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WORKING PAPER

ACHIEVING SOCIAL EQUITY IN CLIMATE ACTION: UNTAPPED OPPORTUNITIES AND BUILDING BLOCKS FOR LEAVING NO ONE BEHIND

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EXECUTIVE SUMMARY

Highlights

- Climate action offers massive opportunities to reduce social inequalities, but they remain largely untapped. This is a key finding from our review of the impacts of priority climate measures in six systems—industry, energy, transport, cities, agriculture, and forestry. This paper highlights pitfalls to avoid and building blocks for fairer climate action.
- Lower-income and disadvantaged people, who suffer the most from climate change and pollution, can benefit most from protection and clean solutions but face the greatest barriers to access the gains of climate policies and are disproportionately affected by their cost.
- Like any other policy, climate actions are designed in the context of socioeconomic and power structures that produce inequality. A just transition and the promise to "leave no one behind" require moving beyond a mere focus on social co-benefits to empower and prioritize underserved groups proactively. Experience shows that the systemic changes needed for a carbon-neutral and resilient society can be used to provide fairer opportunities for all and reduce social injustice.
- Enhancing ambition and equity in climate plans are two imperatives of social justice that should go hand in hand. In the wake of the COVID-19 crisis, which disproportionately affects vulnerable groups, this joint approach is needed more than ever.

CONTENTS

Working Papers contain preliminary research, analysis, findings, and recommendations. They are circulated to stimulate timely discussion and critical feedback, and to influence ongoing debate on emerging issues. Working papers may eventually be published in another form and their content may be revised.

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A Dual Imperative: Reducing Inequalities While Tackling Climate Change

Climate change exacerbates inequalities. The public is increasingly aware that climate change impacts pose a vital threat to humankind and that the least well-off are on the front lines. Climate disasters hit hardest those who have contributed least to the climate crisis and have the lowest capacity to cope. In 2019 the UN rapporteur for human rights warned against the risk of a climate apartheid "where the wealthy pay to escape overheating, hunger and conflict while the rest of the world is left to suffer" (Alston 2019). Climate change is already worsening social disparities and pushing millions of people into poverty.

The year 2019 saw record public mobilization for climate action and social justice around the world. At the time of the UN Climate Summit in September 2019, over 7 million people across 185 countries joined climate marches. Civil disobedience movements have been on the rise globally, from regular Friday climate school strikes to mass direct actions blocking coal mines and city centers. These multigenerational, bottom-up, and broad-based movements base their demands for climate action on human rights and social justice. An increasing number of lawsuits are also taking governments and fossil fuel companies to court, stressing that climate inaction threatens human rights and intergenerational and social equity. These demands echo the protests against high levels of inequality that have spread globally in the past year, from France, Ecuador, and Lebanon to Chile and the United States, including the Black Lives Matter movement.

Climate action should be fair, for both ethical and efficiency reasons. Climate measures perceived as unfair are increasingly meeting pushback in a context of widespread inequality and growing distrust in governments. French yellow vests and Filipino jeepney drivers had similar reasons for rejecting a rise in fuel prices and a shift toward electric vehicles: they feared increased costs and loss of livelihood and demanded fairer measures. Equity in climate actions is also essential to progress toward climate goals. High levels of inequality drive aspirations for unsustainable consumption and weaken the ability of societies to cope with climate change. In the wake of the COVID-19 outbreak and the ensuing economic recession that disproportionately hits women, low-income workers, minorities, and other disadvantaged groups, countries need more than ever to address structural vulnerabilities associated with inequalities to enhance the resilience of our societies. Both the French and UK citizens' assemblies on climate underscore in their final reports that "fairness" should be a core principle of climate action (Citizens' Convention on Climate 2020; Climate Assembly UK 2020).

