuel power, renewable energy tends to involve higher upfront investments (and much lower variable costs). The report's analysis considers that renewable power deployment means additional capital investments, and thus potentially more production and jobs in sectors such as machinery and electronic equipment manufacturing.



Figure 2.3 / Electricity Mix in the Low- and High-Emissions Scenarios in Brazil and Mexico (percent of energy generation)



Source: Authors' elaboration based on OECD/IEA (2017).

Electrification of Transport

In the IEA Beyond 2°C Scenario, domestic transport of passengers by land is almost completely decarbonized by 2050 and 40 percent of land vehicles are electrified by 2030. This requires redirecting investment to the right type of infrastructure, but total investment costs are not higher than in the IEA's Reference Technology Scenario thanks to the falling cost of zero-carbon energy technologies (see also Chapter 1). The decarbonization scenario models a replacement of gasoline and diesel by electricity in the transport sector, also capturing the associated changes in the structure of motor vehicle production. Following ILO

(2018) and Montt et al. (2018), electric equipment (motor and battery) is assumed to represent 45 percent of total electric vehicle production costs.

Energy Efficiency in Manufacturing

The IEA scenarios contemplate gradual energy efficiency improvement in the manufacturing sector. In the IEA Beyond 2°C Scenario (the report's low-emissions scenario), emissions intensity decreases are 33 percent (2030) and 85 percent (2050). The assumption is that these changes are achieved through both energy efficiency improvements and changes in industrial processes. This is interpreted as an equivalent decrease in

the inputs of fossil fuels needed for the industrial sector. As before, the analysis accounts for the investment needed in sectors such as machinery, construction, and business activities to achieve these gains.

Two Controversial Options

Brazil is one of the world's main producers and users of biofuels from fuel crops. The country has committed to using an 18 percent share of biofuels in its energy mix by 2030. According to the IEA (OECD/IEA, 2017, p. 92), conventional biofuel production and use is on track to meet the 2°C target. In its Beyond 2°C scenario, the IEA assumes that 36 percent of energy inputs in refineries come from biomass in 2030. In the high-emissions scenario, biofuels are expected to increase as well, but at a significantly lower rate, reaching 20 percent in 2050.

Biomass can also be used to generate biogas. This report models a replacement of natural gas inputs into refinery processes with biomass. Following IEA assumptions in the low-emissions scenario, this affects 20 percent of natural gas in 2030 and 50 percent in 2050 (5 and 10 percent respectively in the high-emissions scenario).

Finally, the report models a progressive deployment of carbon capture and storage (CCS) technology in the power generation and industry sector, still adhering to the IEA numbers. In the low-emissions scenario, the remaining natural gas and fossil fuel use in industry is upgraded with CCS for 20 percent of the total in 2030 and 80 percent in 2050, while power generation from biomass accounts for 50 percent in 2030 and 95 percent in 2050. This is modelled

by simply reducing GHG emissions proportionally to CCS deployment. In the high-emissions scenario, there is no CCS deployment.

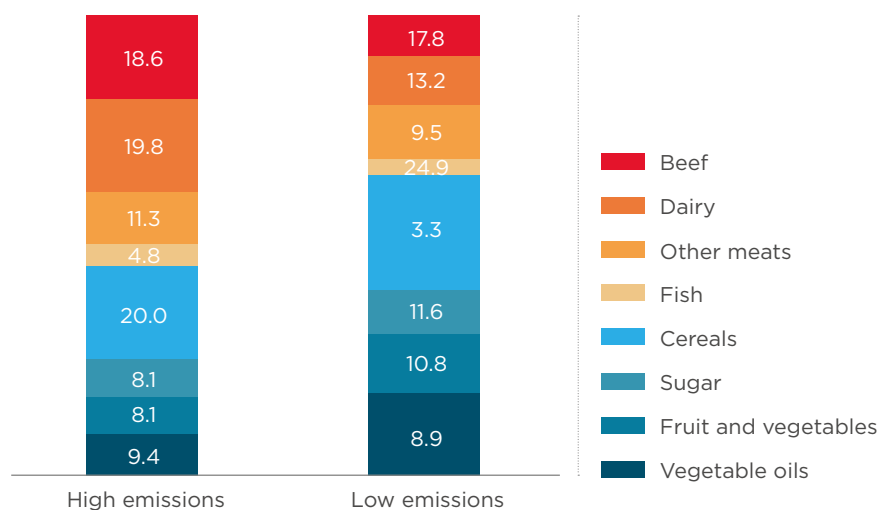
Biofuels and CCS are both controversial technologies. One issue with biofuels is that they can compete with food crops for land, working against food security and affordability goals in the process (Searchinger et al., 2019). Carbon capture and storage plays a prominent role in academic scenarios (Clarke et al., 2014; Rogelj et al., 2018), notably in conjunction with bioenergy (BECCS) to produce net negative carbon emissions. However, the feasibility of the technology from commercial, financial, and political economy perspectives has been called into question, as well as its consistency with biodiversity, land, and water conservation goals (Gasser et al., 2015; Heck et al., 2018; Searchinger et al., 2019; Smith et al., 2016). Meanwhile, wind and solar energy is becoming cheaper than fossil energy (even without the additional cost of CCS) and is already attracting more investment globally in the power generation sector than fossil fuel energy (Chapter 1). Finally, the contribution of these technologies to decarbonizing the region is modest, because renewable power and electrification of energy uses shrink the fossil fuel base that can be upgraded with CCS or substituted with biofuels. Despite these issues, this report sticks with IEA projections for simplicity and transparency. Including biofuels and CCS in the scenarios results in conservative estimates of the number of jobs that could be created in Latin America and the Caribbean in the renewable energy sector, as well as conservative estimates of job destruction in the fossil fuel sector.

What Happens to Food Systems?

This report's scenarios are based on an extrapolation of the Food and Agriculture Organization's scenario (OECD/FAO, 2019), with the addition of two contrasting assumptions about a global shift towards either more animal-based foods (in the high emissions scenario) or more plant-based foods (in the low emissions scenario). In the high emissions scenario, diets follow historic trends: as per capita income increases, so does the share of meat and animal-based products. In the decarbonization scenario,

the report models a progressive shift in each country to a diet in which two-thirds of household baseline spending on animal-based products is replaced by 2050 with spending on plant-based products. This mimics the international recommendations for healthy diets that would also reduce deforestation (see Chapter 1); an example is the “vegan before 6 p.m.” diet, in which two out of three daily meals avoid animal-based foods. The structure of average Latin American and Caribbean food expenditures in 2030 in the high and low emissions scenarios is shown in Figure 2.4.

Figure 2.4 / Structure of Average Latin American and the Caribbean Food Expenditures in 2030 in the High Emissions and Decarbonization Scenarios (Percent of Food Expenditures)



Source: Authors' calculations.

The report contemplates two contrasting evolutions of yields when it comes to agricultural production. It uses scenarios of an evolution in yields by 2028 reported in OECD/FAO (2019) and extrapolates these to 2050. These improved yields reflect the use of more productive

crops and feeds, which results in higher agricultural output for the same or less input. Fewer resources, such as land or energy, are used, which has immediate benefits for the environment, including in terms of reduced GHG emissions. For the high emissions and decarbonization

scenarios, annual changes in yields are assumed to be, respectively, 50 percent lower and higher than the calculation described above.

How much land is needed to support food production, given dietary shifts and the evolution of yields? The assumption is that land not employed in agriculture is dedicated to other uses, including forestry, mimicking the current land use structure in each country. It is also assumed that intermediate inputs (e.g. seed, fertilizer), and associated emission intensities (i.e., N_2O and CH_4 per unit of output) are proportional to the physical area used for agricultural production and grazing, such that improvements in yields are reflected in a proportional increase of value added and a proportional decrease of intermediate inputs and emissions per unit of output.

A Change in the Appetite for the Region's Exports

Since an important portion of the fossil fuels and food produced in Latin America and the Caribbean is exported, decarbonization efforts in the rest of the world can impact jobs in the region. This report simulates changes in the energy system and in diets in the rest of the world aligned with the assumptions described above. International demand for oil, gas, and coal from the region declines 15 percent by 2030 and 25 percent by 2050 when the rest of the world follows the IEA Beyond 2°C Scenario. Global shifts in diets also affect global food demand.

In the high-emissions scenario, global demand for animal-based products in the region decreases by 60 percent in the decarbonization scenario in 2030 compared to the high-emissions scenario, while demand for plant-based foods grows by 30 percent.

Labor Market Risks and Opportunities

Net Job Creation in the Green Economy

This section looks at the potential number of jobs created and destroyed, per sector, during the transition to net-zero carbon emissions. It focuses on the number of jobs created and destroyed by 2030, with a more limited look at insights from the 2050 scenarios. Jobs per sector and per country or group of countries are presented. Many but not all of the jobs created fall into ILO's definition of "green jobs" (see Box 2.1).

The sectoral split separates plant-based food production systems (from crops to processing) and animal-based food (including cattle and poultry breeding, dairy, fishing, and processing of these goods). The service sector includes all subsectors not listed separately, including the hospitality subsector (bars, restaurant, hotels), for which it was impossible to model any direct change linked to decarbonization. A similar situation occurred with eco-tourism, since data are not available separately for sustainable and non-sustainable tourism.

Box 2.1

Green Jobs: a Specific Definition

The ILO defines green jobs as decent jobs that directly contribute to environmental sustainability, either by producing environmental goods or making more efficient use of natural resources (ILO, 2018). Although they represent a small share of total employment, green jobs are key to the success of the transition in all sectors of the economy. In Argentina, for example, green jobs were estimated to represent 7 percent (650,000 jobs) of formal wage employment in 2015 (ILO, 2019). Most green jobs were in manufacturing (38 percent), transport (29

percent), the agriculture, livestock, forestry, and fisheries sector (9 percent), and in water supply and waste management (7 percent).

The transition to net-zero emissions is expected to create many more green jobs that contribute significantly to poverty eradication and social inclusion. However, the transition will also create jobs that do not qualify as green jobs – for instance, informal workers working on retrofitting buildings, or workers in the brown supply chains of green sectors.

Table 2.1.1 / Distribution of Green Jobs by Sector in Argentina in 2015

Main sectors	Number of green jobs	Share of total green jobs (%)
Agriculture, livestock, forestry, and fisheries	58,000	9
Manufacturing	245,000	38
Electricity and gas supplies	11,000	2
Water supply, waste water disposal, waste management	48,000	7
Construction	23,000	3
Transportation and storage	188,000	29
Food services and logging activities	16,000	2
Trade and other non-analyzed services (personal and business)	62,000	10
Total	650,000	100

Note

The proxy for measuring decent jobs in Argentina was workers' registration in the social security system, while the proxy for measuring jobs that contribute to environmental sustainability was

sector-dependent (for example, certification of organic agricultural production, renewable energy, public transport, etc.).

Source: ILO (2019).

The numbers confirm that decarbonization can be a net job creator. The simulations show that compared to the high-emissions scenario, GHG emissions are reduced by 35 percent and 15 million jobs are created by 2030 (representing 4 percent of total employment in the region). Net jobs mask winners and losers. The decarbonization scenario counts 22.5 million more jobs in plant-based food systems, construction, manufacturing, renewable electricity, and forestry, and 7.5 million fewer jobs in animal-based food systems, fossil fuel extraction and mining, and fossil fuel-based electricity generation.

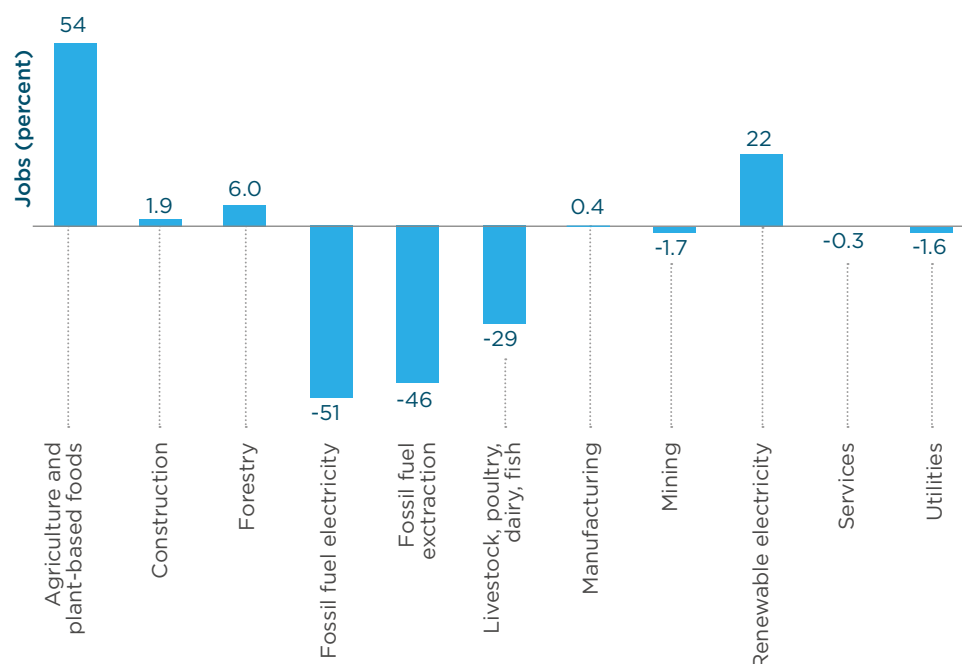
Plant-based agriculture dominates job creation. The sector employs 19 million more full-time equivalent employees in 2030 in the decarbonization scenario than in the high-emissions scenario, a 54 percent increase relative to the high-emissions scenario (Figure 2.5). Employment in the renewable energy sector grows by 22 percent in the decarbonization scenario compared to the high-emissions scenario, representing an additional 100,000 jobs. The construction sector adds 540,000 jobs linked to energy efficiency investments and representing a growth of 2 percent in employment in the sector. Similarly, manufacturing picks up 120,000 jobs to support low-carbon technologies, a net addition of 0.4 percent of the workforce of the sector in 2030. Finally, the forestry sector creates 60,000 jobs, or 6 percent of the sector's jobs by that year. Importantly, the number of jobs that could be created in forestry in a decarbonization scenario is underestimated. Indeed, it is based on the typical labor intensity of existing forestry work in the region. But reforestation

efforts would be much more labor intensive than the current exploitation of forests. If countries planted forests at scale, for instance as a green recovery measure, they could create many more jobs in the short term.

While overall these numbers are good news, the decarbonization scenario presented here is not a prediction of the impact of current trends, but an exploration of the potential impact of structural changes in the energy and food sectors that would put countries on track to decarbonize by midcentury. For these jobs to materialize, governments need to employ appropriate and coherent climate and labor market policies. Specifically, they have to set emissions reduction targets that align with the decarbonization goal (Chapter 1) and invest in human capital, skills, and training systems across their economies (Chapters 3 and 4).



Figure 2.5 / Employment Gains and Losses by Sector as of 2030 in the Decarbonization Scenario, Relative to the High-Emissions Scenario (percent of jobs in the high-emissions scenario, all of Latin America and the Caribbean)



Source: Authors' calculations.

A few sectors will lose jobs in the decarbonization scenario compared to the high emissions scenario (Figure 2.5). This report counts 4.3 million fewer jobs in the livestock, poultry, dairy, fishing, and animal-based food processing sectors compared to the high-emissions scenario (representing 29 percent of jobs in this sector in its projection). Fossil fuel extraction loses more than 520,000 jobs (46 percent), while fossil-fuel electricity generation also suffers a relatively important downsizing with 60,000 fewer jobs (51 percent) compared to the high-emissions scenario. Importantly, the numbers in Figure 2.5 report only the impact of structural changes linked to decarbonization as of 2030. Sectors with fewer jobs in the decarbonization

scenario than in the high-emissions scenario, such as services, can still grow between today and 2030, driven by economic and population growth.

Jobs Lost to Decarbonization

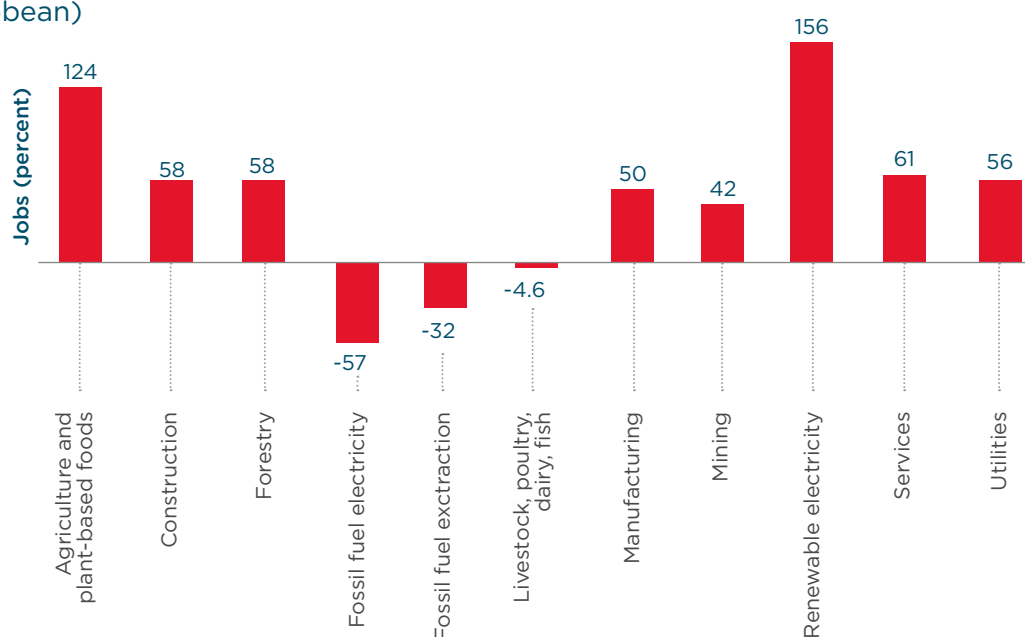
Fewer jobs in certain sectors in the decarbonization scenario than in the high-emissions scenario does not mean that those sectors will shrink over time. When thinking about jobs lost in the transition to net-zero emissions, the point of comparison matters critically. Compared to the current situation, the mining, services, and utilities sectors will all create jobs by 2030. The fact that these sectors may create fewer jobs in the decarbonization scenario

than in the high-emissions scenario, as shown in Figure 2.5, does not necessarily mean that jobs will be destroyed over time. Jobs are created in the services, mining, and utilities sectors under the decarbonization emissions scenario, just at a slower pace than in the high-emissions scenario.

In fact, Figure 2.6 shows that only three sectors would shrink in the transition to a

decarbonized economy: fossil-fuel based electricity, with about 80,000 jobs lost, or more than half of the current number; fossil-fuel extraction, with almost a third of the current number, or 280,000 jobs eliminated; and animal-based food production systems, with 5 percent of current jobs lost, representing half a million jobs. Government policy for these sectors should focus on managing the negative social impacts (Chapter 3).

Figure 2.6 / Employment Gains and Losses by Sector as of 2030 in the Decarbonization Scenario, Relative to 2014 (percent of jobs in 2014, all of Latin America and the Caribbean)



Source: authors' calculations.

Digging deeper to look at subsectors, compared to today, most jobs in petroleum and coal power plants (93 percent to 94 percent) could disappear by 2030, while jobs in natural gas power plants would remain stable. Note that the IEA scenarios used here

are relatively conservative in terms of fossil fuel decline in the short-term; other transition scenarios would show a steeper decline in international fossil fuel consumption by 2030 (CTI, 2019; UNEP, 2019), and more job losses in the fossil fuel extraction sector. The IEA

scenario is also conservative in terms of how many natural gas power plants can be employed in the transition. Scenarios from other sources, for instance the projections from academia compiled by the IPCC, would likely show a greater drop in jobs at natural gas power plants (González-Mahecha et al., 2019).

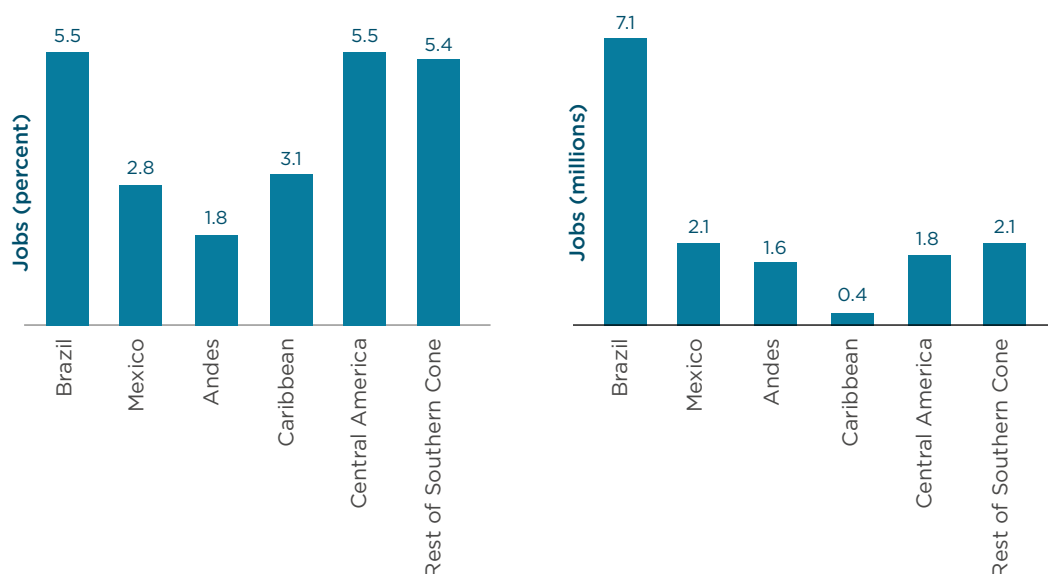
Over the longer term, most fossil fuel jobs are at risk. There is wide agreement in the literature that the energy sector needs to be decarbonized by 2050 (Chapter 1). By that year, nearly 80 percent of jobs in gas power plants will disappear, together with 70 percent of fossil fuel extraction jobs, as the world draws closer to net-zero emissions and drastically reduces demand for fossil fuels from countries in the region. In the animal-based agricultural sector, by contrast, the simulations show a limited long-term impact in relative terms (a 7 percent reduction in the

workforce by 2050), because shifts in diet in favor of plant-based agriculture are compensated significantly by higher global and domestic food demand.

Employment Gains: There for the Taking

Figure 2.7 shows the job impact of decarbonization relative to the high-emissions scenario in the two largest economies of the region (Brazil and Mexico) and among groups of countries in the region. The decarbonization scenario results in more net job creation than the high carbon scenario everywhere. Deeper analysis reveals that all countries experience large net job creations in the plant-based agriculture sector that more than compensate for job losses in the livestock and fossil fuel sectors combined.

Figure 2.7 / Employment Gains and Losses by Country and Region in 2030 in the Decarbonization Scenario, Relative to the High-Emissions Scenario (left: percent of jobs in the high-emissions scenario, right: jobs added in millions)



Source: Authors' calculations.

Which countries are most vulnerable to stranded jobs? Assessing jobs lost in 2030 per sector relative to total employment in each country shows that decarbonization eliminates more than 1 percent of employment in only four countries (before accounting for job creation): Brazil, Honduras, Mexico, and Venezuela. In all these countries, animal-based food systems make up for most of the stranded jobs (relative to total employment), while job creation in plant-based food systems more than compensates for the lost jobs.

A key question when it comes to the food system is whether people currently employed in animal-based production will be able to shift to plant-based production when demand changes. In addition to skills, geography can severely limit the ability to make such a shift: Some land is suitable for raising and breeding livestock but not for growing crops. Infrastructure and transportation costs can also be a factor; lands farther from consumption centers may be less suitable for more perishable or lower value-per-weight products. Communities located on lands suitable for livestock will struggle if that principal economic activity disappears. Another issue is that animal-based agricultural jobs tend to pay better than jobs in plant-based agriculture. At the same time, agriculture often includes a large share of the region's poor population. Changes in the sector and shifts to higher value-added plant-based products could be an opportunity to improve working conditions and incomes and overcome rural poverty (see Chapter 3 for the implications of employment estimates on the skills needed, and Chapter 4 for just transition measures in the agriculture and livestock sector).

Fossil fuel-powered electricity is the most affected sector in terms of jobs lost by 2030 relative to jobs in 2014. But these job losses represent less than 0.1 percent of total employment in each country. Similarly, most fossil fuel extraction jobs will disappear by 2050, but they represent only about 1 percent of jobs in Bolivia, Trinidad and Tobago, and Venezuela, less than half of that in seven other countries, and less than 0.1 percent of jobs, if any, in all the other countries of the region. While the number of jobs lost in the fossil fuel sector is not likely to be a problem per se, the fact that they are concentrated can make the political economy of reforms difficult (Vogt-Schilb and Hallegatte, 2017). In particular, fossil fuel extraction and generation tend to be high-quality jobs concentrated in a few sites, while renewable energy production may be spread throughout a country (see the example of Chile in Chapter 1). In the energy sector, a just transition might thus require supporting affected workers and helping them find employment opportunities in other sectors, rather than expecting them to transition from fossil fuel to renewable energy. The communities where well-paid jobs in fossil fuel extraction or fossil-fuel power plants disappear may also need support (see Chapter 4 for just transition measures in the energy sector).

The details of the transition point to some difficult adjustments, but also to encouragingly large employment gains overall as countries seek to achieve the goals of the Paris Agreement and create more climate friendly economies. The following chapters show how governments, businesses, and workers can work together to remove roadblocks and reap the benefits of a just transition towards net-zero emissions prosperity.

References

- Aguiar, A., Narayanan, B., Mcdougall, R., 2016. An Overview of the GTAP 9 Data Base, *Journal of Global Economic Analysis*.
- Clarke, L., Jiang, K., Akimoto, K., Babiker, M., Blanford, G., Fisher-Vanden, K., Hourcade, J.C., Krey, V., Kriegler, E., Loeschel, A., 2014. Assessing transformation pathways, in: *Climate Change 2014: Mitigation of Climate Change, Working Group III Contribution to the IPCC 5th Assessment Report*, [Edenhofer, O., R. Pichs-Madruga, Y. Sokona, E. Farahani, S. Kadner, K. Seyboth, A. Adler, I. Baum, S. Brunner, P. Eickemeier, B. Kriemann, J. Savolainen, S. Schlömer, C. von Stechow, T. Zwickel and J.C. Minx (Eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.
- CTI, 2019. Breaking the Habit - Why none of the large oil companies are “Paris-aligned”, and what they need to do to get there. Carbon Tracker Initiative.
- Gasser, T., Guivarch, C., Tachiiri, K., Jones, C.D., Ciais, P., 2015. Negative emissions physically needed to keep global warming below 2 °C. *Nature Communications* 6, 7958. <https://doi.org/10.1038/ncomms8958>
- González-Mahecha, R.E., Lecuyer, O., Hallack, M., Bazilian, M., Vogt-Schilb, A., 2019. Committed emissions and the risk of stranded assets from power plants in Latin America and the Caribbean. *Environ. Res. Lett.* <https://doi.org/10.1088/1748-9326/ab5476>
- Guillemette, Y., Turner, D., 2018. The Long View: Scenarios for the World Economy to 2060. OECD Economic Policy Paper. <https://doi.org/10.1787/b4f4e03e-en>
- Heck, V., Gerten, D., Lucht, W., Popp, A., 2018. Biomass-based negative emissions difficult to reconcile with planetary boundaries. *Nature Climate Change* 8, 151-155. <https://doi.org/10.1038/s41558-017-0064-y>
- IDB, DDPLAC, 2019. Getting to Net-Zero Emissions: Lessons from Latin America and the Caribbean. Inter-American Development Bank and Deep Decarbonization Pathways for Latin America and the Caribbean. <https://doi.org/10.18235/0002024>
- ILO, 2019. Estimating Green Jobs in Argentina 2019 Executive summary and conclusions. International Labour Organization Argentina, Argentina.
- ILO, 2018. World Employment and Social Outlook 2018: Greening with jobs (Report). International Labour Organization.
- Montt, G., Wiebe, K.S., Harsdorff, M., Simas, M., Bonnet, A., Wood, R., 2018. Does climate action destroy jobs? An assessment of the employment implications of the 2-degree goal. *International Labour Review* 157, 519-556.
- OECD/FAO, 2019. OECD-FAO Agricultural Outlook 2019-2028 - Special focus: Latin America.
- OECD/IEA, 2017. Energy Technology Perspectives 2017 Catalysing Energy Technology Transformations. International Energy Agency, Paris.
- Perrier, Q., Quirion, P., 2018. How shifting investment towards low-carbon sectors impacts employment: Three determinants under scrutiny. *Energy Economics* 75, 464-483. <https://doi.org/10.1016/j.eneco.2018.08.023>
- Peters, J.C., 2016. The GTAP-Power Data Base: Disaggregating the Electricity Sector in the GTAP Data Base. *Journal of Global Economic Analysis* 1, 209-250. <https://doi.org/10.21642/JGEA.010104AF>
- Rogelj, J., Shindell, D., Jiang, K., Fifita, S., Forster, P., Ginzburg, V., Handa, C., Kheshgi, H., Kobayashi, S., Kriegler, E., Mundaca, L., Seferian, R., Vilarino, M.V., Calvin, K., Edelenbosch, O., Emmerling, J., Fuss, S., Gasser, T., Gillet, N., He, C., Hertwich, E., Höglund Isaksson, L., Huppmann, D., Luderer, G., Markandya, A., McCollum, D., Millar, R., Meinshausen, M., Popp, A., Pereira, J., Purohit, P., Riahi, K., Ribes, A., Saunders, H., Schadel, C., Smith, C., Smith, P., Trutnevyte, E., Xiu, Y., Zickfeld, K., Zhou, W., 2018. Chapter 2: Mitigation pathways compatible with 1.5°C in the context of sustainable development, in: *Global Warming of 1.5 °C an IPCC Special Report on the Impacts of Global Warming of 1.5 °C above Pre-Industrial Levels and Related Global Greenhouse Gas Emission Pathways, in the Context of Strengthening the Global Response to the Threat of Climate Change*. Intergovernmental Panel on Climate Change.
- Searchinger, T., Waite, R., Hanson, C., Ranganathan, J., Dumas, P., Matthews, E., 2019. Creating a Sustainable Food Future: A Menu of Solutions to Feed Nearly 10 Billion People by 2050. World Resources Institute, Washington DC.

- Smith, P., Davis, S.J., Creutzig, F., Fuss, S., Minx, J., Gabrielle, B., Kato, E., Jackson, R.B., Cowie, A., Kriegler, E., van Vuuren, D.P., Rogelj, J., Ciais, P., Milne, J., Canadell, J.G., McCollum, D., Peters, G., Andrew, R., Krey, V., Shrestha, G., Friedlingstein, P., Gasser, T., Grubler, A., Heidug, W.K., Jonas, M., Jones, C.D., Kraxner, F., Littleton, E., Lowe, J., Moreira, J.R., Nakicenovic, N., Obersteiner, M., Patwardhan, A., Rogner, M., Rubin, E., Sharifi, A., Torvanger, A., Yamagata, Y., Edmonds, J., Yongsung, C., 2016. Biophysical and economic limits to negative CO₂ emissions. *Nature Clim. Change* 6, 42–50. <https://doi.org/10.1038/nclimate2870>
- Solano-Rodriguez, B., Pye, S., Li, P.-H., Ekins, P., Manzano, O., Vogt-Schilb, A., 2019. Implications of Climate Targets on Oil Production and Fiscal Revenues in Latin America and the Caribbean (Discussion Paper 701). Inter-American Development Bank. <https://doi.org/10.18235/0001802>
- UNEP, 2019. The Production Gap. UN Environment.
- UNFCCC, 2015. Adoption of the Paris agreement. United Nations Framework Convention on Climate Change.
- Vogt-Schilb, A., Hallegatte, S., 2017. Climate policies and nationally determined contributions: reconciling the needed ambition with the political economy. *Wiley Interdisciplinary Reviews: Energy and Environment* 6, 1–23. <https://doi.org/10.1002/wene.256>

Chapter

3

Policy Options for a Just Transition



The first two chapters of this report set out the rationale for reaching net-zero carbon emissions in Latin America and the Caribbean and presented the potential employment impact of decarbonization. Transitioning to net-zero carbon emissions, which is the path to limit global warming, will create jobs in certain sectors and destroy them in others. Net job creation will be positive. But many workers will have to update their skills to meet the demand of emerging sectors, and many firms will have to adopt new technologies and adapt to new ways of doing business. A mix of just transition policies is needed to reduce the adverse impacts of decarbonization on workers, firms, and communities in order to ensure that the transition is fair and inclusive for all.

An estimated 22.5 million jobs will be created by 2030 from the transition to net-zero carbon emissions (see Chapter 2). This chapter shows how these jobs are distributed by skill, occupation, and gender, and what measures are required to make sure they are decent jobs. Just as the transition transforms jobs, it also requires changes in the provision of social benefits. The chapter demonstrates how energy subsidies can be reformed without hurting the poor, and how to use public employment programs to restore the environment in the context of a post-COVID decarbonization strategy. The chapter also emphasizes the specific roles of enterprises and workers as agents of change capable of developing new ways to produce goods and services with more energy- and resource-efficient practices.

New business models and efforts are making workplaces more environmentally sustainable. Social dialogue can also help in designing fair, climate-friendly solutions and ensuring that the concerns of stakeholders are voiced and heard. The last chapter will show how a just transition can be operationalized, both in sectors with potential for job creation and in sectors whose workers and/or firms will be adversely affected by the transition.

Defining a Just Transition

The concept of a “just transition” originated in the 1970s labor movement in North America in response to workers displaced from their work in the process of phasing out polluting industries for the benefit of the environment (Morena et al., 2019).¹ Today, just transition measures refer to policy interventions that aim to shift the economic structure to a low-carbon, socially and environmentally-friendly one. A growing body of literature has contributed to the development of the just transition concept within the context of climate change mitigation policies, for example Green (2018); Heffron and McCauley (2018); Rosemberg (2010); Stevis et al. (2018); and Stevis and Felli (2015). This report refers to a just transition in this context.

Behind the concept of a just transition lies the recognition that a structural transformation towards environmental sustainability is urgent and that it can be achieved with a participatory approach that focuses on the most vulnerable segments in society (Saget et al.,

¹The explicit use of the “just transition” language was first used in the mid-1990s.

Forthcoming). Transition policies refer to measures that protect population groups adversely affected by policy interventions. With the appropriate framework, enterprises and workers can all become key drivers of the transition to a carbon-free, climate-resilient economy.

At the international level, the concept of a just transition has not been legally defined, but it has been referred to in various international instruments. The just transition concept was recognized in the Paris Agreement (UNFCCC, 2015) and the Declaration on a Just Transition at the COP 24 in Katowice in December 2018. In its *Guidelines for a just transition*, the ILO offers advice for governments, workers, and employers as they design, implement, and monitor the policy framework to ensure a just transition (ILO, 2015). The guidelines emphasize that, if managed well, “*Transitions to environmentally and socially sustainable economies can become a strong driver of job creation, job upgrading, social justice and poverty reduction.*”

A just transition towards environmental sustainability means that all groups adversely affected must be compensated and supported in order to benefit from the transition. It also means that workers and enterprises can contribute to environmental sustainability by adopting new resource consumption practices in the workplace. Policies that are conducive to a just transition may include skills development, social dialogue and tripartism,² protection of workers’ rights, occupational safety and health,

social protection, active labor market policies, enterprise policies, industrial and sectoral policies, and macroeconomic and growth policies (ILO, 2015). This chapter focuses on the most relevant policy areas for achieving a just transition in Latin America and the Caribbean, given the estimated employment impacts from decarbonization as well as the high level of informality and low, albeit increasing, social protection coverage in much of the region (Chapters 1 and 2).

Developing the Right Skills for a Net-Zero Emissions Future

Decarbonization has the potential to generate 15 million net jobs in the region by 2030: 22.5 million jobs created and 7.5 million jobs lost. This scenario assumes the phasing out of fossil fuels in the energy sector, improvements in energy efficiency, better carbon capture and storage technologies, as well as changing consumer diets. The sectors projected to grow the most by 2030 are plant-based agriculture and food processing, construction, manufacturing, mining, and electricity production.

However, the net gain will only be fully realized if the labor market responds to changes in demand. Upskilling and reskilling mechanisms can support workers in the transition towards environmental sustainability and help spur economic productivity and growth (ILO, 2018a, 2019a). Skills development policy can be efficient and fair by (i)

²Tripartism refers to a decision-making process that includes employers’ organizations, trade unions, and the government of a country.



identifying new occupations in the green economy, classifying these occupations, and matching them with competencies and curricula; (ii) identifying skills needs through labor market analysis and enterprise surveys that involve social partners; (iii) implementing training programs to respond to the skills gaps identified; and (iv) monitoring the quality and fairness of training (ILO, 2019a). This is the approach of the Philippines' Green Jobs Act of 2016, which promotes skills for green jobs by identifying skills needs, maintaining a database of green careers, formulating training regulations, assessing and certifying skills, and developing new curricula (ILO, 2018c).

Identifying skills needs and mismatches is, therefore, critical for policymakers

in designing policies that ensure that workers and communities adversely affected by the transition can seize new opportunities and make the transition just and sustainable. The scope for new and adjusted training programs, job search support, and income support to jobseekers can be estimated more precisely by examining occupations in the green economy. Identifying skills needs for new and current jobs can also benefit from new information sources such as big data (Azuara Herrera et al., 2019). This information helps workers track skills requirements as they change.

Using eight national labor force surveys³ and the results from Chapter 2, the next section quantifies the occupational impacts of decarbonization with

³Eight national labor force surveys (LFSs) are employed to calculate an average regional industry-occupation structure for Latin America and the Caribbean. The countries are Ecuador, El Salvador, Guatemala, Honduras, Mexico, Panama, Peru, and Uruguay. These LFSs are selected due to the availability of a two-digit categorization of industry (ISIC Rev. 4) and occupation (ISCO-08) and data in or close to 2014 (the base year of the simulation in Chapter 2); data for Uruguay and Honduras are for 2015.

implications for skills and gender by 2030.⁴

Jobs for Low- and Medium-Skill Workers

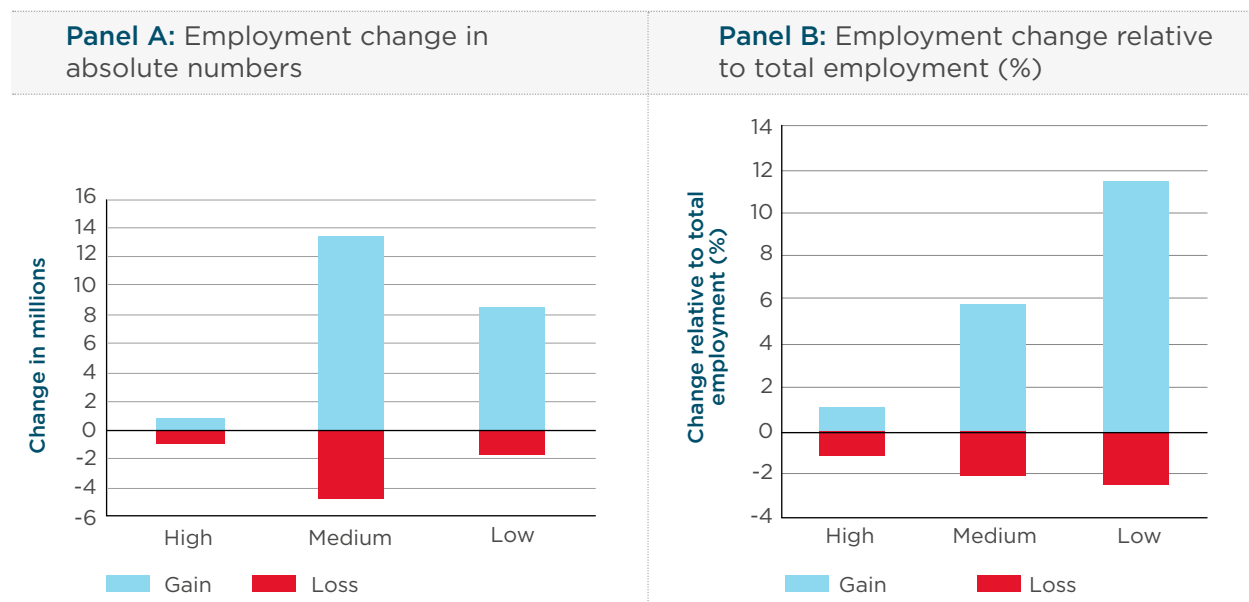
Decarbonization changes the global electricity mix and energy efficiency, as well as production patterns and diets. By 2030, decarbonization is projected to create jobs at the medium- and low-skills levels and result in net job destruction at the high-skills level.⁵ This pattern of job creation at the lower, middle and upper end of the skills spectrum reflects varying employment demand from sectors that either win or lose from decarbonization. Plant-based agriculture and food manufacturing, which largely employ medium- and low-skill workers, will benefit from decarbonization. Fossil-fuel-based electrical generation, energy distribution, and animal-based agriculture, which require a higher level of skill, will lose in the transition. As shown in Figure 3.1, Panel A, job creation is concentrated among medium-skill occupations. Of the 22.5 million jobs created in Latin America and the Caribbean by 2030 under the decarbonization scenario, 13.5 million jobs fall into the medium-skill category, while 8.2 million jobs will be created for low-skill workers and 820,000 jobs for high-skill workers. Interestingly, workers at the medium-skill level will also suffer the greatest job losses (4.8 million jobs),

followed by low-skill workers (1.8 million); high-skill workers will lose the fewest jobs (910,000 jobs). Overall in relative terms, low-skill occupations will experience the highest proportion of job gain and loss (11 and 2 percent, respectively) while high-skill occupations will experience the smallest gain and loss (around 1 percent for both) (Figure 3.1, Panel B).



⁴It is assumed that all countries in the region share the average regional industry-occupation structure. This structure is used to calculate the employment by occupation based on the employment by industry estimation from Chapter 2. The methodology used in this exercise is detailed in Appendix 5 of ILO (2019a).

⁵Skills are categorized in three levels according to the one-digit codes of the International Standard Classification of Occupations (ISCO-08). 1-Managers; 2-Professionals; and 3-Technicians and associate professionals are high-level skills. 4-Clerical support workers; 5-Service and sales workers; 6-Skilled agricultural, forestry, and fishery workers; 7-Craft and related trades workers; and 8-Plant and machine operators and assemblers are medium skills. 9-Elementary occupations are at a low-level of skills.

Figure 3.1 / Jobs Created and Destroyed by Decarbonization as of 2030, by Skills Level**Note**

Occupations are aggregated to the one-digit level, with the result that occupations requiring high-level skills are listed under the International Standard Classification of Occupations (ISCO-08) codes

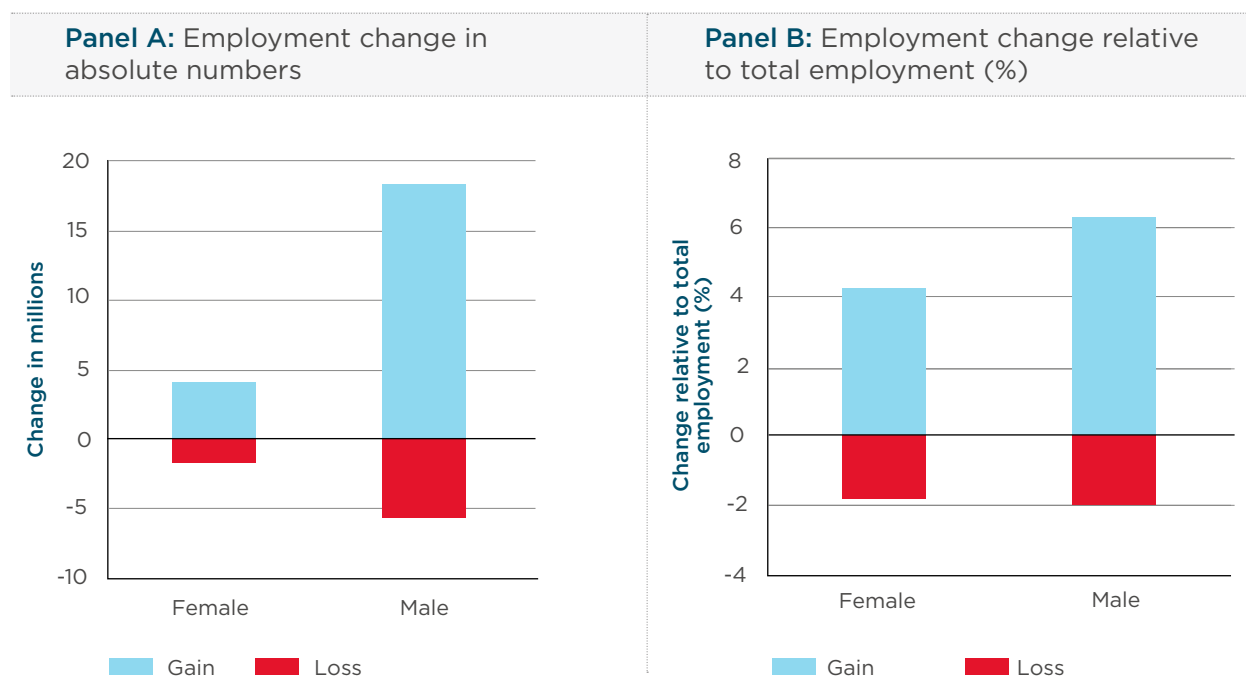
1, 2 and 3; those requiring medium-level skills are listed under ISCO-08 codes 4 through 8; and those requiring low-level skills are listed under ISCO-08 code 9.

Source: Authors' calculations based on GTAP 2014 and national labor force surveys.

Job Reallocation: A Challenge for Gender Equality

Job creation under the decarbonization scenario is concentrated in male-dominated occupations. This gender bias reflects today's high level of male employment in the agriculture sector (as seen in Figure 1.1 in Chapter 1). More than 39 million workers were employed in agriculture, livestock, forestry and fishing in Latin America and the Caribbean in 2018 and only 22 percent

were women (ILO STAT). Occupations employing men will gain 18.5 million jobs and lose 6 million by 2030 under the decarbonization scenario. On the other hand, occupations employing women will experience a gain of 4 million jobs and a loss of 1.5 million. In relative terms, female- and male-dominated occupations will experience similar losses (about 2 percent), but male-dominated occupations will enjoy a higher proportional job gain (6.3 percent) compared to female-dominated occupations (4.3 percent) (Figure 3.2, Panel B).

Figure 3.2 / Jobs Created and Destroyed by Decarbonization in 2030 by Gender

Source: Authors' calculations based on GTAP 2014 and national labor force surveys.

In other words, with decarbonization, jobs are created mostly in occupations that are dominated by men today. This projection underlines the need to reduce gender segregation and promote gender equality in the labor market. To do this and achieve gender equality in employment and remuneration, a multi-track approach is needed (ILO, 2019b). First, workers' rights should ensure that women and men have equal opportunities, are protected from discrimination, and have access to maternity and parental leave. Second, child-care policies, support for lifelong learning, an enabling environment for female entrepreneurs, and greater participation in social dialogue can also help empower women in the labor market.

On the bright side, some of these changes are already underway. Female employment as a percentage of the working-age population (persons aged 15 years and older) grew from 41.9 percent to 47.2 percent in Latin America and the Caribbean between 2000 and 2014 (ILO, 2019f). Women have also surpassed men in years of tertiary education (ILO, 2020a). An example of training programs that can help unemployed women gain employment, even in a country with a high level of informality, is the Programa de Apoyo al Empleo (Program for the Support of Employment, PAE) in Bolivia. The program provides jobseekers with a wage subsidy and the opportunity to gain formal employment experience for three

months if they are selected by firms that have a vacancy registered with the public employment service. The evaluation of this program shows that beneficiaries of PAE have greater levels of employment, including formal employment, and higher incomes, and that these impacts are more pronounced for women than for men (Novella and Valencia, 2019).

Reskilling and Upskilling for Decarbonization

Some occupations will experience high levels of job creation with little or no job destruction. For these occupations, the policy focus should be on skills development, through expanded training capacity or new curricula. Other occupations will experience high levels of both job creation and job destruction, requiring a policy focus on reskilling/adult training to adapt workers' skills to the new emerging industries. New job creation and reallocation projections in this exercise assume there is no labor mobility across countries. Allowing for some mobility across countries, however, renders job reallocation more feasible in occupations that experience high levels of net job creation and for which skills are not available in the same country. Figure 3.3 identifies 15 occupations that will experience the highest levels of net job creation (Panel A) and 15 occupations that will experience the highest levels of job reallocation (Panel B).

The occupations that create the most new net jobs will require the skilling of new workers. They also will require the reskilling of workers who may need to move from one industry to another. The workers these occupations will employ include agriculture, forestry, and fishery

laborers (6 million new net jobs), market-oriented and skilled agricultural workers (5 million jobs), and subsistence farmers, fishers, hunters, and gatherers (4 million jobs).

Some occupations will both gain and lose jobs, encouraging workers to bring their skills sets to other industries (see Figure 3.3 Panel B). Workers will have to be reallocated for 1.3 million jobs in agriculture, forestry, and fisheries; 1 million jobs in market-oriented skilled agriculture; and about 765,000 jobs in subsistence farming, fishing, and hunting. Drivers and mobile plant operators; laborers in mining, construction, manufacturing, and transport; and workers in food processing, wood-working, garments, and other craft-related trades are occupations that each gain around 200,000 jobs that could be filled by reallocating workers within the same occupation.

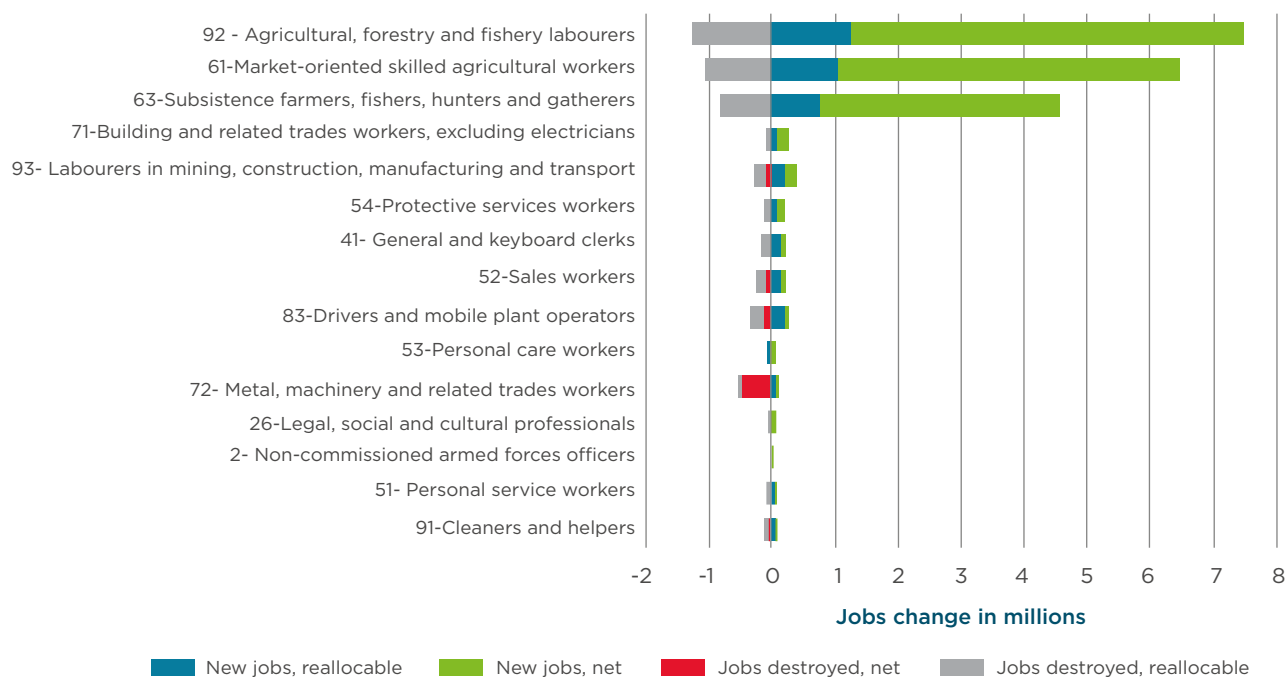
Many workers in the agriculture sector will have to update their skills or learn new ones when switching from one industry to another (for example, from animal-based to plant-based farming). The aging of the rural population may make it more difficult for older workers, especially subsistence farmers, to switch to other activities. The share of farmers over 55 years old is estimated at 25.3 percent in the Caribbean and 12.3 percent in Latin America (HelpAge International, 2014). The share of agricultural holders—people who exercise management control over an agricultural holding and make major decisions regarding resource use—who are older than 55 is 44.7 percent in the Caribbean and 29.8 percent in Latin America, compared to a global average of 27.5 percent (ibid.).

A lifelong learning approach that encompasses formal and informal learning from early childhood through adulthood will enable people to skill, reskill, and upskill. The ILO Global Commission on the Future of Work calls for a human-centered agenda—that is, placing people and the work they do at the center of economic and social policy and business practices—that involves investing in people’s capabilities, enabling them to acquire skills, reskill, and upskill,

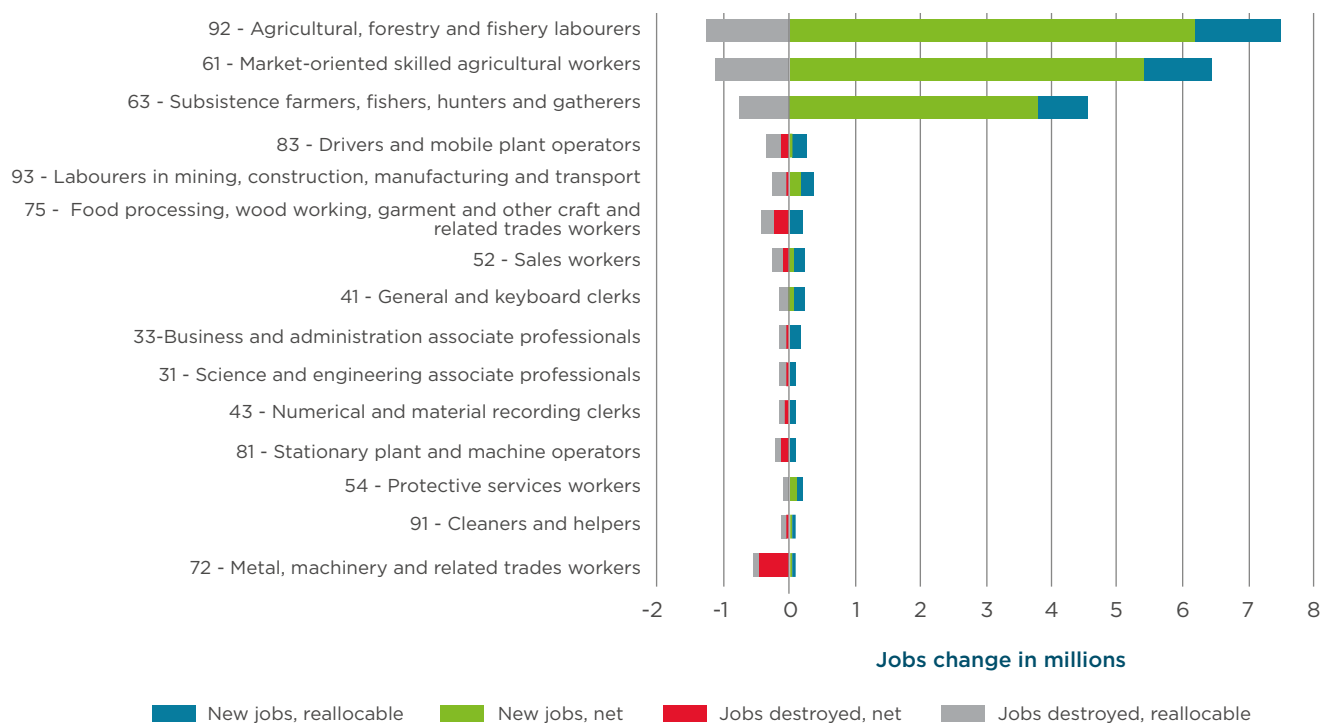
and supporting them through the various transitions they will face in their lifetimes (ILO, 2019c). Skills needs are not only shaped by climate change but also by technological innovation, globalization, and demographic change. Workers need skills that can be transferred from declining sectors to emerging sectors—skills that are relevant and shared across different occupations (Amaral et al., 2018).

Figure 3.3 / Jobs Created and Destroyed by Decarbonization in 2030, by Occupation

Panel A: Occupations with the highest number of new net jobs created under decarbonization



Panel B: Occupations with the greatest reallocation of jobs under decarbonization



Note

Occupations are measured at the ISCO-08 two-digit level. Panel A shows the 15 occupations with the highest levels of net new jobs. Panel B shows the 15 occupations with the highest levels of new jobs absorbing laid-off workers (“New jobs, reallocable”) – jobs that can be filled by similar (reallocable) jobs lost in other industries in the same country (“Jobs

destroyed, reallocable”). “New jobs, net” are jobs created that cannot be filled by jobs lost in similar occupations from other industries in the same country. “Jobs destroyed, not reallocable” are jobs for which vacancies in the same occupations in other industries within the same country will not be found.

Source: Authors’ calculations based on GTAP 2014 and national labor force surveys.

The job creation potential associated with decarbonization in Latin America and the Caribbean will be fully realized if the labor market adjusts to the changing demand for skills by providing jobs of higher quality, as well as relevant training that boosts the productivity of enterprises. With the transition to net-zero emissions creating many jobs in agriculture, the focus must be on rural development and increasing the quality of jobs—especially in agriculture—in rural areas. As most jobs will be created in occupations that predominantly employ men, measures to promote gender equality and remuneration in employment are central to ensure that a just transition benefits everyone.

General education also needs to adapt. Schools must provide students with sound foundations and soft skills that give them the ability to continue learning and to move to growing sectors of the economy (Azuara Herrera et al., 2019). Modern systems are needed to ensure that people learn cross-cutting skills from an early age, that they continue acquiring relevant skills once they are in the labor market, and that they have flexible tools that they can use to fill gaps in their education throughout their lifetimes. In addition, upskilling traditional occupations (e.g., low-skill jobs in agriculture, forestry, and construction) that employ predominantly vulnerable groups (i.e., youth, people with disabilities, indigenous people, and migrant workers) can improve employment quality and wages.

The private sector also plays a key role in identifying the skills needed

and aligning the training content with changing labor demand. In many cases, training for the transition is provided by private enterprises. This is mainly because the private sector is directly affected by the changes in skills needs, and because formal technical and vocational education and training (TVET) systems are insufficient. In most countries, skills for a transition to a net-zero emissions economy are not yet part of the TVET curriculum, often because of the disconnect between TVET systems, environmental policies, and national development strategies, as well as between TVET institutions and industry (ILO, 2018a). An exception is Barbados' recently adopted National Energy Policy 2017-2037, which recognizes the contribution of skills to the development of the renewable energy sector. This policy outlines specific elements of skills development, such as qualification standards; curricula that emphasize innovation at various educational levels; TVET programs; information-sharing systems between educational institutions and the energy sector; and scholarship programs related to sustainability in the energy sector (ILO, 2018a).

Collaboration between the private sector, the government, and TVET institutions in anticipating the need for green skills can help prepare the workforce for the transition. Policy coherence among government ministries and between the government and other stakeholders, especially social partners, is essential in this process. Moreover, since workers affected by the transition are often clustered in specific sectors and geographic locations, coordination at the



local level is also important to identify workers, businesses, and communities that will most likely be negatively affected and design skills development policies that meet the new green sectors' demand. Inclusiveness is paramount to overcome a common policy bias towards workers with high initial education and a strong labor market attachment. This bias often shuts out the most disadvantaged workers (i.e., workers with limited schooling and low-level skills) (Holzer, 2015).

Protecting Poor Households: The Challenge for Reforming Energy Subsidies

The main areas of social protection that can contribute to the adaptation and mitigation of environmental degradation and climate change at the global level have been reviewed in detail elsewhere (see Chapter 4 and ILO, 2018b). This section focuses on a challenge more

specific to Latin America and the Caribbean: how to protect vulnerable populations when reforming energy subsidies so as to reduce emissions without hurting the poor. Price incentives can be a significant barrier to adopting carbon-free technologies in the energy and transport sectors. Removing energy subsidies would provide economic agents with price incentives to decarbonize the delivery of infrastructure services. In particular, introducing taxes to internalize the cost of fossil fuels on global warming, the health impacts of air pollution and traffic accidents, the productivity loss due to congestion, and the fiscal burden of road damage would provide an additional US\$148 billion per year to Latin American and Caribbean governments while helping reduce GHG emissions (Coady et al., 2019).

Removing energy subsidies would also free up additional resources for social protection. In Latin America and the Caribbean, energy subsidies cost governments on average US\$12 to transfer US\$1 of income to households

in the poorest quintile while targeted programs like cash transfers cost on average US\$2 for every US\$1 transferred to the poorest households (Feng et al., 2018a; Robles et al., 2017). Nonetheless, many governments still subsidize energy: In 2017, governments in Latin America and the Caribbean spent up to US\$77 billion subsidizing energy (Coady et al., 2019).

Environmental taxes and energy subsidy reforms, however, have proven difficult to implement (Rentschler and Bazilian, 2016; Whitley and Van Der Burg, 2018). One reason is their adverse impact on the cost of food, utilities, and public transportation, which affects poor and vulnerable consumers. If not well managed, price increases lead to frustration and even social unrest. The hike in public transport prices in Santiago, Chile ignited a series of violent protests across the country in late 2019. In Ecuador, rapid removal of subsidies for gasoline and diesel in October 2019 led to public outrage over significant fuel price hikes and sparked 12 days of violent protests. The violence was initiated by transportation workers and led later on by indigenous groups from the Amazon and the Andes. Negotiations with the Indigenous Nations Confederation forced the government to reinstate the subsidies and work on a second reform attempt with a social assistance program for the neediest.⁶ Overall, higher prices conspire against affordable and inclusive infrastructure services and increase resistance to decarbonization. Anticipating the impact of price hikes on

consumers and compensating negatively affected households improves the political economy of policies and makes it possible to align environmentally motivated price reforms with broader development goals (Schaffitzel et al., 2019).

Social protection schemes, such as cash transfer programs, are one option for compensating consumers adversely affected by the removal of energy subsidies. Most countries in the region already have cash transfer programs that can easily be expanded. Recent research shows that in half of the countries under analysis,⁷ governments would need to recycle less than 30 percent of carbon revenues into carbon rebates backed by existing cash transfer programs to allow households at the bottom 40 percent of the income spectrum to break even following the introduction of a carbon tax (Vogt-Schilb et al., 2019). That would leave more than 70 percent of carbon tax receipts to fund other political priorities (ibid.). Further studies are needed for a complete assessment of a carbon tax's impact on consumers and workers in these sectors, and additional social protection measures are needed to ensure an inclusive intervention.

In Brazil, the government removed subsidies for liquefied petroleum gas (LPG) in 2002 and replaced them with a gas voucher of US\$2.38 per month per household to support low-income households. Households with a monthly income of no more than half the minimum wage were eligible for the voucher

⁶See <https://www.iisd.org/blog/lesson-ecuador-fossil-fuel-subsidies>.

⁷These countries are Brazil, Colombia, Costa Rica, Ecuador, El Salvador, Guatemala, Mexico, Panama, and Peru, from a total of 16 countries under study (Vogt-Schilb et al., 2019).



(IISD, 2010). In Mexico, the government gradually removed the LPG subsidy while strengthening an existing social welfare program (Oportunidades) to cushion the effects of higher energy prices on poor households (Toft et al., 2016).

In-kind transfers are another option. In Latin America and the Caribbean, most of the impact of carbon taxes and lower energy subsidies on households comes from higher prices for food, public transportation, electricity generated from fossil fuels, and domestic fuels used for heating and cooking (Feng et al., 2018b). To shield vulnerable households, governments can ensure that these items remain affordable through targeted public transport subsidies, food vouchers, and electricity lifelines, which are subsidized rates for a first block of consumption that covers basic needs (Schaffitzel et al., 2019).

Targeted policies often impose behavioral conditions on the recipients and risk excluding marginalized populations.

A more encompassing and inclusive approach is to expand social protection coverage not only to protect people against the risks of poverty, but also against those of sickness, employment injury, old age, and maternity.

The recent protests in Latin America and the Caribbean demonstrate that it is not enough to protect only the most vulnerable: The middle class has also been affected by structural change. According to an ILO index, social unrest has been increasing slowly over the past decade in countries that have been hard hit by economic and social crises including Bolivia, Chile, Ecuador, and Venezuela (ILO, 2020a). Universal approaches such as increasing access to public services and public infrastructure, rather than narrowly targeted measures, have gained support over the years (ECLAC, 2015; ILO, 2017a). Other options include using the proceeds of a carbon tax to improve services that are used by the most affected people. Ideas include expanding public transport,

improving homes' energy efficiency, and providing solar energy systems that allow access to free energy over the long term. In Colombia, income from a national carbon tax is used to finance activities related to conservation and environmental sustainability, sustainable rural development, and peacebuilding (World Bank, 2019).

International experience shows that for price reforms to be socially accepted and complementary policies to be relevant and fair, the government must design compensatory policies in consultation with stakeholders (e.g., unions, consumer groups, professional associations, employers' organizations, and environmental organizations). Progressively phasing in price reforms rather than hiking prices overnight also gives people time to adapt and improves the odds that price reforms will be successful (Coady et al., 2018; Rentschler and Bazilian, 2016; Whitley and Van Der Burg, 2018).

Public Employment Programs in the Time of COVID

Public employment programs (PEPs) can be an effective way to generate green jobs in the post-COVID-19 recovery. Recovery packages must provide income support and employment opportunities to vulnerable people (e.g., casual workers in informal sectors, the underemployed and working poor, older workers, women, and youth) who are heavily affected by both the pandemic and the government's response to it. The ILO recommends enhancing the employment impact of public investments for post-COVID-19

recovery by (i) focusing on public works that are labor-intensive by default (such as work in maintenance, forestry, land and environmental improvements, community works, and sanitation) and (ii) using labor-intensive processes such as expanding construction activities that use labor as a competitive alternative to conventional construction methods (ILO, 2020b).

PEP measures refer to both temporary responses to specific shocks and crises (public work programs) and long-term, rights-based employment programs that entitle people to work and offer predictable and stable incomes while creating needed public assets and services (employment guarantee schemes) (Lieuw-Kie-Song, 2010). These programs combine the goals of job creation, income security, poverty reduction, and the provision of public goods and services. Infrastructure that includes an environmental component is a case in point. Ethiopia's Productive Safety Net Program is an example of such a multifaceted PEP. It contributes to improving food security through land restoration and reforestation and has become Africa's largest climate resilience program (ILO, 2018a). Public works provided through the program have boosted food output by increasing land productivity and enhanced community resilience. The program mitigates climate change by promoting land use practices that increase carbon sequestration and increase yields by reducing soil erosion and sediment loss. Another example is in South Africa where the Working for Water Program provides income support to participants in exchange for protecting the natural environment of rivers (Schwarzer et al., 2016). The program



also includes skills development for a largely unskilled and typically vulnerable segment of the population; in this way the program pursues both environmental and social objectives (ILO, 2019d).

Well-designed PEPs that include environmental components are still few and far between in Latin America and the Caribbean. Five of the 10 PEPs implemented since 2000 reviewed by Subbarao et al. (2013) have a specific component aimed at preventing poverty. Only three PEPs link infrastructure development to programs that adapt to or mitigate environmental damage: Chile's Direct Employment Program launched in 1993; Uruguay's Community Activities Program (2003); and El Salvador's Program for Temporary Income Support (2009). These types of PEPs will contribute to a green recovery that stimulates growth and job creation post-COVID-19 while helping in the mitigation and adaptation of climate change impacts. They include measures that help protect or restore ecosystems that have been damaged and destroyed: reforestation, forest protection, slope

protection, soil and water conservation, construction of dikes, sluices, and footbridges, and lining of rivers and creeks, among others (ILO, 2020b).

A Human-Centered Approach: Linking Social, Environmental, and Economic Goals

A just transition to a greener economy has the potential to reduce inequality and improve labor market conditions while protecting the unique natural environment of the region. These three goals—social, environmental, and economic— can and should go together. Empowering workers with the right skills for the transition towards net-zero emissions is a powerful strategy to ensure a just transition that creates more decent and productive jobs. To achieve this objective, skills needs should be identified and new retraining and training programs implemented within the context of environmental and climate policy. Policy coherence and institutional coordination between government

ministries as well as between government and other stakeholders, especially social partners, are central to achieving a just transition (ILO, 2019a, 2015).

While coordination at the national level is challenging, recent progress shows the way. In Colombia, the Ministry of Employment and Pensions and the ILO adopted a pact for green employment and a just transition in November 2019 to ensure a coherent approach to sustainable development and to implement skills development policies that are relevant for a green economy (Ministerio del Trabajo, 2019). The agreement recognizes that green jobs and green growth generate opportunities to transform the economy towards environmentally sustainable and cost-cutting solutions. It also recognizes that the transition will create employment opportunities and upgrade the labor market if it develops new skills for the green economy. Finally, it recommends strengthening social dialogue and coordination with key actors to identify concrete actions for the transition (ibid.).

Barbados has made progress over the past decade to better coordinate labor and environmental policies at the ministerial level (ILO, 2018a). Although there is no formal arrangement among the ministries of labor, environment, agriculture and education, they work together to conceptualize, develop, and implement training programs aimed at providing decent work through sustainable businesses and occupations. All programs being developed and implemented are based on the concepts of sustainability and the green economy (ibid.).

Another example is Costa Rica. Its national decarbonization plan is one of the first in the world to include a comprehensive description of the sectoral transformation required to transition to net-zero emissions by 2050, as well as a policy roadmap to enable the transition. It provides a framework to coordinate 35 government ministries and agencies, the private sector, academia, and civil society in the move toward environmental sustainability (Government of Costa Rica, 2019). The government is also strengthening policy coherence with institutional and policy changes that will give the ministries of finance and planning active roles in coordinating the implementation of the plan by the line ministries (IDB, 2020). In addition, the plan's Labor Strategy for a Just Transition recognizes that the political feasibility of these transitions is strengthened by adapting to the opportunities and challenges that arise in the labor market. The strategy recognizes the need to review the progress made, identify best practices, and develop specific plans for the sectors that are exposed to the greatest impacts.

Support for Enterprises

Enterprises are key actors in guiding and sustaining the transition towards net-zero emissions as they are sources of innovation, new technologies, financing, strategic outlooks, contracts through the value chains, and know-how to address environmental challenges (ILO, 2013a; ITC-ILO, 2016). Targeting large corporations can be an effective step, as

actions by a few large enterprises can go a long way towards reducing emissions and environmental degradation, especially if green actions involve complete value chains (ILO, 2018a). The 1,839 firms reporting to the Carbon Disclosure Project in 2015 account for around 11 percent of global emissions (CDP, 2016). If these firms adopted environmentally sustainable practices and aggressively reduced their GHG emissions, the mitigation impact would be significant.

On the other hand, even though micro-, small, and medium-sized enterprises (MSMEs) consume relatively little energy individually, together they can have a major impact on greening the economy because of their collective size and the vast number of workers they employ. Together, MSMEs consume over 13 percent of total global energy production (IEA, 2015). In Latin America and the Caribbean, they represent 99.5 percent

of firms, 61.1 percent of employment, and 24.6 percent of total production (see Table 3.1). This low production share stands in contrast to that of similarly sized firms in other regions, particularly in the European Union where MSMEs represent around 56 percent of total production (Dini and Stumpo, 2018).

MSMEs are also an important source of female employment and firm ownership in the region. Some 33 percent of full-time permanent employees in MSMEs in Latin America and the Caribbean are women, compared with 26 percent in large enterprises (ILO, 2017b). MSMEs are also more likely than large enterprises to have a woman as their top manager: 20 percent of small firms compared with 10 percent of large firms have female top managers. Therefore, MSMEs are often an entry point into the formal labor market for women and can help empower women and improve gender equality.

Table 3.1 / Distribution of Firms by Number, Employment, and Production in Latin America and the Caribbean in 2016 (percent)

	Number of firms	Employment	Production
Micro enterprises	88.4	27.4	3.2
Small enterprises	9.6	19.7	8.8
Medium enterprises	1.5	14.0	12.6
Large enterprises	0.5	38.9	75.4

Source: Dini and Stumpo (2018).



The transition to environmental sustainability has been limited in MSMEs, however. This is due to the additional costs of adopting technology, lower awareness, limited access to information and finance, non-legally-binding practices that can be adopted by firms (e.g., certification) that might not result in direct business benefits, and firms' beliefs that consumers might not be interested in the environmental impact of such practices (despite consumers' growing demand for environmentally friendly products and services). Measures to help MSMEs reap the benefits of the transition include increased energy efficiency, reduced operational costs, and a speedy response to changes in consumers' demand for more environmentally sustainable products. These measures may also limit the adverse impacts of climate change and climate-related policies on MSMEs and facilitate a just transition for them. ILO's "Guidelines for a Just Transition" (2015) highlight the need to enhance the resilience of businesses,

particularly MSMEs, to avoid disrupting economic activities and losing assets, jobs, and incomes (ILO, 2015).

Certification can help firms transition to low-carbon and environmental sustainability. Certification often occurs in the private sphere, where firms pay for an external and independent certification service. The possibility of acquiring certification motivates companies to adopt measures that improve their environmental and social performance. Acquiring it allows them to signal to consumers that they meet certain social and environmental standards. Although certification is voluntary and not legally binding, it has become a requirement for operating in some sectors, such as the international timber trade.

An example is the certification program of the Forest Stewardship Council (FSC), a program based on environmentally appropriate, socially beneficial, and economically viable forest management

(see Box 4.6 in Chapter 4). Forest management certification helps improve occupational safety and health (OSH) and other working conditions while at the same time improving firms' access to environmentally sensitive markets. It can lead to premium prices for certified timber and greater transparency in supply chains. One limitation of certification is its cost, which is often prohibitive for micro- and small enterprises. Nevertheless, in Chile, for example, progress has been made to extend FSC certification to smallholders and communities.⁸ Another solution is to have the government or nongovernmental organizations regulate the certification process, thereby improving its affordability and accessibility.

Cooperatives can be another way to advance sustainable development and improve decent work in sectors with high levels of informality (e.g., renewable energy, waste management, and agriculture). Indeed, forming cooperatives among informal waste pickers enhances social inclusion and economic activities (see Box 4.7 in Chapter 4). Cooperatives are also active in the renewable energy sector, ranging from biomass production plants in Brazil to photovoltaic cooperatives in Argentina. Renewable energy cooperatives can help member companies access affordable and clean energy sources. They can grant communities democratic control over energy production and use, the capacity

to create local employment and promote local development, and reasonable pricing (ILO, 2013b). Financial and technical assistance could promote the development of cooperatives significantly.

In addition to cooperatives, innovative and sustainable ways of doing businesses have gradually sprung up around the region. Colombia, for example, was one of the first countries to recognize and create a legal framework for commercial enterprises that maximize economic profits while advancing social and environmental benefits.⁹

Public procurement with a green goal can stimulate a greater supply of green products and services when private demand is insufficient. Green procurement is particularly important to MSMEs because government contracts could represent a significant share of their sales (OECD, 2018). An example is in Brazil, where a public procurement regulation stipulates that contracted companies must adopt sustainability practices.¹⁰ Another example is in the city of Buenos Aires, where the municipal government has set targets specifying that by 2025 at least 20 percent of the energy consumed by large users within the city's public sector (e.g., universities, civil society organizations, and purchasing agencies of different jurisdictions) must come from renewable sources.¹¹

⁸See <https://fsc.org/en/news/new-approaches-advances-smallholder-and-community-certification-in-chile>

⁹Colombia's Law No. 1901 on creating and developing Corporations for Benefit and Collective Interest (BIC), June 18, 2018.

¹⁰Brazil's Normative Instruction SLTI/MP n° 01/2010 establishes the rules for preparing the Sustainable Logistics Management Plans, 2010.

¹¹See <http://gicn-on-sp.org/cities/buenos-aires/>

Another obstacle commonly faced by MSMEs in improving their environmental performance is limited access to finance. Although green bond issuance remains low in many countries, the market has expanded significantly over the last few years in Argentina, Brazil, Chile, Colombia, Costa Rica, Mexico, Peru, and Uruguay.¹² Brazil leads the region with 41 percent of total regional issuance; Chile follows at 25 percent; and Mexico is third at 14 percent (Climate Bonds Initiative, 2019). Half of these green bond proceeds are located to renewable energy projects, especially wind and solar, while a quarter of issuance goes to land use (mostly certified forestry and paper, especially from Brazil) and industry (ibid).

In addition to green bonds that explicitly finance green projects, broader labelled bonds that integrate environmental and social dimensions into their portfolios can enhance enterprises' environmental sustainability and social inclusion. Financing schemes targeting MSMEs are also crucial for a just transition, as the majority of MSMEs have limited or no access to the bond market. EcoMicro is an IDB-led technical cooperation program that partners with financial institutions in the region to create financial products that help MSMEs and low-income households finance climate change adaptation and mitigation projects.¹³ One of EcoMicro's successful projects is a partnership with Te Creemos in Mexico. Green loans through the partnership

promote access to solar water heaters, efficient refrigeration, and photovoltaic systems for 100 microenterprise clients. The successful uptake of the green loans allowed Te Creemos to change its entire business model to support the delivery of green products and train over 1,000 employees. In Colombia, EcoMicro partners with Bancamia to develop green loans to enable 240 MSMEs across 12 districts to incorporate energy efficiency solutions into their business processes. These solutions reduce the MSMEs' energy costs and minimize their environmental impacts.

Another mechanism for greening MSMEs is to tackle their market demand and environmental technology constraints through pressure and guidance from larger corporations along their supply chains (OECD, 2018). As mentioned in Chapter 1, most multinational firms are aware of greening practices and some have already integrated these measures into their business models. These pressures are increasingly passed along to smaller firms that supply big corporations. At the same time, supply chains can offer smaller firms access to knowledge and the global market. An example of greening the supply chains is Natura, a Brazilian-based cosmetics manufacturing firm. Through interaction with rural communities in the Amazon, the company seeks to develop value chains that are sustainable and generate superior returns (Boehe et al., 2014).

¹²Green bonds are bonds whose proceeds are used for green projects, including climate change mitigation and adaptation projects.

¹³See <https://lab.org.uk/bogotas-recyclers-fight-for-inclusion/>

The Workplace: Ground Zero for a Greener Economy

The aforementioned policy options to make enterprises more sustainable are predicated on the active involvement of workers, employers, and labor market governance to achieve a just transition. These actors also contribute to making the workplace more sustainable and to achieving deep changes in the way energy and resources are used in the market (ILO, 2015). This section looks at rules and regulations to improve resource efficiency, reduce waste, and promote responsible consumption in order to encourage sustainability in the workplace.

One way to reduce work-related energy consumption is to replace the use of private vehicles with public transport, bicycles, and other means of transport in companies or workplaces, as per the Colombian Indicative Action Plan on Energy Efficiency.¹⁴ In a similar vein, the Mexican General Law on Climate Change promotes carbon emission reductions with initiatives like housing programs that bring workers closer to their jobs, schools, and entertainment facilities and the development of public transport services that can get workers to their places of employment.¹⁵

Sustainable consumption in the workplace is also encouraged through flexible working arrangements; less time

spent commuting means less use of energy resources and less pressure on the transportation system. The COVID-19 pandemic and the accompanying lockdowns are a massive global experiment in teleworking; more people than ever before have been teleworking to reduce the risks of spreading and contracting the virus. Although the positive environmental impacts of cutting pollution and fuel use by reducing traffic will be short-lived, they point to the possibility of changing behaviors and highlight the potential effectiveness of teleworking and virtual meetings. Up to 25 percent of all jobs can be carried out remotely in the region, ranging from 17 percent in Peru and Guatemala to 33 percent in Brazil and Argentina (see Figure 3.4).¹⁶ In addition to regulations to ensure decent work conditions, teleworking should be continued once the economy gets back to normal and adjusted to reflect workers' and employers' needs and aspirations.

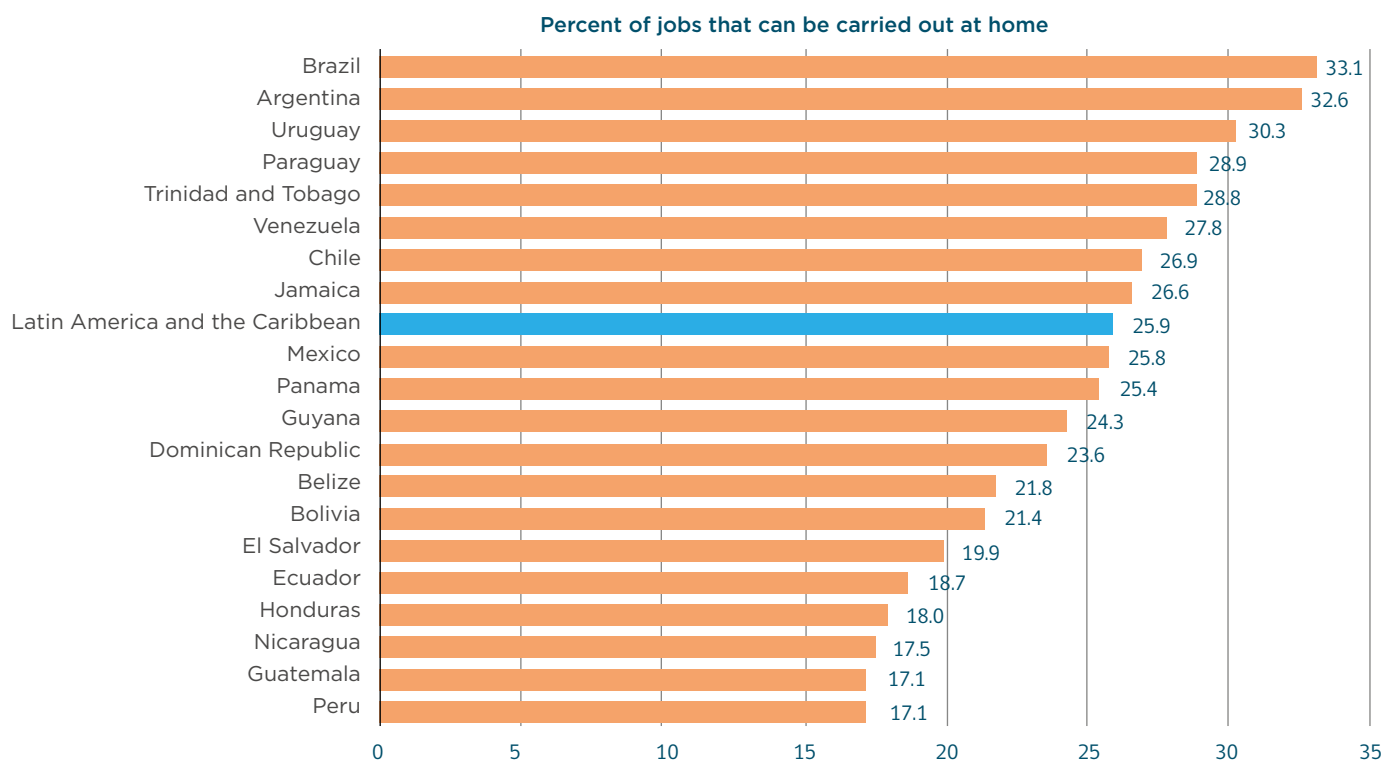


¹⁴Plan de Acción Indicativo de Eficiencia Energética 2017-2022, Una Realidad y Oportunidad para Colombia, p. 62

¹⁵Mexico's General Law on Climate Change, 2012

¹⁶The number of jobs is calculated based on the tasks that are carried out in each occupation. For example, jobs that involve operating machines and driving trucks cannot be done by teleworking. These estimates are of teleworking feasibility; they refer to how many jobs can be carried out at home rather than how many jobs are actually carried out at home.

Figure 3.4 / Share of Jobs That Can Be Carried Out at Home, Selected Countries, Latest Available Year



Note

The teleworking feasibility of each occupation (the share of hours of work that can be carried out from home, based on data from the United States) is merged with the occupation structure of each economy using the ISCO two-digit classification and the latest labor force surveys. For countries

where only the one-digit classification is available, teleworking feasibility is aggregated at the one-digit occupational classification (these countries are Belize, Chile, Panama, Paraguay, Trinidad and Tobago, and Venezuela).

Source: Data on teleworking from Dingel and Neiman (2020) and Gottlieb et al., (2020); Labor Force Surveys from ILOSTAT.

Teleworking has been implemented in several countries in the region. The San José Declaration, which was adopted pursuant to the Buenos Aires Declaration on Telework,¹⁷ recommends further studies to generate scientific knowledge about the impact of teleworking on society, the economy, and the environment and to support policymaking.¹⁸ Following these initiatives, legislative efforts are under way to regulate teleworking in Argentina, Chile, Ecuador, Mexico, and Paraguay, among others, in order to curb urban congestion and environmental problems.¹⁹ In Mexico, for example, the 2012 General Law on Climate Change requires the public sector to establish programs that promote office work at home in order to reduce workers' commutes. Since 2015, Costa Rica has promoted the use of teleworking in the public sector, touting it as a tool to lower work-related use of fossil fuels and promote environmental protection.

Public procurement has been used to stimulate greater supply of green products and services, and to foster sustainable workplace practices. For example, in Brazil, a 2010 public procurement regulation stipulates that contracted companies adopt sustainability practices in the execution of services. These include training employees to reduce electricity consumption, water consumption, and solid waste, as well as separating recyclable waste and providing for the

proper environmental disposal of used and disposable batteries.²⁰

Legislative changes are also under way to promote sustainable business models. Originating in the United States' legal tradition, corporations for "Benefit and Collective Interest" (BIC) are a new business modality that aims to generate both economic profit and greater social and environmental responsibility for incumbent companies. Colombia was the first country in Latin America to provide a legal framework for BICs in 2018. Its legislation considers a company to be a BICs if it has one of the following characteristics: (i) It gives preference in awarding contracts to suppliers of goods and services that implement equitable and environmental standards; (ii) it carries out annual environmental audits on the efficiency of its use of energy, water, and waste; disseminates the results to the general public; and trains its employees in the social and environmental mission of society; (iii) it oversees the greenhouse gas emissions generated by its business activity, implements recycling or waste reuse programs, progressively increases the sources of renewable energy it uses and motivates its suppliers to make their own environmental assessments and audits; and (iv) it uses energy efficient lighting systems and provides incentives for workers to use environmentally sustainable means of transportation in their travel to work.²¹

¹⁷Text of the Declaration reproduced in International Telework Academy, *Telework Argentina: Telework for Sustainable Development*, El Cid Editor, 2011, p. 16.

¹⁸Declaración de San José "La Modernización del Estado: El Teletrabajo en la Sociedad del Conocimiento", available at https://www.uned.ac.cr/viplan/images/teletrabajo/Textos/Declaracion_San_Jose_Telework_2012.pdf

¹⁹See the draft proposal at http://infosen.senado.gob.mx/sgsp/gaceta/64/1/2019-06-19-1/assets/documentos/Dictamen_Teletrabajo.pdf

²⁰Brazil's Normative Instruction SLTI/MP n° 01/2010 establishes the rules for preparing the Sustainable Logistics Management Plans, 2010.

²¹Colombia's Law No. 1901 on creation and development of Corporations for Benefit and Collective Interest (BIC), 18 June 2018.

Other regulatory and policy approaches to the greening of workplaces in the region have been cast more broadly. In Cuba, the environmental protection legislation dating back to 1997 instructs its public sector to promote and implement activities aimed at workers' environmental awareness and obliges employers to instruct workers in measures to control environmental risks.²² This shows an effective culture of preventing risks and reducing vulnerability as opposed to reactive approaches of preparedness and response.

Finally, workplaces can become drivers of greening the economy by promoting workers' environmental rights. Since 2006 Venezuelans have had the right and duty to report anything that threatens a healthy, safe, and ecologically balanced environment.²³ In effect, rights at work are one of the pillars of the transition to sustainable economies as provided for by the ILO's "Guidelines for a Just Transition" (ILO, 2015). The rights of workers to request information from employers, to notify them of an imminent environmental risk, and take a proactive role in following up with public authorities are among the tools to ensure enterprise-level environmental compliance with ecological requirements.

As some of these laws fall under environmental authorities rather than traditional labor inspectors, institutions are needed to ensure policy compliance by sharing information and guidance among authorities, in particular with regard to different target groups, such as MSMEs. There is also a need to rethink areas of competence and training for those who

apply the law and monitor compliance. Close collaboration and coordination across ministries (e.g., ministries of environment and labor) can also facilitate policy coherence and the reaching of policy targets.

Finally, while this report focuses on a just transition in the workplace, consumers are also an integral part of the transition toward environmental sustainability. They can support the development of a circular economy in many ways: separating out recyclables in their waste, reducing GHG emissions by traveling less, and changing their diets by eating less meat. Consumers are also affected by the environmental transition to net-zero emissions economy.

Social Dialogue for Inclusivity

A just transition emphasizes a participatory approach to environmental and social sustainability. Social dialogue gives voice to the concerns and needs of workers, employers, and communities affected by the transition towards net-zero emissions, helps build trust, and forges consensus.

Smoothing Out the Energy Transition in Chile

Coal supplies 40 percent of Chile's power mix and emits 26 percent of the country's GHG emissions. The coal-fired generation sector provides an estimated 4,400 direct jobs and 9,500 indirect jobs, accounting for 0.17 percent of the country's total

²²Cuba's Environmental Law No. 81, 11 July 1997.

²³Venezuela's Ley Orgánica Del Ambiente, 2006.

employment (Viteri Andrade, 2019). Large-scale coal mining offers relatively stable and formal jobs in Chile. Average salaries, benefits, and the percentage of full-time jobs in the sector are higher than national averages. Decarbonization will lead to structural shifts in both informal and formal employment which could impact the livelihoods of workers and enterprises. A small segment of the mining sector in Chile is informal and offers poor economic security and working conditions.

In June 2019, Chile announced its commitment to become carbon neutral by 2050 and pledged to phase out all coal power generation plants by 2040 starting with the closure of the eight oldest ones by 2024 (there are 28 such plants altogether). In January 2018, prior to the announcement of the carbon neutral target, the government signed an

agreement with power companies that own coal-fired power plants in which they pledged (i) not to build more coal power plants without carbon capture and storage facilities; (ii) to set up a working group of main stakeholders (ministries, National Energy Commission, local government, social partners, academics) led by the Ministry of Energy and tasked with establishing criteria for a smooth transition to a low-carbon economy in social, economic, and environmental terms; and (iii) to define a schedule to phase out or reconvert existing coal power plants.²⁴

Based on the knowledge gathered from consultations with stakeholders, the Ministry of Energy developed strategies to address the social impacts of decarbonization that could help enable a just energy transition (see Table 3.2).

Table 3.2 / Strategies to Address the Social Impacts of Decarbonization in Chile

Energy transition strategy	Source of information
Quantification of the number of contracted and subcontracted staff	Companies and trade unions
Current skills in demand	National Training and Employment Service and other initiatives
Survey of job opportunities in surrounding areas	Environmental Impact Assessment System, Office of Sustainable Projects Management of Ministry of Economy
Linkage with entities that provide support for training	Education and Dissemination Unit of the Ministry of Energy (Training Round Table), Ministry of Labor, National Training and Employment Service
Linkage with current initiatives of local development	Survey of labor intermediation options, National Training and Employment Service, universities, local technical training institutes and centers, Production Development Corporation, etc.

Source: Presentation of the Ministry of Energy at the UNFCCC-ILO Awareness Creation workshop. May 22-24, 2019, Santiago, Chile.

²⁴See <https://coaltransitions.org/publications/chiles-decarbonization-efforts/>



Another important policy intervention in the coal phase-out in Chile is a formalization strategy for those workers in informal mining and/or targeted social protection and training to compensate for their limited access to conventional recovery packages.

The case of Chile underlines the importance of publishing a phase-out schedule in advance and developing energy transition strategies that take into account environmental, social, and economic impacts. Setting a long-term goal makes it possible to negotiate the timing with different stakeholders and discuss possible compensation mechanisms for households and communities that currently rely on coal jobs. Social dialogue among stakeholders played a key role in ensuring compliance with the country's decarbonization commitments.

On the Cutting Edge in Costa Rica

In February 2019, Costa Rica became the first country in Latin America and the Caribbean to announce a comprehensive plan to become a zero-emissions economy by 2050 (Government of Costa Rica, 2019). The National Decarbonization Plan covers ten sectoral areas including transportation, industry, waste management, and agriculture (including livestock). In addition to sectoral targets, the plan highlights important cross-cutting issues, one of which is *Labor Strategies for a Just Transition*. This seeks to ensure that no one is left behind when the country moves toward a green economy. The plan recognizes that:

The political feasibility of these major transitions is associated with the process of adapting to the opportunities and challenges that will arise in the

labor market. The best practices in just transition processes will be identified and relevant plans will be prepared for the sectors that are exposed to the greatest impacts.

The government worked with various stakeholders to draft the decarbonization plan. In addition to addressing the labor issues inherent in decarbonization, the plan is being used by the country to address multiple social challenges, such as health care and gender equality. Actions to meet the plan's objectives, however, have not yet been implemented.

Social dialogue among organizations representing both workers and employers was important in drafting the plan. Youth dialogues also provided a platform for young people to raise concerns and contribute new ideas on the emergence of green jobs and the need to ensure that the structural shift to environmental sustainability would be fair and inclusive. Similar national youth dialogues have been organized by the ILO, governments, and civil organizations in Argentina, Costa Rica, Dominican Republic, Guatemala, Honduras, and Mexico recently (ILO, 2019e). These initiatives play a significant role as youth unemployment and youth not in employment and education have been critical issues in many countries.

Environmental Sustainability: A Shared Responsibility

In Latin America and the Caribbean, as in other regions of the world, a just

transition to a low-carbon economy requires collective action by government, workers' and employers' organizations as well as the private sector. A just transition not only contributes to social justice but also increases the political feasibility of climate-related policies that are vital to curbing global GHG emissions (Hallegatte et al., 2013; Vogt-Schilb and Hallegatte, 2017). A just transition can also contribute to social development, poverty reduction, and the achievement of the Sustainable Development Goals.

A sectoral approach has proven to be useful to overcome some political resistance to the move towards net-zero carbon emissions. Collaboration and policy coherence across sectors and among ministerial departments is also valuable. Chapter 4 will look at the transition in Latin America and the Caribbean from a sectoral perspective, explaining opportunities and challenges that have arisen and underscoring the need to ensure fairness for all stakeholders. Just transition measures should not be limited to the energy sector. They should apply to all sectors in which workers, employers, and communities are adversely affected by the transition, including agriculture, forestry, waste management, tourism, transport, and construction. Once measures are taken to protect and support workers, employers, and communities, these sectors can begin to realize the opportunities afforded by an efficient, low-carbon economy.

References

- Amaral, N., Eng, N., Ospino, C., Pagés, C., Rucci, G., Williams, N., 2018. How Far Can Your Skills Take You. Inter-American Development Bank, Washington, D.C. <https://doi.org/10.18235/0001291>
- Azuara Herrera, O., Pagés, C., Rucci, G., Amaral, N., Ospino, C., Torres, J., González, S., 2019. El futuro del trabajo en América Latina y el Caribe: ¿Cuáles son las ocupaciones y las habilidades emergentes más demandadas en la región? IDB, Washington, D.C.
- Boehe, D., Pongeluppe, L., Lazzarini, S., 2014. Natura and the Development of a Sustainable Supply Chain in the Amazon Region. pp. 147-156. https://doi.org/10.1057/9781137024107_13
- CDP, 2016. Out of the starting blocks: Tracking progress on corporate climate action. Carbon Disclosure Project, London.
- Climate Bonds Initiative, 2019. Latin America & Caribbean Green finance state of the market 2019.
- Coady, D., Parry, I., Le, N.-P., Shang, B., 2019. Global Fossil Fuel Subsidies Remain Large: An Update Based on Country-Level Estimates. International Monetary Fund.
- Coady, D., Parry, I.W.H., Shang, B., 2018. Energy Price Reform: Lessons for Policymakers. *Rev Environ Econ Policy* 12, 197-219. <https://doi.org/10.1093/reep/rey004>
- Dingel, J., Neiman, B., 2020. How many jobs can be done at home? Covid Economics.
- Dini, M., Stumpo, G., 2018. MIPYMES en América Latina Un frágil desempeño y nuevos desafíos para las políticas de fomento. CEPAL, Santiago.
- ECLAC, 2015. Towards universal social protection: Latin American pathways and policy tools. CEPAL, Santiago, Chile.
- Feng, K., Hubacek, K., Liu, Y., Marchán, E., Vogt-Schilb, A., 2018b. Managing the distributional effects of energy taxes and subsidy removal in Latin America and the Caribbean. *Applied Energy* 225, 424-436. <https://doi.org/10.1016/j.apenergy.2018.04.116>
- Gottlieb, C., Grobovsek, J., Poschke, M., 2020. Who can work at home around the world. Covid Economics.
- Government of Costa Rica, 2019. National Decarbonization Plan Costa Rica (Long-term low greenhouse gas emission development strategies to the United Nations). UNFCCC.
- Green, F., 2018. Transition policy for climate change mitigation: who, what, why and how (No. 1807), CCEP Working Papers. Centre for Climate Economics & Policy, Crawford School of Public Policy, The Australian National University.
- Hallegatte, S., Fay, M., Vogt-Schilb, A., 2013. Green Industrial Policies: When and How. World Bank Policy Research Working Paper.
- Heffron, R.J., McCauley, D., 2018. What is the 'Just Transition'? *Geoforum* 88, 74-77. <https://doi.org/10.1016/j.geoforum.2017.11.016>
- HelpAge International, 2014. The ageing of rural populations: evidence on older farmers in low- and middle-income countries. HelpAge International.
- Holzer, H.J., 2015. Sector-based training strategies: the challenges of matching workers and their skills to well-paying jobs. Presented at the Symposium on the Changing Structure of Work at the US Department of Labor.
- IDB, 2020. Towards a green economy: support for Costa Rica's decarbonization plan (Loan Proposal No. CR-L1142). Inter-American Development Bank, Washington DC.
- IEA, 2015. Accelerating energy efficiency in small and medium-sized enterprises: Powering SMEs to catalyse economic growth. International Energy Agency, Paris.
- IISD, 2010. Lessons Learned from Brazil's Experience with Fossil-Fuel Subsidies and their Reform. International Institute for Sustainable Development, Geneva.
- ILO, 2020a. World Employment and Social Outlook: Trends 2020 (Report). ILO, Geneva.
- ILO, 2020b. COVID-19 - Job creation through employment intensive public works programmes. International Labour Office, Geneva.
- ILO, 2019a. Skills for a greener future: a global view (Publication). Geneva.
- ILO, 2019b. A quantum leap for gender equality: For a better future of work for all (Report).
- ILO, 2019c. Work for a brighter future - Global Commission on the Future of Work. International Labour Office, Geneva.
- ILO, 2019d. Skills for Green Jobs in South Africa (Publication). ILO, Geneva.
- ILO, 2019e. Informe dialogos nacionales de juventud en Iberoamerica: Empleo verde para las personas jovenes (Noticia).
- Switch order: ILO 2019f then ILO 2018a
- ILO, 2018b. Skills for green jobs in the Philippines. International Labour Office, Geneva.

- ILO, 2017a. World Social Protection Report 2017-19: Universal social protection to achieve the Sustainable Development Goals. International Labour Organization, Geneva.
- ILO, 2017b. World Employment and Social Outlook 2017: Sustainable enterprises and jobs: Formal enterprises and decent work. International Labour Office, Geneva.
- ILO, 2015. Guidelines for a just transition towards environmentally sustainable economies and societies for all. International Labour Organization, Geneva.
- ILO, 2013a. Sustainable development, decent work and green jobs (No. 5), 102nd Session. International Labour Conference, Geneva.
- ILO, 2013b. Providing clean energy and energy access through cooperatives. International Labour Office, Geneva.
- ITC-ILO, 2016. Greening economies, enterprises and jobs. International Training Centre of the International Labour Organization, Turin.
- Lieuw-Kie-Song, K.P., 2010. Towards the right to work: Innovations in Public Employment Programmes (IPEP) (Working paper).
- Ministerio del Trabajo, 2019. Pacto por los Empleos Verdes y Transición Justa en Colombia, firmaron OIT y MinTrabajo. Comunicados del Ministerio del Trabajo de Colombia.
- Morena, E., Krause, D., Stevis, D., 2019. Just Transitions Social Justice in the Shift Towards a Low-Carbon World. Pluto Press, London.
- Novella, R., Valencia, H., 2019. Active Labor Market Policies in a Context of High Informality: The Effect of PAE in Bolivia. IDB, Washington, D.C.
- OECD, 2018. SMEs: Key Drivers of Green and Inclusive Growth. OECD, Paris.
- Rentschler, J., Bazilian, M., 2016. Reforming fossil fuel subsidies: drivers, barriers and the state of progress. Climate Policy 1-24. <https://doi.org/10.1080/14693062.2016.1169393>
- Robles, M., Rubio, M.G., Stampini, M., 2017. Have cash transfers succeeded in reaching the poor in Latin America and the Caribbean? Development Policy Review 37, O85-O139. <https://doi.org/10.1111/dpr.12365>
- Rosemberg, A., 2010. Building a Just Transition: The linkages between climate change and employment. International Journal of Labour Research 2, 125-161.
- Saget, C., Luu, T., Karimova, T., Forthcoming. A Just Transition towards Environmental Sustainability for All, in: Handbook of Environmental Labour Studies. Palgrave.
- Schaffitzel, F., Jakob, M., Soria, R., Vogt-Schilb, A., Ward, H., 2019. Can government transfers make energy subsidy reform socially acceptable? A case study on Ecuador (IDB Working Paper Series No. IDB-WP-01026). IDB, Washington, DC.
- Schwarzer, H., van Panhuys, C., Diekmann, K., 2016. Protecting people and the environment: Lessons learnt from Brazil's Bolsa Verde, China, Costa Rica, Ecuador, Mexico, South Africa and 56 other experiences (No. 54). ESS Working Paper.
- Stevis, D., Felli, R., 2015. Global labour unions and just transition to a green economy. Int Environ Agreements 15, 29-43. <https://doi.org/10.1007/s10784-014-9266-1>
- Stevis, D., Uzzell, D., Räthzel, N., 2018. The labour-nature relationship: varieties of labour environmentalism. Globalizations 15, 439-453. <https://doi.org/10.1080/14747731.2018.1454675>
- Subbarao, K., del Ninno, C., Andrews, C., Rodríguez-Alas, C., 2013. Public Works as a Safety Net : Design, Evidence, and Implementation. Washington, DC: World Bank. <https://doi.org/10.1596/978-0-8213-8968-3>
- Toft, L., Beaton, C., Lontoh, L., 2016. LPG Subsidy Reform - Options for Indonesia, International Experiences With LPG Subsidy Reform. International Institute for Sustainable Development (IISD).
- UNFCCC, 2015. Paris Agreement. Paris.
- Viteri Andrade, A., 2019. Impacto económico y laboral del retiro y/o reconversión de unidades a carbón en Chile (Estudio desarrollado para el Ministerio de Energía de Chile).
- Vogt-Schilb, A., Hallegatte, S., 2017. Climate policies and nationally determined contributions: reconciling the needed ambition with the political economy. Wiley Interdisciplinary Reviews: Energy and Environment 6, 1-23. <https://doi.org/10.1002/wene.256>
- Vogt-Schilb, A., Walsh, B., Feng, K., Capua, L.D., Liu, Y., Zuluaga, D., Robles, M., Hubaceck, K., 2019. Cash transfers for pro-poor carbon taxes in Latin America and the Caribbean. Nat Sustain 2, 941-948. <https://doi.org/10.1038/s41893-019-0385-0>
- Whitley, S., Van Der Burg, L., 2018. Reforming Fossil Fuel Subsidies: The Art of the Possible, in: Skovgaard, J., van Asselt, H. (Eds.), The Politics of Fossil Fuel Subsidies and Their Reform. Cambridge Univ Press, Cambridge, UK.

An aerial photograph of a dense tropical forest. The canopy is a mix of dark green and lighter green, with some yellowish-green patches. A small clearing in the center-right shows a dark-colored vehicle parked on a dirt path. The overall scene is vibrant and lush.

Chapter

4

Making a Just Transition, Sector by Sector

A just transition is essential to decarbonize Latin America and the Caribbean. But how does that apply to sectors and fit in with the current challenges faced by workers and employers? Decarbonization will create jobs in some sectors while destroying them in others, generating positive net employment overall (see Chapter 2). Despite the gain, green restructuring does not guarantee the creation of decent new jobs or better working conditions for workers already in green sectors. Without adequate policy measures, some workers and firms in these sectors will be adversely affected. As the transition occurs, workers will update their skills and/or learn new ones, and firms will adopt new technologies and innovative ways of doing business to reap the transition's benefits. Other workers and firms will need compensatory and social protection measures to overcome the disruptive changes (see Chapter 3).

Although decarbonization requires significant transformations in energy efficiency, energy demand, and diets, restructuring the economy will also impact sectors other than energy and agriculture. This ripple effect stems from the tight interlinkage of jobs across sectors and the great potential for greening through jobs in sectors beyond energy and agriculture.

This chapter looks at sectors with a high potential for job creation in the

transition to net-zero emissions, as well as those in which employment and working conditions will be negatively impacted. These sectors include energy, agriculture and livestock, forestry, waste management, ecotourism, transport, and construction. The chapter employs a sectoral approach to lay out the case for a just transition. This approach allows for an assessment of potential labor market gains and losses from decarbonization, helps identify just transition initiatives in the region, and provides insights for the design of sectoral policies and programs that are in line with the specific conditions of each sector.

Energy: The Heart of a Just Transition

Case studies from across the world show that most just transition measures formulated and implemented in the context of climate-related policies focus on the energy sector, in particular coal mining (Box 4.1). This bias reflects the prominent role of the energy sector in greenhouse gas (GHG) emissions, the strong advocacy of organizations that represent workers, and proactive social dialogue between government, workers, and employers. But just transition efforts should not be limited to the energy sector because reducing the economy's reliance on fossil fuels may have indirect impacts along supply chains and in locally affected communities.

Box 4.1

Lessons Learned from a Just Transition in Coal Mining

In recent decades, coal mining regions in many parts of the world (including Europe, North America, Australia, and South Africa) have seen businesses downsized and jobs destroyed. The economic restructuring and policy measures taken to address the resulting social and environmental impacts provide lessons of what might and might not work in a just transition.

In the last half century, the closing of inefficient or unsustainable coal mines destroyed more than 4 million jobs globally (Stanley et al., 2018). The lessons learned from these experiences suggest different ways to “lessen the shock to coal-dependent communities and facilitate new employment possibilities for redundant workers” (ibid.). They also suggest that support should be considered for shuttered businesses, even if informal.

Another lesson is that workers with coal mining-related training and experience may face difficulty finding jobs in other industries due to the specificity of their skills. The mining sector is often the main industry in coalfield regions, where people have similar jobs and professional training. This hinders economic diversification and the ability to find employment in other sectors. Assistance in job searches and training, as well as compensatory schemes such as early-retirement plans, are common measures to deal with these problems. In Poland, the Mining Social Package (1998-2002) was designed to encourage mine workers to voluntarily accept layoffs through measures like early retirement, severance payments, welfare allowances, and a

retraining course (Szpor and Ziolkowska, 2018). While the program has been shown to reduce some of the adverse social impacts of downsizing coal mining activities, the retraining course failed to sufficiently help former mine workers land new jobs. The former mine workers also spent their severance payments on consumption rather than saving or investing in self-owned businesses. These two factors led to a large-scale contraction of the labor force as people stopped looking for jobs, which in the long term threatened to worsen households’ livelihoods and limited the region’s economic activities.

Strategic planning and measures that place humans at the center of policymaking can help coal mining regions achieve a just transformation from a coal-based to a knowledge-based economy. In the Ruhr region of Germany, for example, a vocational training company has facilitated a successful labor market transition after the closing of coal mines. Together, the regional government, company management, and the works councils that represent workers at the local level developed a re-employment strategy for each affected worker (Galgóczy, 2019). A map of existing and future skills demand was also used to set objectives and develop model projects in the Ruhr region. This skills map played a key role in reallocating workers to new industries.

Social dialogue and active engagement from relevant stakeholders are also crucial to a just transition. In keeping with its plan to phase out coal-fired electricity by 2030, the Canadian government in 2018 appointed a just transition

Latin America and the Caribbean is endowed with vast resources for renewable energy (Paredes, 2017), and, as shown in Chapter 2, the region is technically well-equipped to embark on a decarbonization pathway. The region's renewable energy mix is dominated by hydropower, bioenergy, and a growing share of non-hydro renewables such as wind and solar. While wind and solar capacity is growing rapidly, representing 57 percent of additional capacity in 2017, it represents only 6.5 percent of installed capacity (IRENA, 2018). Some countries are reverting to fossil fuels such as natural gas, which could, in the absence of changes in public policies and/or market design, jeopardize climate change goals (González-Mahecha et al., 2019).

There were almost two million renewable energy jobs in Latin America and the Caribbean in 2016, and this number is expected to rise given policies to help achieve ambitious climate stabilization targets. The current stock of renewable jobs is already more than double the number of jobs in fossil fuel industries in the region (about 1 million jobs in 2014).¹ A transition to net-zero emissions will boost renewable jobs in the short and medium term, while fossil fuel jobs will eventually disappear. As shown in Chapter 2, decarbonization is expected to increase employment in the renewable

energy sector by an additional 100,000 full-time equivalent jobs in 2030, compared to a scenario in which current trends continue.

Latin America accounted for half of the liquid biofuel jobs² worldwide in 2018, of which 830,000 jobs were in Brazil and 200,000 in Colombia (IRENA, 2019a). The wind industry alone employed 34,000 workers in Brazil while the solar heating and solar PV industries provided 41,000 and 16,000 jobs, respectively (IRENA, 2019a). Other countries still lag behind, and could use forward-looking industrial and skills policies to spur development of renewable sectors. In Central America, for example, a group of technical and vocational education and training (TVET) institutions from different countries—all governed by tripartite boards and practicing social dialogue among private companies, workers' representatives, and training providers—cooperated in designing training standards and curricula for installers and maintainers of wind energy and photovoltaic systems, installers, and maintainers (ILO, 2011).

Concern, however, remains regarding the quality of local jobs created by the transition to net-zero emissions. The majority of domestic jobs in renewable energy supply chains are in construction and installation. Manufacturing and

¹Authors' calculations including both direct and indirect jobs based on GTAP 2014 data. Fossil fuel industries include coal (coal, coal-fired power, and petroleum and coal products), oil (oil, oil-fired power as base load, oil-fired as peak load) and gas (gas, gas-fired power as base load, gas-fired as peak load, gas manufacture, and distribution).

²There are sustainability limits to bioenergy provision. One issue is land availability and competition with food, feed, timber, fiber production, conservation, and ecosystem services. Large-scale cultivation of dedicated biomass is likely to affect food prices, water scarcity and reforestation efforts. Integrated policies for energy, land use and water management are needed to ensure that biomass production does not impede sustainability in other sectors.



technology innovation jobs by contrast are often outsourced. In Chile, only 17 percent of goods and services consumed in solar energy projects were provided by national suppliers while less than 23 percent of workers on these projects came from within the country (CODESSER, 2019). Industrial policies that favor new technologies and government support for building local market capacity will, therefore, increase the sector's added value and contribute to local job creation. Auctions for local renewable energy providers could rapidly enhance renewable energy penetration and create jobs. In Argentina, the government launched a renewable energy auction program, RenovAr, that is expected to create 15,000 jobs during the construction, operation, and maintenance phases of projects, with wind and solar

energies each generating about 5,000 jobs (Government of Argentina, 2018). However, it remains uncertain whether the new government elected in late 2019 will continue the renewable energy policy or develop the oil sector to attract foreign investment to deal with Argentina's public debt.

Local content requirements can also increase the participation of local companies in renewable energy supply chains. Aligned with the World Trade Organization's regulations, such requirements specify the share of inputs that must come from domestic suppliers (see Box 4.2 for examples from Uruguay and Brazil). Other local content requirements have been implemented in Argentina, Ecuador, Honduras, and Panama.

Box 4.2

Local Content Requirements in Renewable Energy Supply Chains in Uruguay and Brazil

Local content requirements encourage local companies to participate in the renewable energy supply chain, making the energy transition more inclusive and contributing to local economic growth. In Uruguay, an auctioning call was opened in 2009 to small wind farms of 30-50MW with a required local content of at least 20 percent. It also required that a minimum of 80 percent of employees be locally hired and that the control center be based in Uruguay (IRENA, 2015a). Another example is the feed-in tariff, which pays a fee for the excess energy that is produced by the plants and goes back to the national grid. Reserve capacity receives a payment of US\$48/MW per hour available, plus US\$59/MWh for electricity produced. This feed-in tariff was designed to promote electricity generation from biomass, which was opened to plants up to 20MW that have 30 percent local content. The first three projects with over 50 percent local content would also receive the equivalent of an additional US\$3,000/MWh in tariff. Local content requirements in Uruguay have also benefited the upstream segments of the supply chain (e.g., manufacturing). This creates local green jobs, i.e., jobs that preserve or restore the natural environment and also provide decent working conditions. On the whole, green jobs

accounted for 2.7 percent of employment in Uruguay in 2013 (ILO, 2016a).

In Brazil, the Program to Incentivize Alternative Electricity Sources (PROINFA) was launched in 2002 to develop a total of 3,300 MW of renewable energy generation capacity, equally distributed among wind, biomass, and small hydropower projects. As in other types of infrastructure projects, PROINFA includes a 60 percent local content requirement in equipment and provides additional financial services to firms (IRENA, 2015b).

Industrial policies and local content requirements have contributed to the growth of Brazilian domestic supply chains for wind and solar energy (IRENA, 2016). In 2014, domestic content in Brazil's manufacturing for the wind energy sector was about 89 percent (IRENA, 2019a). Over the years, such measures have stimulated the emergence of a domestic supply chain of more than 300 companies (ibid.) and widespread installation of wind generators (Recalde, 2016). The local content requirement has had less impact on the solar PV industry, as its technology is heavily dependent on imports.

Skills development is needed to respond to the increase in demand along the renewable energy supply chains. As shown in Chapter 2, 15 million jobs will be created in the region in the move to a net-zero emission economy, and investment will be required to help workers develop the necessary skills, although in most cases brief courses and on-the-job training will be sufficient to prepare workers for the transition.

Measures to promote skills for these jobs and ensure they are decent jobs have already been implemented on the ground, as in the cases of Argentina and Guyana (see Box 4.3). At the same time, as a result of decarbonization's impact on skills and occupations, 2 million workers are likely to be in occupations where lost jobs have no equivalent vacancies in other industries (as shown in Chapter 3), and will require retraining for other types of occupations.

Box 4.3

Skills Training for Green Jobs in Argentina and Guyana

Argentina's national government has made a priority of green jobs. Provincial governments have shown a similar interest. In the province of Santa Fe, the ILO Provincial Decent Work Agenda for 2017-2020 seeks to help develop skills for green jobs (Government of Santa Fe, 2009), and in 2018, the provincial government established a public agency to promote them. The specific goals of the agency involve training, re-qualifying, and certifying green job competencies, as well as analyzing and developing occupational standards to improve working conditions. It also seeks to transform some traditional occupations into green jobs. Since 2016, more than 1,500 participants have been trained in green occupations under a program called "Green Jobs—Caring for the Planet Provides Work" ("Empleos Verdes—Cuidar el planeta da trabajo").³ The trainings are carried out in collaboration with municipalities, communities, and civil society organizations. As

the demand for green jobs grows (particularly in bioenergy) in Santa Fe, various training courses following a similar framework have also been designed and implemented in the province (FAO and ILO, 2019).

Guyana provides another example of the importance of anticipating skills gaps and new occupations and effectively coordinating among relevant stakeholders in the energy sector to meet the demands of the transition to a low-carbon economy. The Guyana Energy Agency has been preparing a ten-year Human Resource Development Plan (ILO, 2017a). It collaborates with the University of Guyana and TVET institutions to update electrical engineering and renewable energy courses. It also requires certification updates for standardizing skills, as well as professional competencies and practices for renewable energies.

³See <http://www.ramcc.net/es/posts/view/339/la-provincia-de-santa-fe-apuesta-a-la-generacion-de-empleos-verdes>

Renewable energy deployment is only one part of the equation. Phasing-out fossil fuels is also crucial to reduce GHG emissions, and the most carbon intensive fossil fuel is coal. Most coal reserves in the region are located in Colombia and Brazil (IRENA, 2016). Colombia is the world's fourth largest exporter of steam coal, and it exports 90 percent of its production thanks to the coal's high quality and low production costs. Stringent climate and environmental policies in importing countries would adversely impact demand for Colombian coal in coming decades (Oei and Mendelevitch, 2019). This would have a significant effect on employment. More than 30,000 Colombians are directly employed in large-scale coal operations in Cesar and La Guajira departments, and 100,000 others work in small- and medium-sized mines in Cundinamarca, Boyacá, Norte de Santander, Santander, and Antioquia departments. Where large-scale coal mines operate, alternative employment options are often limited and provide lower incomes than the national average.

Although the government has to date no specific policy to phase out coal in Colombia, an involuntary transition is already underway. Two top coal mining companies, Cerrejon and Prodeco, recently began implementing closure plans, and in 2019 Colombia's coal production declined by 5 percent (Reuters, 2019). Transition policies are needed to support these workers and their communities as they face the negative impacts of the involuntary transition. As shown in Box 4.1, labor market policies involving training programs help create formal employment opportunities and positively affect earnings, although their scope is

limited to a few countries (ILO, 2016b). Responses that prepare the workforce for changes in the productive structure are also needed (ILO, 2019a).

Gender differences in the coal mining sector may lead to different impacts on men and women in affected communities. In Poland, for example, most laborers working in the surface mining of coal were women, while all underground and coal washing jobs were held by men (Stanley et al., 2018). As part of a plan for downsizing coal mining, a social package for miners was available initially only to underground mine workers and coal washing plant workers, thus excluding women from the labor divestiture process. Women can also be affected differently by indirect impacts: When men lost their jobs in coal mines in Poland, substance abuse and intra-household tensions, including gender-based violence, increased (Stanley et al., 2018). Shifting to renewable energy has the potential to increase female employment: Worldwide, women represent 32 percent of the renewable energy workforce but only 22 percent of the workforce in the oil and gas industry (IRENA, 2019b). Mainstreaming gender issues in transition policies to ensure that women benefit (not only in terms of employment but also with regards to decent working conditions, including wages and social protection) is key to ensuring the transition is just.

Energy poverty, particularly among remote rural communities, remains one of the region's key challenges. Energy poverty differs from energy access and, despite a variety of definitions, generally refers to a level of energy consumption that is insufficient to meet certain basic



needs (Barnes et al., 2018). Despite a high electricity access rate of 98 percent, 12 million people in Latin America and the Caribbean still lived without electricity in 2017 (WDI, 2018). Even in places with energy access, many people, especially the poor in remote rural areas, cannot afford electricity for their basic needs, making energy a large share of household expenditure. Realizing renewable energy's socioeconomic benefits and ensuring the inclusiveness of marginalized populations are central to achieving a just energy transition. Renewable energy could not only benefit job creation; it could enhance local value chain development and help achieve universal access to clean energy.

The falling costs of wind and solar PV, combined with their unique suitability to isolated, low-density areas, also make renewable energy a compelling solution

to energy poverty (IRENA, 2016). The majority of countries have launched initiatives and implemented measures to expand modern energy access to unserved populations in remote areas. These include, for example, the National Photovoltaic Household Electrification Program in Peru, the National Program for Sustainable Electrification and Renewable Energy in Nicaragua, the Hinterland Renewable Energy project in Guyana, and the Isolated Communities Electrification project in Mexico. Evidence shows that these initiatives have improved access to modern electricity for households, which in turn enhance their labor productivity and living conditions (see Table 4.1). In several cases, the development of local microenterprises in renewable energy production has empowered entrepreneurship and facilitated capacity building in local communities.

Table 4.1 / Off-grid Renewable Energy for Rural Development

Country	Program Name and Date	Details
Argentina	Project for Renewable Energy in Rural Markets (PERMER) (launched in 1999, ongoing)	<p>Aim: provide renewable energy to public institutions and private individuals that lack access to the national grid.</p> <p>Impact: some positive impacts from electrification on livelihoods, including more hours for cultural and productive activities (Alazraki and Haselip, 2007), as well as higher quality and safer lighting (Best, 2011).</p>
Bolivia	Electricity for Living with Dignity Program (PEVD) (launched in 2008, ongoing)	<p>Aim: achieve universal electricity access with renewables in rural areas by 2025.</p> <p>Impact: greater sustainability and local entrepreneurship, in particular through use of traditional indigenous knowledge and promotion of local microenterprises (Pansera, 2013, 2012).</p>
Brazil	Light for All (launched in 2003, extended to 2022)	<p>Aim: universalize access to electricity by deploying renewables in rural and isolated areas. This is the first socially oriented electricity access policy in Brazil to which beneficiaries need not contribute financially (Goldemberg et al., 2004).</p> <p>Impact: 462,000 new direct and indirect jobs have been created and around 244,000 women began productive activities, for example, opening small shops and restaurants, etc. (Bezerra et al., 2017). By December 2017, more than 16 million people benefited from the program.</p> <p>Education was the area most influenced by electrification. This should lead to labor productivity growth (Bezerra et al., 2017).</p>
Venezuela	Sowing Light (launched in 2005, ongoing)	<p>Aim: provide energy and water services in remote and indigenous communities through solar PV and hybrid systems.</p> <p>Impact: increased productivity among beneficiaries. The impact is higher in communities with lower development levels prior to the electricity access, particularly in the case of the indigenous population (López-González et al., 2018).</p>

Collective agreements are contracts negotiated between trade unions and either representatives of businesses or corporate management. The agreements regulate the terms and conditions of employment (wages, duties, working hours). It is now common for collective agreements to contain environmental clauses. In Argentina, for example, a collective labor agreement in the petroleum sector includes environmental clauses in addition to articles covering labor law and health and safety compliance (Ministry of Labor, Employment and Social Security, 2018). According to this agreement, environmental staff are delegated to participate in (i) compliance with all environmental legislation; (ii) monitoring of the use of raw materials, natural resources, and energy; (iii) support for creating an environmental recovery industry; and (iv) dissemination of environmental information among workers. These clauses enhance workers' environmental rights on the job as well as raise awareness among employers and employees.

Net metering policies provide an economic incentive for renewable energy adoption by encouraging small-scale users such as households and small businesses to adopt distributed generation resources. The most general expression of a net metering policy is permitting utility-connected consumers to offset their consumption by inputting self-generated electricity into the national

grid and generating credits that can be used afterwards (Ji et al., 2018). Net metering has been used in 17 countries⁴ to promote renewable energy distribution while benefiting small-scale users. Net metering mechanisms allow utility consumers to reduce their electricity bills and use the registered credits (in monetary or energy terms or both) in the future, for example during high-peak demand. Barbados, for example, adopted the Renewable Energy Rider program in which consumers may generate renewable electricity up to a maximum of 1.5 times their monthly energy consumption and sell the excess to the national utility company for an assured 10 years. Another example is Mexico's net metering program, which was launched in 2007. That program attracted 1,700 connected users through the end of 2012, of which more than 90 percent were small-scale users (up to 30 kWh) and the remainder medium-scale (up to 500 kWh) (IDB, 2014). A growing number of consumers recognize the economic benefits of renewable energy adoption and are making the shift.

The Challenge in Agriculture: Cultivating Decent Work

Latin America and the Caribbean, with 17 percent of the world's agricultural GHG emissions, is the second largest producer of such emissions, behind Asia with 44 percent.⁵ On average,

⁴These countries are Argentina, The Bahamas, Barbados, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, El Salvador, Guatemala, Jamaica, Honduras, Mexico, Nicaragua, Panama, Suriname, and Uruguay.

agriculture accounted for 14 percent of total employment in the region in 2018, but more than 25 percent in Bolivia, Ecuador, Guatemala, Haiti, Honduras, Nicaragua, and Peru (ILOSTAT, 2020). Reducing emissions from agriculture and compensating them with reforestation and other land-use carbon sequestration practices is key to decarbonizing. Boosting agricultural productivity, meanwhile, remains important for growth and development.

A transition to a low-carbon economy has different implications for different types of farms and producers. Of the estimated 20.4 million farms in the region, 19 percent are large farms accounting for 77 percent of agricultural land. Smallholder family farms, meanwhile, represent 81 percent of all farms (but only 23 percent of farm land) and employ about 60 million people (OECD and FAO, 2019).

Large-scale commercial agriculture is the main engine of deforestation, accounting for almost 70 percent of deforestation between 2000 and 2010 (FAO, 2016). In Argentina, for example, the expansion of pastures was responsible for 45 percent of deforestation while commercial farmland expansion was responsible for 43 percent (*ibid.*). In Brazil, more than 80

percent of deforestation was associated with the conversion of forest into grazing land (*ibid.*).

Reducing deforestation plays a key role in the transition towards a low-carbon economy in Latin America and the Caribbean, where one-quarter of the world's forests are located. This implies more intensive agricultural practices that can be both economically more productive and help ensure food security.

The effects on employers and workers of the decarbonization scenario developed in Chapter 2 will vary among agricultural industries. Compared to a high emissions scenario, the plant-based agriculture sector in 2030 will enjoy a net creation of 19 million jobs while animal-based agriculture will face a potential loss of 4 million jobs with decarbonization. A shift to the production of high-value fruits and vegetables would provide greater opportunities for smallholders and family farmers as well as healthier diets for the population at large. However, a transition cannot be just without targeted policies to help producers, farmers, agricultural workers, and consumers reap these benefits, while at the same time protecting the region's rich natural resource base.

⁵See <http://www.fao.org/americas/noticias/ver/en/c/240449/>

Table 4.2 / Inclusive Growth in a Just Transition in the Agricultural Sector

Type	Agricultural sector category	Example of production	Example of policy relevance
A	Dynamic, export- oriented, capital- intensive, with low smallholder participation	Soybeans, wheat, meat	Training to increase the engagement of the rural population; supporting entrepreneurial initiatives for the establishment of micro, small- and medium-sized enterprises (MSMEs) in rural areas that will provide competitive (including green) services to the export-oriented agricultural sector and agri-food value chains.
B	Dynamic, export-oriented, labor-intensive, with low smallholder participation	Some fruits and vegetables	Fostering decent rural employment, especially for youth; strengthening social capital and farmers' organizations to ensure increased inclusion and knowledge sharing.
C	Dynamic, export-oriented, labor-intensive, with high smallholder participation	Coffee, cocoa, some tropical fruits	Strengthening social capital and farmers' organizations; improving agricultural productivity, marketing, and product differentiation (organic, fair trade, eco-labelling).
D	Relatively less dynamic and oriented to the domestic market, with high smallholder participation	This covers a wide range of agricultural products: cereals, pulses, tubers, fruits, vegetables, meat, dairy.	Specific programs targeting small family farming to raise productivity in a sustainable manner and to improve access to information, inputs, service, and product markets.

Source: Adapted from (OECD and FAO, 2019).

Different sets of policy measures are needed to address sustainable growth in the four segments of the agricultural sector (table 4.2). A large proportion of smallholders and family farmers fall into category D (relatively less dynamic, domestic-market oriented). Policy measures that increase the agricultural

productivity of these producers, such as credit lines to help them adopt sustainable agricultural practices, could help boost incomes and reduce climate change impacts. The promotion of climate-smart agricultural practices in Brazil is one example (Box 4.4).

Box 4.4

Brazil's Low Carbon Agriculture Plan

In 2010, Brazil launched the Low-Carbon Agriculture (ABC) Plan to reduce agricultural GHG emissions while increasing agricultural efficiency and enhancing community resilience to climate shocks. At the core of the ABC Plan is a new low-interest rural credit line called the ABC Program. This credit line funds the implementation of climate smart agriculture (CSA) practices that reduce GHG emissions and/or sequester carbon (Newton et al., 2016). These practices include, but are not limited to, recovery of degraded pastures, crop-livestock-forestry integration and agroforestry systems, no-till systems, biological nitrogen fixation, and forestry. The program aims to rehabilitate 15 million hectares of degraded pastures and 4 million hectares of integrated crop-livestock-forest, while planting 3 million hectares of commercial trees and treating 4.4 million cubic meters of animal waste. The program seeks to

reduce GHG emissions by 160 million tons annually by 2020.⁶

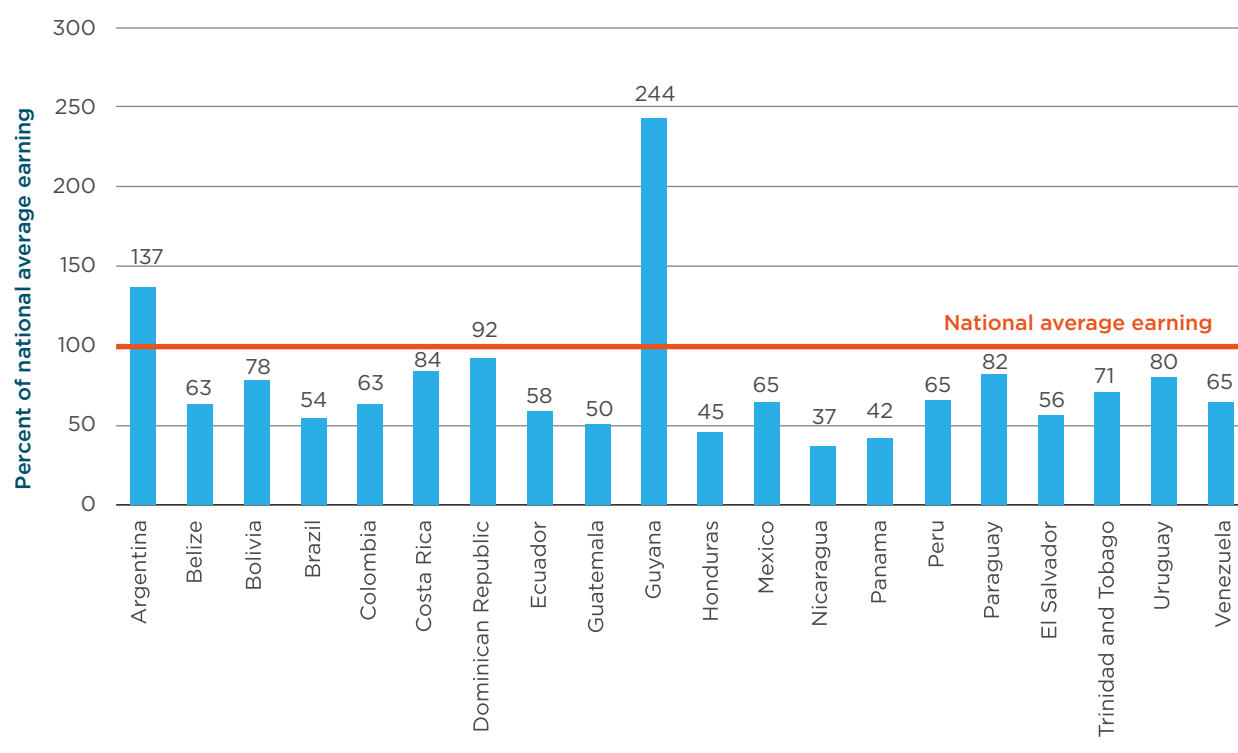
Despite a low uptake during its initial years, the ABC program reached 25,000 beneficiaries during the 2014-15 period. It had a positive impact on agricultural productivity and reduced GHG emissions. When it comes to livestock, CSA entails shifting to more intensive pasture management and meat production systems, adopting improved crop varieties, and improving forage for cattle to reduce methane emissions from digestive processes without reducing meat production (OECD and FAO, 2019). Credit programs such as the ABC would generate greater benefits if combined with capacity building to help farmers implement low carbon strategies and knowledge sharing initiatives (Newton et al., 2016).

⁶See <https://ccafs.cgiar.org/bigfacts/#theme=evidence-of-success&subtheme=policiesprograms&casestudy=policiesprogramsCs1>

Limited access to markets and a low level of integration in value chains is another challenge for agricultural producers who often depend on intermediaries to sell their products. The lack of market integration leaves small-scale producers with little power to negotiate prices and, combined with low productivity, results in low agricultural wages in the region. In most countries where recent

data are available, monthly earnings for agricultural employees are lower than the national average (Figure 4.1). In Guatemala, Honduras, Nicaragua, and Panama, monthly earnings are less than half the national average. Strengthening producers' and farmers' organizations and working for better integration into supply chains will help improve small farms' earnings and working conditions (FAO, 2014).

Figure 4.1 / Earnings of Agricultural Wage Earners as a Fraction of National Average Earnings, Selected Countries, 2018



Source: ILOSTAT.

Occupational safety and health play a key role in ensuring decent work in agriculture. The ILO code of practice on occupational safety and health provides broadly accepted advice to manage risk and prevent accidents and disease in the sector (ILO, 2010). Such measures, including better information on acceptable temperatures in the workplace and changes in work organization, can help protect agricultural workers against heat stress (Kjellstrom et al., 2019).

By replacing arduous and poorly paid work on the field, advancements in technology could also generate better quality jobs. Agricultural employment could then become less manual and routine, and more concentrated in computer, informational, and biological sciences, with better working conditions (Montt and Luu, 2019). Technological change and the sustainable intensification of the sector would imply an important transformation in skills for agricultural workers. A strategy to create employment locally is to reskill agricultural workers according to territorial development strategies, as can be seen in the case of Honduras (Marques Almeida et al., 2019). The private sector also plays a critical role in providing information to narrow any relevant skills mismatch.

Enhancing Decent Work in Forestry

Forests provide oxygen, carbon sinks, food-producing habitat, medical products, and cultural value. They are also vital for biodiversity and help protect

us from the spread of diseases and other health problems. The unsustainable management of forest lands, forest degradation, and fragmentation are linked to the spread of zoonotic diseases (transmitted from animals to humans), for example, in the case of Ebola (Bausch and Schwarz, 2014; Olivero et al., 2017) and the COVID-19 pandemic (WHO, 2020).

When sustainably managed, forests and the forestry sector possess great potential for GHG emissions reductions. Market-based measures, such as payments for ecosystem services, provide cash or training to landowners and communities living in protected areas in exchange for services that protect the environment. They reduce GHG emissions while at the same time generating socioeconomic benefits. Moreover, they generally benefit poor and marginalized populations (see Box 4.5). PES initiatives thus have the potential to combine both environmental and social objectives in their program design. The project “South-South cooperation for sustainable development through decent work and social protection,” implemented by the ILO and the Brazilian Ministry of the Environment in 2015, is an example of this form of integration.⁷ The project provides employment and higher incomes for families living in protected areas of the Amazonian region, in return for services to the environment. It also aims to create a pan-Amazonian network of countries to ensure environmental conservation and social protection for indigenous and tribal peoples.

⁷See https://www.ilo.org/global/topics/green-jobs/projects/latin-america/WCMS_213184/lang--en/index.htm.

Box 4.5

Payment for Ecosystem Services Schemes with Social Objectives

Though initially designed as a market-based measure to address environmental issues, several PES programs have become pro-poor over time. The Payment for Environmental Services scheme in Costa Rica (Pago por Servicios Ambientales - PSA) abandoned its previous formal land-title requirements for PES in order not to exclude indigenous, poor, and landless households from participating in the program (Wunder, 2008). In Mexico, an outreach and support campaign was added to the Payment for Hydrological Environmental Services (PSAH) scheme to ensure that the poorest communities could participate equally in the program (Muñoz-Piña et al., 2008).

Other programs have included pro-poor components from their inception, such as the Socio Bosque program in Ecuador, which offers communities in the poorest private and communal forests yearly payments in return for maintaining forest cover. The program also seeks to improve the socioeconomic situation of

beneficiaries by asking them to submit a plan on how the payments will be spent and encouraging them to invest.⁸

As part of Brazil's Without Extreme Poverty Plan, the Bolsa Verde provides a conditional cash transfer for ecosystem conservation. The program also aims to promote citizenship and improve the living conditions and incomes of the extremely poor. Another program, Bolsa Floresta, tries to generate employment and income from the sustainable use of natural resources (Law No. 3.135 State Policy on Climate Change; complementary Law No. 53 State System for Protected Areas). With more than 8,500 participating families in 15 conservation units covering 10 million hectares in 2013, it is one of the largest PES programs in the world (Schwarzer et al., 2016). The program rewards indigenous peoples for their conservation work in tropical forests, provides training and support for sustainable production, and strengthens community associations.

⁸See https://cdkn.org/resource/private-conservation-agreements-support-climate-action-ecuadors-socio-bosque-programme/?loclang=en_gb

Forest management certification schemes have been launched in the forestry sector by various stakeholders to promote environmentally and socially responsible forest supply chain management. Certifications such as the Forest Stewardship Council (FSC) and the Programme for the Endorsement of Forest Certification (PEFC) improve firms' access to environmentally sensitive markets and to premium prices for certified timber, while also increasing transparency in supply chains. To qualify, forestry businesses need to implement certain environmental and social measures that improve working conditions and social benefits. These measures include reducing deforestation, rehabilitating natural ecosystems, providing more benefits to local communities, and developing a positive dialogue between forestry businesses and their stakeholders. These certifications also recognize adherence to international labor standards, including fundamental principles and rights at work, referring to the ILO code of practice, *Safety and Health in Forest Work*, and the *ILO Guidelines for Labor Inspection in Forestry* (ILO, 2019b). National forest certification systems approved by PEFC are in place in Argentina, Brazil, Chile, and Uruguay, while FSC has certified forests in most countries in the region (Brazil and Chile have the largest FSC-certified areas).

However, information on the impacts of these schemes on social and employment outcomes varies considerably (Box

4.6). For example, it was found that between 2000 and 2008, FSC reduced dependence on firewood as well as respiratory infections and malnutrition in Indonesia (Miteva et al., 2015). However in Malaysia, noncompliance with forest management certification schemes was common, compromising the health and safety of workers and their families, evaluations of social impacts, and consultations among relevant stakeholders to identify and maintain certified areas (Lewis and Davis, 2015). These examples show that, unlike national labor laws and regulations, which are enforceable and often based on international labor standards, these certification initiatives are voluntary and are not legally binding. They cannot replace public governance systems in promoting compliance with labor laws in the forestry sector.

In Latin America and the Caribbean, forest management certification has been adopted mainly by large-scale plantation forestry businesses. The cost of certification can be high, and the certification process burdensome, especially for small- and medium-sized enterprises. Adapting certification to small-scale and indigenous forestry is important to generate benefits for forest-dependent communities while supporting environmental sustainability and social justice. Some certifiers have tried to improve the accessibility of the certification process to MSMEs, for example FSC schemes in Chile and Peru.⁹

⁹See <https://fsc.org/en/news/new-approaches-advances-smallholder-and-community-certification-in-chile> for Chile and <https://fsc.org/en/news/peruvian-smallholders-become-the-largest-group-to-obtain-fsc-forest-management-certification> for Peru.

Box 4.6

The Impact of Forest Certification in Chile and Argentina

Forest management certification has been widely adopted in both the native and plantation forestry sectors in Chile. The certification schemes of the Forest Stewardship Council (FSC) and the Programme for the Endorsement of Forest Certification (PEFC) encourage companies to comply with regulations on occupational safety and health (OSH) and working conditions and even go beyond them in some cases (Tricallotis et al., 2018). One example is a large plantation forestry firm that provided additional social benefits for workers, including better work shifts and holidays. Certification also improves the relationship between companies and stakeholders through formal consultation processes, the hiring of local workers, and the control of traffic generated by logging trucks. Certification in the native forestry businesses helped improve OSH conditions by better implementing regulations, hiring a full-time OSH expert, and providing OSH training for forestry workers. Despite these advantages, certification has not been able to resolve long-standing land tenure conflicts between companies and indigenous communities.

FSC and PEFC schemes also provide certification

in Argentina. In 2015, there were an estimated 3,300 green jobs in the forestry sector (34 percent of total sectoral employment) (ILO, 2017b). These jobs include management of forest law, the management services and administrative personnel of national parks in forested areas, and personnel involved in fighting fires in forested and rural areas. Although certification could improve sustainable forest management practices and decent working conditions, the adoption rate is still low. Firms with environmental certification in the forestry and wood extraction industries only employ around 400 formal workers (ibid.). And environmental certification is more common in the industrial stages of the value chains (production of paper and wood products), possibly because in these sectors certifications are more relevant to participating in global value chains. The case underlines the need to expand certification access and make it more affordable for MSMEs. This could be achieved by reducing the transaction costs of getting certification and providing targeted credit lines to MSMEs.

Strengthening forest rights for forest communities helps protect forests and fight climate change, and ensuring indigenous people's rights to forest lands makes the achievement of a just transition possible. The ILO Indigenous and Tribal Peoples Convention of 1989 (No. 169) calls for the protection of indigenous peoples' rights to land and natural resources (ILO, 1989). It also

requires an assessment of the impact of any development plan affecting indigenous and tribal peoples (ILO, 2019c). The evidence indicates that deforestation rates inside community forests with strong legal recognition and enforcement are dramatically lower than in similar areas where forest rights are not recognized (Gray et al., 2015). Two examples are indigenous territories in the Brazilian

Amazon and Guatemala's Maya Biosphere Reserve, where indigenous communities have the right to benefit economically from their lands but the territories are designated as protected areas. Moreover, strong legal recognition and enforcement bring additional benefits to communities. For example, communities in Brazil's protected indigenous territories can fish, hunt, and extract forest products, such as food, medicine, and materials for handicrafts. In Guatemala's Maya Biosphere Reserve, communities can extract timber and engage in non-timber forest production while benefiting from ecotourism development and limited agricultural activities.

Waste Management: A New Model of Decent Work for Vulnerable Workers

Employment in waste management will undergo substantial changes when countries, particularly urban areas, advance towards a circular economy. The circular economy offers an alternative model to the current linear model of extract, manufacture, use, and discard. In the circular economy, material extraction is reduced and the product life cycle is extended. A global circular economy would create an estimated 6 million net jobs worldwide by 2030 (ILO, 2018a). Compared to other world regions, Latin America and the Caribbean is projected to benefit the most from this transition, with over 10 million new jobs, especially in services and recycling. This would likely increase the share of female and highly skilled employment. It might also result in a greater number of self-employed and contributing family workers (ibid.). Ensuring decent working conditions for

vulnerable workers in this transition to a circular economy is important, as their numbers will increase.

Skills development is key to bringing more sustainable practices to waste management. In Uruguay, several organizations have developed a training scheme for the tire industry, including tire disposal (ILO and MTSS, 2017). The initiative was governed by an inter-institutional working group for an inclusive and green economy, which involved the National Institute for Employment and Professional Training (INEFOP), the National Directorate of Employment (DINAE) of the Ministry of Labor and Social Security (MTSS), and the Tire Traders Center of Uruguay (CECONEU), a representative organization of traders and sellers of tires.

Waste collection is highly dependent on waste pickers, as they are responsible for 10 to 50 percent of the total waste collected and recovered in the region. Informal waste pickers often face decent work challenges with low pay, insufficient hygiene, poor safety conditions (Dias, 2016; Zolnikov et al., 2018), and a lack of social security (Borges et al., 2019). The integration of the informal recycling sector into the formal waste management system contributes to social, economic, and environmental benefits (Dias, 2016; Silva de Souza Lima and Mancini, 2017). In Latin America and the Caribbean, forming cooperatives among informal waste pickers has been shown to enhance social inclusion and economic activity in Argentina, Brazil, and Colombia (Box 4.7), and more recently in other countries including Costa Rica, Ecuador, Guatemala, Nicaragua, Peru, and Venezuela (Hettiarachchi et al., 2018).

Box 4.7

Decent Work Policies for Informal Waste Pickers

Solid Waste Initiatives in Brazil

Implemented in 2010 by the government of Brazil, the National Policy on Waste¹⁰ recognizes the value of waste as an economic asset that is capable of creating employment and income and promoting sustainable development. The policy encourages the creation and development of cooperatives of recyclable waste collectors, and sets targets for the social inclusion and economic emancipation of collectors of recyclable materials.¹¹ Moreover, Brazilian municipalities are allowed to hire waste-picker cooperatives as private service providers without going through the formal bidding process (Rutkowski and Rutkowski, 2015).

In the city of Belo Horizonte, local waste picker cooperatives have been included as formal partners of the municipal public cleaning authority since 1993. In 2003, organizations representing these workers joined the Municipal Waste and Citizenship Forum to work on the planning, implementation, and monitoring of recycling schemes (Dias, 2016). The workers acknowledged that their lives had changed for the better due to the city's approach to integrating

them into the formal waste management system (Dias, 2011). In 2011, the state government of Minas Gerais implemented the Recycling Bonus program (Bolsa Reciclagem), which offers a financial incentive to cooperatives dependent on the quality and kind of recyclables collected and sold. This program has been shown to lead to more efficient picking and higher incomes for waste pickers (Dias, 2016).

Formalization of Waste Pickers in Colombia

In Colombia, Constitutional Court rulings require all municipal authorities to consider recycling and waste pickers in developing their solid waste plans. Bogotá was the first city where waste pickers received payment for their work, followed by other cities such as Medellín, Popayán, and Montería.¹² In Bogotá, the payment scheme was extended in March 2013 to remunerate nonorganized waste pickers for the service they provide (Dias, 2016). Every two months under this scheme, individual waste pickers are paid a fixed amount per ton of recyclables collected and registered at authorized weighing centers. This income is in addition to

¹⁰Law 12.305/2010: http://www.planalto.gov.br/ccivil_03/_ato2007-2010/2010/lei/l12305.htm

¹¹For a historical review of waste picker cooperatives and informal recycling sector in Brazil, see (Silva de Souza Lima and Mancini, 2017)

¹²See <http://www.wiego.org/blog/waste-pickers-medell%C3%ADn-popay%C3%A1n-and-monter%C3%ADa-receive-their-first-payment-recycling-public-servic>

the money they make from selling the materials they collect at market prices. The scheme increases formality and financial access for waste pickers since they need an identification card and a bank account to participate. As of December 2015, some 10,000 waste pickers had opened a bank account and their income had tripled.¹³

Buenos Aires' Green City Plan

Under Buenos Aires' Green City plan, informal waste pickers have become formal recyclers,

now receive a salary and are covered by social security.¹⁴ In addition to better incomes and social protection, waste pickers can work in green centers where recyclable waste is received and categorized. They are also given the equipment they need to do their work. More than 2,000 waste collectors in urban areas have had their jobs formally legalized by city authorities.¹⁵

¹³See <https://lab.org.uk/bogotas-recyclers-fight-for-inclusion/>

¹⁴See <https://www.theguardian.com/environment/2016/jan/20/buenos-aires-litter-pickers-cartoneros-recycling-argentina-environment>

¹⁵See <https://turismo.buenosaires.gob.ar/en/article/waste-management>

Participation in a cooperative provides a guaranteed income and some form of social protection. However, many waste pickers choose not to join a cooperative because of its strict governmental control and limited flexibility. In addition to integrating informal waste workers into formal waste management systems, governments should also move to recognize waste collection as an occupation and strengthen health and safety standards.

Diversifying the Economy with Ecotourism

Tourism generated 319 million direct, indirect, and induced jobs worldwide, or 10 percent of total employment, in 2018 and is expected to account for 420 million jobs in 2029 (WTTC, 2019a). In Latin America and the Caribbean, tourism

generated 19 million jobs in 2018, or 8 percent of total employment (WTTC, 2019b). Tourism can accelerate poverty alleviation and social inclusion, especially in remote areas where alternative sources of job creation are scarce. Tourism activities and the production of goods and services supplying those activities, including through local sourcing, provide foreign exchange and jobs for the local population (including the most disadvantaged and marginalized groups) across economic sectors (IDB, 2017). However, tourism that is not sustainable contributes substantially to global GHG emissions and other environmental degradation.

The tourism industry and the employment it generates are directly dependent on the environment (see Chapter 1). But the environment and biodiversity of a tourism destination can come under significant

pressure through strains on natural resources, pollution, and the deterioration of ecosystems. Nature-based tourism activities are likely to be most affected by climate change. For example, the 2017 hurricane season resulted in an estimated loss of more than 800,000 visitors to the Caribbean. These visitors would have generated US\$740 million for the region and supported about 11,000 jobs. To strengthen labor markets so they can prepare and respond to climate-related disasters, the ILO Caribbean Resilience Project was launched in 2019 in Dominica, Guyana, and Saint Lucia.¹⁶ The initiative seeks to develop capacities for the transition to green economies, increase participation in post-disaster needs assessments, and implement social protection mechanisms that are responsive to shocks.

The tourism industry is also vulnerable to global economic and health shocks, as in the cases of the 2008 financial crisis and the recent COVID-19 pandemic. Throughout the region, travel bans and other preventive measures threaten the high tourism season that plays a critical role in the regional economy. As borders are closed and quarantines are implemented, pressure grows on normally attractive tourism markets such as Argentina, Colombia, and Peru. Since the tourism sector is often informal, many

workers are expected to be especially vulnerable to income losses as the COVID-19 crisis spreads across the world. When hit by shocks, tourism may slow or be altogether on hold for a limited time; but over the long-term the tourism industry is resilient and is generally expected to recover, generate jobs, and continue to grow.

Sustainable tourism, and in particular ecotourism—which promotes responsible travel to natural areas, conserves the environment, and improves the well-being of local people—could help create the conditions for prosperous lives and at the same time reduce GHG emissions. Since the Rio Earth Summit in 1992, a growing number of countries in the region have embraced ecotourism as one of their key sustainable economic development strategies, with Costa Rica serving as a prime example (see Box 4.8). Sustainable tourism can also be an effective means of economic diversification. It has helped Dominica, for example, reduce its traditional reliance on agriculture. Skills development there was essential to the success of its tourism policy (Commonwealth of Dominica, 2013) and has included training in vocational crafts, supervisory and middle management, senior management, tour guiding, customer care for all front-line personnel, and foreign language skills (ibid.).

¹⁶See https://www.ilo.org/caribbean/projects/WCMS_714015/lang--en/index.htm

Box 4.8

The Social Impacts of Ecotourism in Costa Rica

The development of ecotourism in Costa Rica resulted from the Biodiversity Law (No. 7788, 1998) and complementary entrepreneurship training programs tailored to the needs of each community. Hosted by various environmental organizations including the Nature Conservancy and Conservation International, entrepreneurship training includes business development with a focus on environmental and social responsibility. Over the past two decades, the ecotourism industry in Costa Rica has expanded extensively, making Costa Rica one of the world's best ecotourism destinations.

One study on the social impact of ecotourism on local communities focused on the Osa Peninsula, a region in southwest Costa Rica

that has been heavily dependent on the influx of international tourists and foreign investment (Hunt et al., 2015). Interviews with more than 200 participants from within and outside the tourism industry reveal that the tourism industry tends to hire more local people than other sectors. Ecotourism also provides jobs with higher salaries and better opportunities for advancement than other options in the region, including for young people (who often have lower skills and less experience than the labor force as a whole) and women with children (thanks to a more flexible working schedule). Moreover, workers employed in ecotourism are less likely to engage in illegal logging or the extraction of non-timber products, further reducing deforestation (ibid.).

In Argentina, the Sustainable Tourism Strategy aims at tourism development based on social inclusion and the protection of the natural and cultural heritage of the country's protected areas, especially Iguazú, Glaciares, and Tierra del Fuego (ILO, 2017c). Other major initiatives have strengthened waste management in tourism-oriented urban areas or fostered environmental sustainability and poverty reduction in the Salta province of northern Argentina. Private initiatives meanwhile have included voluntary certification of environmentally sustainable tourism services and adherence to standards

established by the Global Sustainable Tourism Council (GSTC). Beyond its primary certification objective, the GSTC also helps tourism businesses identify and manage environmental issues.

Sustainable tourism has shown its capacity to develop while producing environmental, economic, and in many cases, social benefits. However, the tourism sector also faces a variety of decent work challenges: seasonal fluctuations, high rates of informality, vulnerable employment, poor working conditions, a lack of social protection, and in extreme cases, abusive treatment,

violence, and sexual harassment. The expansion of the tourism sector, if not well managed, can be problematic. Foreign visitors and investors can sometimes create social disruption in local communities, as when they buy up land and beaches for resort development or contribute to increasing rates of drug use and prostitution. Complementary policies, such as local capacity development and platforms for social dialogue, are essential to ensure that the promotion of ecotourism does not result in adverse social impacts on local communities.

Driving Social Benefits and Better Energy Use in the Transport Sector

Transport plays a key role in greening the economy. Historically, its development has been associated with economic growth as it facilitates mobility for economic activity and connects production to new markets. At the same time, transport contributes to climate change as the sector emits one-third of the carbon emissions of Latin America and the Caribbean.¹⁷ In 2014, international transport stakeholders announced four initiatives to help combat climate change: expanding the use of electric vehicles; increasing the efficiency

of rail transport; increasing the efficiency of air travel; and enhancing urban transport in cities around the world (High-level Advisory Group on Sustainable Transport, 2016).

The shift towards green transport involves creating jobs in certain sectors and destroying them in others. Ten million additional jobs could be created worldwide if 50 percent of all vehicles manufactured in the region of the United Nations Economic Commission for Europe (UNECE)¹⁸ were electric (ILO and UNECE, 2020). Doubling investment in public transport in the UNECE region would create an additional 5 million jobs worldwide. Investment is also needed in a green transition in transport to expand access to charging stations for electrified passenger transport. There will be winners and losers from such a transition, but the net impact is positive.

The expansion of a formal public transport system brings environmental benefits. It also, however, affects informal transport workers, as it did in Bogotá, Colombia (Box 4.9). In the region, 55 cities offer a bus rapid transit (BRT) system, together serving 20 million passengers per day, or 61 percent of all BRT passengers in the world (Rivas et al., 2019).

¹⁷See <https://blogs.iadb.org/sostenibilidad/en/efficiency-standards-to-decarbonize-the-transport-sector-in-latin-america/>

¹⁸The UNECE region includes 56 member States including all European countries, Canada, Israel, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan and the United States.

Box 4.9

BRT Development and Informal Transport Workers in Bogotá, Colombia

TransMilenio is one of the busiest and largest BRT systems in the world with a ridership of 2.4 million passengers daily and a 114-km exclusive road and integrated feeder system. In addition to reducing air pollution, GHG emissions, and traffic congestion, TransMilenio created during its first implementation phase between 1,900 and 2,900 jobs in operation in addition to 1,400 to 1,800 jobs in construction (Hidalgo et al., 2013).

In principle, the development of a BRT system should be beneficial for workers as it replaces insecure informal jobs with formal employment, better working conditions, and social protection. However, informal drivers who provided the bulk of Bogotá's transport before the implementation of TransMilenio were not necessarily absorbed into its operations.

Before the implementation of the BRT, the work of informal workers driving minibuses involved long hours, unsafe conditions, and lack of social protection. The centralization and rationalization of Bogotá's public transport created jobs with better working hours, safe conditions, and social protection, but it created far fewer jobs than it replaced; every TransMilenio bus replaced seven minibuses, leaving many informal minibus drivers unemployed. The harsh working conditions of informal minibus drivers generated health problems, preventing these workers from passing the medical requirements to work for TransMilenio. These workers also lacked the ability to organize and voice their concerns to stakeholders, and there are no transition policies, like early retirement, to support them.

The TransMilenio case underscores the importance of involving workers and their representatives as well as employers' organizations and donors in the planning of sustainable transport projects. Social dialogue helps identify the scope for transition and can include reskilling and upskilling mechanisms to support drivers and transport workers during a transition. It also contributes to inclusive transition mechanisms that leave no one behind (i.e., low-skilled workers, those with limited access to social protection, those who cannot voice their concerns, etc.) (ILO, 2018a). And it helps ensure that higher skills translate into higher wages as workers express their concerns and interests (ibid.).

Effective social dialogue between stakeholders in informal transport remains rare. Most workers' organizations in the informal transport economy are in some form of cooperative and informal self-help group, which are not recognized or registered as trade unions and are rarely included in formal tripartite processes or structures (ILO, Forthcoming b).

Examples of social dialogue used during BRT design and implementation abound. Several African cities used it to minimize the adverse impacts of a BRT on informal workers (Global Labour Institute, 2019). In Lagos, Nigeria, a consultation involving management, unions, and associations led to an agreement on a pilot project using a private-public financing framework to extend fleet size. A cooperative was created, which then obtained a bank guarantee to lease 100 buses for operation.

In Tanzania, consultation with minibuss operators in Dar es Salaam informed a policy measure to support the 1,500 workers who would lose their jobs as a result of BRT implementation (Global Labor Institute, 2019).

Social dialogue has afforded workers similar gains in Latin America and the Caribbean. For example, the National Union of Transportation Services of Colombia (*Sindicato Nacional de Rama y Servicios del Transporte de Colombia, SNTT*) signed collective agreements with public transport companies in the Tolima region for better working conditions. A collective agreement between SNTT and the Ibagué Express Company guarantees job security for workers with HIV and commits the company to supporting union campaigns for HIV/AIDS prevention.¹⁹ In Mexico City, one of the main public transport lines (Metrobus) was created as a private-public partnership aimed at mitigating air pollution and GHG emissions (Francke et al., 2012). The partnership allowed stakeholders, including the city government, service operators, and fare collectors, to become involved in the decision-making process.

Despite advancement through the implementation of BRT systems, transport sustainability in the region still has a long way to go, especially with regards to the integration of all transport modes within cities: inter-urban and urban buses, metros, rail, walking, cycling, and private cars (Rivas et al., 2019). Nonetheless, a number of passenger and freight rail networks

¹⁹See <https://www.itfglobal.org/en/news/colombia-bus-agreement-contains-hiv-aids-clauses>



are starting up again after coming to an almost complete standstill over the past several years (e.g., Argentina with improvement of the Belgrano rail freight network; Brazil with a high-speed passenger train from Rio de Janeiro to Sao Paulo, among others).

Construction: The Need to Reduce Informality and Build Skills

The construction sector is a major source of employment, currently accounting for 7.4 percent of total employment in Latin America and the Caribbean (ILO, 2018b). Green building has great potential to create jobs, especially in growing urban areas. This includes retrofitting, lighting, sales, and maintenance of efficient appliances, as well as providing and using energy-efficient construction materials. As Chapter 2 shows, a decarbonization scenario in the energy and agriculture sectors would result in a net creation of 540,000 additional jobs in construction

by 2030 compared to a high emissions scenario.

Growth in the construction sector relies largely on local value chains and hence provides opportunities for small- and medium-sized enterprises, even though some large-scale construction works in the region rely on global investors. The region also has great potential to adopt locally developed and manufactured technologies and building materials, including green ones, which in turn can help promote local economic activity and employment opportunities. In Brazil, for example, for every job created in construction in 2009, 4.4 were created in the economy as a whole. The multiplier effect was 3.5 in Paraguay and 2.4 in Mexico in 2009 (Ernst and Sarabia, 2015).

Construction can create many jobs in the transition towards net zero, but complementary policies are necessary to address the sector's high level of informality—two-thirds of workers in Latin America and the Caribbean's construction

sector are informal (ILO, 2019d)—as well as occupational safety and health issues since construction workers often face hazardous working conditions, including heat stress (Kjellstrom et al., 2019).

Green building certification has contributed significantly to the increase in environmentally sustainable construction in the region. One of the most successful international labelling initiatives for the promotion of green buildings is the Leadership in Energy and Environmental Design (LEED) Certification System, administered by the World Green Building Council. Certification has been used in Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, El Salvador, Guatemala, Mexico, Panama, Paraguay, and Uruguay and contributed to updating skills and sharing knowledge. Certification has also facilitated bidding on sustainable projects. Brazil is the world's fourth largest market in terms of new LEED projects.²⁰ In Colombia, between 2008 and 2016, 1.6 million square meters of building space were certified green.²¹ International certification, however, can be costly and inaccessible to many MSMEs. Certifications administered by the government or non-profit organizations can, therefore, be a good way to welcome small companies on board. Legislation can also facilitate sustainable construction. In Colombia, a new green building code is part of the national strategy to reduce construction emissions by 28 percent in 2021.

Social housing construction can also seek to become sustainable while generating green jobs, as in “My House, My Life” (“Minha Casa, Minha Vida”), Brazil's largest affordable social housing project. Sustainability is a priority of the program, which, among other things, provides solar water heating and solar power to low-income households. Since 2014, the program's rural projects have also placed bio-digesters in homes. These digesters allow residents to process organic matter, like food and animal waste, and turn it into energy and fertilizers.

As in other industries, a skills shortage in the construction sector is a major barrier to green jobs creation (Fundación Alternativas, 2019). This is the case for building planners and designers, who often have insufficient knowledge about green building. But it is also true for construction workers who might lack the skills needed to implement green practices. In addition, workers whose skills have been certified might be able to better demonstrate their expertise to potential employers at green construction sites.

Coherent Policies: The Key to a Just Transition

The sectoral approach is key to formulating and implementing just transition policies. Without complementary measures including skills

²⁰See <https://www.worldgbc.org/member-directory/green-building-council-brasil>; https://bucket-gw-cni-static-cms-si.s3.amazonaws.com/media/filer_public/3e/5c/3e5cd175-ce05-4fb3-a1b8-b9e12dfb45b9/20131003133315678912a.pdf

²¹See <https://www.edgebuildings.com/wp-content/uploads/2017/09/Colombia-Green-Building-Market-Intelligence.pdf> and https://www.ifc.org/wps/wcm/connect/b8f1c623-bbe5-400e-b50b-463fb0cfa38c/13StoriesOfImpact-GreenBuildingsCode_Colombia.pdf?MOD=AJPERES



development, social protection, rights at work, and social dialogue, workers and communities in certain sectors will be adversely affected by climate change as well as the economy's structural transition. The sectoral approach is also key to ensuring that growing sectors of the economy do not experience a skills shortage, as identification of needed skills and training often occurs at the sector level (ILO, 2019e). Stakeholders, including employers' and workers' organizations, are often organized at the sector level. Moreover, with a sectoral approach, transition measures can help poor and marginalized people benefit from the greening of the economy, as is the case, for example, in the expansion of renewable energy and skills training for women in rural areas and youth in ecotourism.

Despite their advantages, sectoral policies should not be considered in isolation. A structural change in certain sectors will likely affect workers and firms in other sectors through direct and

indirect supply chain channels. Similarly, just transition measures in certain sectors will also likely benefit workers, firms and communities in other sectors. Policy coherence and collaboration across line ministries are thus of great importance for a just transition (Fay et al. 2015; IDB and DDPLAC 2019).

International climate change commitments provide an opportunity. The parties to the Paris Agreement have been invited to provide long-term, low-emission, resilient development strategies. Many countries around the world are answering the call by developing a national strategy to reach net-zero emissions by 2050 (IDB and DDPLAC, 2019). Such strategies provide an opportunity to convene social partners and line ministries, ensure collaboration in anticipating the labor impacts, and guarantee a just transition. They also give countries a chance to compare the cumulative effect of sector initiatives with what is required to fulfil international climate targets.

References

- Alazraki, R., Haselip, J.A., 2007. Assessing the uptake of small-scale photovoltaic electricity production in Argentina: the PERMER project. *Journal of Cleaner Production* 15, 131-142. <https://doi.org/10.1016/j.jclepro.2005.12.015>
- Bausch, D.G., Schwarz, L., 2014. Outbreak of Ebola Virus Disease in Guinea: Where Ecology Meets Economy. *PLOS Neglected Tropical Diseases* 8, e3056. <https://doi.org/10.1371/journal.pntd.0003056>
- Best, S., 2011. Remote access: Expanding energy provision in rural Argentina through public-private partnerships and renewable energy. A case study of the PERMER programme. IIED.
- Bezerra, P.B. da S., Callegari, C.L., Ribas, A., Lucena, A.F.P., Portugal-Pereira, J., Koberle, A., Szklo, A., Schaeffer, R., 2017. The power of light: socio-economic and environmental implications of a rural electrification program in Brazil. *Environ. Res. Lett.* 12, 095004. <https://doi.org/10.1088/1748-9326/aa7bdd>
- Borges, M.S., Cruvinel, V.R., de Lira, L.H.P., Martins, A.C.S., Ghosh, S.K., 2019. Socioeconomic and Demographic Profile of Waste Pickers in Brazil and India, in: Ghosh, Sadhan Kumar (Ed.), *Waste Management and Resource Efficiency*. Springer Singapore, pp. 263-273.
- CODESSER, 2019. Bases técnicas para la contratación de servicios.
- Commonwealth of Dominica, S., 2013. National Tourism Policy 2020.
- Dias, S.M., 2016. Waste pickers and cities. *Environment and Urbanization* 28, 375-390. <https://doi.org/10.1177/0956247816657302>
- Dias, S.M., 2011. Integrating Informal Workers into Selective Waste Collection: The Case of Belo Horizonte, Brazil (Policy Brief (Urban Policies) No. 4). WIEGO, Cambridge, MA.
- Ernst, C., Sarabia, M., 2015. The role of construction as an employment provider: A world-wide input-output analysis (Employment Working Paper No. 186). International Labour Office, Geneva.
- European Commission, 2019. Case study Task force on Just Transition for Canadian Coal Power Workers and Communities.
- Fay M, Hallegatte S, Vogt-Schilb A, Rozenberg J, Narloch U, Kerr T, 2015. Decarbonizing Development: Three Steps to a Zero-Carbon Future. Washington DC, USA: World Bank Publications.
- FAO, 2016. El Estado de los bosques del mundo 2016. Los bosques y la agricultura: desafíos y oportunidades en relación con el uso de la tierra. FAO, Rome.
- IDB, DDPLAC, 2019. Getting to Net-Zero Emissions: Lessons from Latin America and the Caribbean. Inter-American Development Bank and Deep Decarbonization Pathways for Latin America and the Caribbean.
- FAO, 2014. Agricultura Familiar en América Latina y el Caribe. Recomendaciones de Política. FAO Regional Office for Latin America and the Caribbean, Santiago.
- FAO, ILO, 2019. Manual de metodología de estimación de empleo verde en la bioenergía. Herramientas para la investigación de los efectos de la producción bioenergética sobre el empleo en las provincias, ILO Working Papers. FAO, Buenos Aires.
- Francke, E., Macías, J., Schmid, G., 2012. Mobilising Private Investment for Bus Rapid Transit systems: The case of Metrobus, Mexico city. OECD, Mexico City.
- Fundación Alternativas, 2019. Informe sobre Sostenibilidad en España 2019. Madrid.
- Fay M, Hallegatte S, Vogt-Schilb A, Rozenberg J, Narloch U, Kerr T, 2015. Decarbonizing Development: Three Steps to a Zero-Carbon Future. Washington DC, USA: World Bank Publications.
- Galgóczy, B., 2019. Phasing out coal – a just transition approach (Working Paper). European Trade Union Institute, Brussels.
- Global Labour Institute, 2019. Nairobi Bus Rapid Transit Labour Impact Assessment Research Report. Global Labour Institute, Manchester.
- Goldemberg, J., Rovere, E.L.L., Coelho, S.T., 2004. Expanding access to electricity in Brazil. *Energy for Sustainable Development* 8, 86-94. [https://doi.org/10.1016/S0973-0826\(08\)60515-3](https://doi.org/10.1016/S0973-0826(08)60515-3)
- González-Mahecha, R.E., Lecuyer, O., Hallack, M., Bazilian, M., Vogt-Schilb, A., 2019. Committed emissions and the risk of stranded assets from power plants in Latin America and the Caribbean. *Environ. Res. Lett.* <https://doi.org/10.1088/1748-9326/ab5476>
- Government of Argentina, 2018. Generación de empleos energías renovables Programa RenovAr y MATER.
- Government of Santa Fe, 2009. Agenda Provincial de Trabajo Decente en Santa Fe. Santa Fe.

- Gray, E., Veit, P., Altamirano-Cabrera, J.-C., Ding, H., Rozwalka, P., Zúñiga, I., Witkin, M., Lucchesi, A., Pereda, P., Ussami, K., 2015. The Economic Costs and Benefits of Securing Community Forest Tenure. <https://doi.org/10.13140/RG.2.1.1189.5120>
- Hettiarachchi, H., Ryu, S., Caucci, S., Silva, R., 2018. Municipal Solid Waste Management in Latin America and the Caribbean: Issues and Potential Solutions from the Governance Perspective. *Recycling* 3, 1-15.
- Hidalgo, D., Pereira, L., Estupiñán, N., Jiménez, P.L., 2013. TransMilenio BRT system in Bogota, high performance and positive impact – Main results of an ex-post evaluation. *Research in Transportation Economics*, THREDBO 12: Recent developments in the reform of land passenger transport 39, 133-138. <https://doi.org/10.1016/j.retrec.2012.06.005>
- High-level Advisory Group on Sustainable Transport, 2016. Mobilizing Sustainable Transport for Development. United Nations, New York.
- Hunt, C.A., Durham, W.H., Driscoll, L., Honey, M., 2015. Can ecotourism deliver real economic, social, and environmental benefits? A study of the Osa Peninsula, Costa Rica. *Journal of Sustainable Tourism* 23, 339-357. <https://doi.org/10.1080/09669582.2014.965176>
- IDB, 2017. Tourism Sector Framework Document.
- IDB, 2014. Study on the Development of the Renewable Energy Market in Latin America and the Caribbean. Inter-American Development Bank, Washington DC.
- ILO, 2019a. Work for a brighter future – Global Commission on the Future of Work. International Labour Office, Geneva.
- ILO, 2019b. Promoting decent work and safety and health in forestry (Report for discussion at the Sectoral Meeting on Promoting Decent Work and Safety and Health in Forestry). International Labour Office, Geneva.
- ILO, 2019c. Indigenous Peoples and Climate Change: Emerging Research on Traditional Knowledge and Livelihoods. International Labour Office, Geneva.
- ILO, 2019d. Panorama Laboral 2019. América Latina y el Caribe. ILO Regional Office for Latin America and the Caribbean, Lima.
- ILO, 2019e. Skills for a greener future: a global view (Publication). Geneva.
- ILO, 2018a. World Employment and Social Outlook 2018: Greening with jobs (Report). International Labour Organization.
- ILO, 2018b. 2018 Labour Overview of Latin America and the Caribbean (Publication). Lima.
- ILO, 2017a. Skills for Green Jobs Study – Guyana (Report). Office for the Caribbean - Port of Spain, Port of Spain.
- ILO, 2017b. Estimacion del Empleo Verde en la Argentina Sector Forestal. ILO Argentina, Argentina.
- ILO, 2017c. TURISMO Estimacion del empleo verde en la argentina Turismo. ILO Argentina, Argentina.
- ILO, 2016a. Empleos verdes para un desarrollo sostenible. El caso Uruguayo. Geneva.
- ILO, 2016b. What Works: Active Labour Market Policies in Latin America and the Caribbean.
- ILO, 2011. Skills and occupational needs in renewable energy (Report). Geneva.
- ILO, 2010. Safety and Health in Agriculture. Code of practice. Geneva.
- ILO, 1989. Indigenous and Tribal Peoples Convention, 1989. International Labour Organization, Geneva.
- ILO, MTSS, 2017. Nota 1: Gestión de neumáticos fuera de uso, Serie Notas Técnicas Empleos Verdes en Uruguay. International Labour Office.
- ILO, UNECE, 2020. Jobs in green and healthy transport: Making the green shift. UNECE, Geneva.
- IRENA, 2019a. Renewable Energy and Jobs – Annual Review 2019. Abu Dhabi.
- IRENA, 2019b. Renewable Energy: A gender perspective. IRENA, Abu Dhabi.
- IRENA, 2018. Renewable Energy and Jobs - Annual Review 2018. International Renewable Energy Agency, Abu Dhabi.
- IRENA, 2016. Renewable Energy Market Analysis: Latin America. International Renewable Energy Agency, Abu Dhabi.
- IRENA, 2015a. Renewable Energy Policy Brief: Uruguay. IRENA, Abu Dhabi.
- IRENA, 2015b. Renewable Energy Policy Brief: Brazil. IRENA, Abu Dhabi.

- Ji, Y., Hallack, M., Novaes Mejdalani, A., Chueca, J.E., Lopez Soto, D.D., 2018. Implementing Net Metering Policies in Latin America and the Caribbean: Design, Incentives and Best Practices. Inter-American Development Bank. <https://doi.org/10.18235/0001463>
- Kjellstrom, T., Maitre, N., Saget, C., Otto, M., Karimova, T., 2019. Working on a warmer planet: The effect of heat stress on productivity and decent work (Report). ILO, Geneva.
- Lewis, R.A., Davis, S.R., 2015. Forest certification, institutional capacity, and learning: An analysis of the impacts of the Malaysian Timber Certification Scheme. *Forest Policy and Economics* 52, 18–26. <https://doi.org/10.1016/j.forpol.2014.12.011>
- López-González, A., Domenech, B., Ferrer-Martí, L., 2018. Sustainability and design assessment of rural hybrid microgrids in Venezuela. *Energy* 159, 229–242. <https://doi.org/10.1016/j.energy.2018.06.165>
- Marques Almeida, E., Prat, J., Vargas-Moreno, J.C., Acevedo, M.C., 2019. Honduras: A Territorial Approach to Development. Inter-American Development Bank, Washington, D.C. <https://doi.org/10.18235/0001679>
- Ministry of Labor, Employment and Social Security, 2018. Convenio Colectivo de Trabajo 1572/18 (E) Pioneros del Futuro.
- Miteva, D.A., Loucks, C.J., Pattanayak, S.K., 2015. Social and Environmental Impacts of Forest Management Certification in Indonesia. *PLoS One* 10. <https://doi.org/10.1371/journal.pone.0129675>
- Montt, G., Luu, T., 2019. Does Conservation Agriculture Change Labour Requirements? Evidence of Sustainable Intensification in Sub-Saharan Africa. *Journal of Agricultural Economics* 0. <https://doi.org/10.1111/1477-9552.12353>
- Muñoz-Piña, C., Guevara, A., Torres, J.M., Braña, J., 2008. Paying for the hydrological services of Mexico's forests: Analysis, negotiations and results. *Ecological Economics, Payments for Environmental Services in Developing and Developed Countries* 65, 725–736. <https://doi.org/10.1016/j.ecolecon.2007.07.031>
- Newton, P., Gomez, A.E.A., Jung, S., Kelly, T., Mendes, T. de A., Rasmussen, L.V., Reis, J.C. dos, Rodrigues, R. de A.R., Tipper, R., van der Horst, D., Watkins, C., 2016. Overcoming barriers to low carbon agriculture and forest restoration in Brazil: The Rural Sustentável project. *World Development Perspectives* 4, 5–7. <https://doi.org/10.1016/j.wdp.2016.11.011>
- OECD, FAO, 2019. *Agricultural Outlook 2019–2028*. OECD, Rome.
- Oei, P.-Y., Mendelevitch, R., 2019. Prospects for steam coal exporters in the era of climate policies: a case study of Colombia. *Climate Policy* 19, 73–91. <https://doi.org/10.1080/14693062.2018.1449094>
- Olivero, J., Fa, J.E., Real, R., Márquez, A.L., Farfán, M.A., Vargas, J.M., Gaveau, D., Salim, M.A., Park, D., Suter, J., King, S., Leendertz, S.A., Sheil, D., Nasi, R., 2017. Recent loss of closed forests is associated with Ebola virus disease outbreaks. *Sci Rep* 7, 1–9. <https://doi.org/10.1038/s41598-017-14727-9>
- Pansera, M., 2013. Innovation system for sustainability in developing countries: the renewable energy sector in Bolivia. *International Journal of Innovation and Sustainable Development*.
- Pansera, M., 2012. Renewable energy for rural areas of Bolivia. *Renewable and Sustainable Energy Reviews* 16, 6694–6704. <https://doi.org/10.1016/j.rser.2012.08.015>
- Paredes, J.R., 2017. La Red del Futuro: Desarrollo de una red eléctrica limpia y sostenible para América Latina. <https://doi.org/10.18235/0000937>
- Recalde, M.Y., 2016. The different paths for renewable energies in Latin American Countries: the relevance of the enabling frameworks and the design of instruments. *Wiley Interdisciplinary Reviews: Energy and Environment* 5, 305–326. <https://doi.org/10.1002/wene.190>
- Reuters, 2019. Colombian coal production to fall 5% this year, mining group says. CNBC.
- Rivas, M.E., Suárez-Alemán, A., Serebrisky, T., 2019. Urban transport policies in Latin America and the Caribbean: where we are, how we got here, and what lies ahead. Inter-American Development Bank, Washington, D.C.
- Rutkowski, J.E., Rutkowski, E.W., 2015. Expanding worldwide urban solid waste recycling: The Brazilian social technology in waste pickers inclusion. *Waste Manag Res* 33, 1084–1093. <https://doi.org/10.1177/0734242X15607424>
- Schwarzer, H., van Panhuys, C., Diekmann, K., 2016. Protecting people and the environment: Lessons learnt from Brazil's Bolsa Verde, China, Costa Rica, Ecuador, Mexico, South Africa and 56 other experiences (No. 54). ESS Working Paper.

- Silva de Souza Lima, N., Mancini, S.D., 2017. Integration of informal recycling sector in Brazil and the case of Sorocaba City. *Waste Manag Res* 35, 721-729. <https://doi.org/10.1177/0734242X17708050>
- Stanley, M.C., Strongman, J.E., Perks, R.B., Nguyen, H.B.T., Cunningham, W., Schmillen, A.D., McCormick, M.S., 2018. Managing Coal Mine Closure: Achieving a Just Transition for All (No. 130659). The World Bank.
- Szpor, A., Ziółkowska, K., 2018. The Transformation of the Polish Coal Sector. International Institute for Sustainable Development, Global Subsidies Initiative, Institute for Structural Research, Climate Strategies.
- Tricallotis, M., Gunningham, N., Kanowski, P., 2018. The impacts of forest certification for Chilean forestry businesses. *Forest Policy and Economics* 92, 82-91. <https://doi.org/10.1016/j.forpol.2018.03.007>
- WHO, 2020. Report of the WHO-China Joint Mission on Coronavirus Disease 2019 (COVID-19). World Health Organization.
- WTTC, 2019a. The Economic Impact of Travel & Tourism. World Travel & Tourism Council, London.
- WTTC, 2019b. Travel and Tourism Benchmarking Reports 2019 - June 2019 Latin America. London.
- Wunder, S., 2008. Payments for environmental services and the poor: concepts and preliminary evidence. *Environment and Development Economics* 13, 279-297. <https://doi.org/10.1017/S1355770X08004282>
- Zolnikov, T.R., da Silva, R.C., Tuesta, A.A., Marques, C.P., Cruvinel, V.R.N., 2018. Ineffective waste site closures in Brazil: A systematic review on continuing health conditions and occupational hazards of waste collectors. *Waste Management* 80, 26-39. <https://doi.org/10.1016/j.wasman.2018.08.047>



The signatories of the Paris Agreement have agreed to pursue efforts to limit global warming to between 1.5°C and 2°C. At the same time, governments are now focused on economic and social recovery with an emphasis on job creation. It is crucial to advance on all fronts.

Jobs in a Net-Zero Emissions Future quantifies job losses and job gains in the transition to a net-zero carbon economy. It finds that 15 million net jobs can be created in the region by 2030. Transformations in agriculture, forestry, energy, transport, waste management, tourism, and construction make decarbonization possible and can create jobs, unlock economic and social benefits, and help protect the region's unique natural resource treasures.

From this report, decision-makers and technicians will gain insight into the role of social dialogue, cooperation among public and private stakeholders, and the involvement of environment, labor, and line ministries in the design of public policies and development strategies capable of delivering a just and inclusive transition to carbon-free prosperity.



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