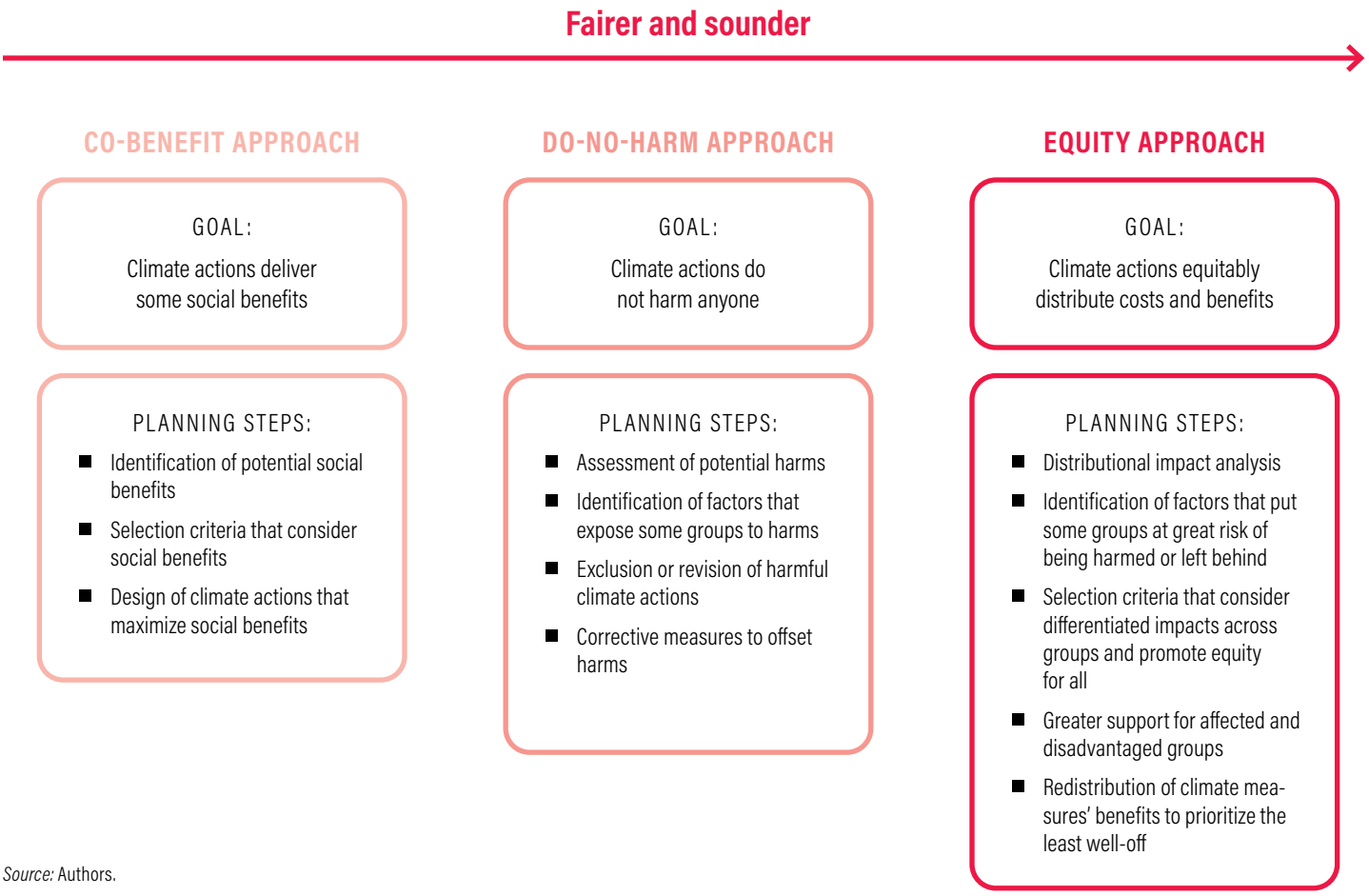
The need for equity to be at the core of climate policy is not new, but its implications are often overlooked. Equity does not mean treating everyone equally. An equity-focused approach to climate policy cares about the distribution of the costs and benefits across social groups as well as difference in ability to engage in decision-making in the light of existing inequality. It involves assessing differentiated impacts of climate change and climate actions across population groups and providing the least well-off, disadvantaged, and most vulnerable with greater protection and support. Prioritizing equity means going beyond co-benefit and do-no-harm approaches that foster development gains and prevent socially adverse effects without necessarily addressing their distribution across society (Figure ES-1). Embedding equity in climate policy planning means taking account of existing inequalities and, insofar as possible, preventing their perpetuation.

Contribution of This Paper: Evidence-Based Guidance for Designing Equitable Climate Action

The goal of this paper is to help planners of climate policies and projects do a much better job of ensuring social equity. It provides them with knowledge and recommendations drawn from an analysis of internationally agreed commitments and a broad literature review of the social impacts of priority climate actions.

It aims at supporting the development and review of climate actions embedded in nationally determined contributions (NDCs), long-term low-emission development strategies (LTS), national adaptation plans (NAPs), national and subnational development plans, and climate policies and projects. It puts greater emphasis on climate actions that have been identified by the scientific

Figure ES-1 | **Three Approaches to Social Benefits in Climate Policy Planning**



Source: Authors.

and climate literature as priorities to meet the global mitigation and adaptation goals of the Paris Agreement, in the industry, energy, transport, city, agriculture, and forestry systems. The intended audience includes all planners of climate measures, including government decision-makers in climate or sectoral institutions at the national and local levels as well as actors in civil society, nongovernmental organizations (NGOs), and the private sector.

The paper starts by unpacking the implications for climate action planning of the pledges to ensure a just transition and to leave no one behind. These pledges are enshrined in the Paris Agreement and the 2030 Agenda for Sustainable Development, respectively. The paper examines the concepts and goals of these pledges and analyzes how they can be jointly translated into climate action planning.

The paper then takes stock of the lessons learned from experience and research about how climate policies and projects can ensure social equity. The literature review focuses on priority climate mitigation and adaptation goals and measures, referred to as "climate actions," in six main systems—industry, energy, transport, cities, agriculture, and forestry. The analysis identifies the main progressive and regressive impacts reported as well as the corrective and accompanying measures adopted by countries to offset regressive impacts and enable disadvantaged groups to enjoy greater benefits.

This study distills the lessons learned from country experience to provide policy guidance. It proposes elements that could help improve the equity impact assessment of climate actions, including a typology of equity impacts, a catalog of the most frequent progressive and regressive impacts and a typology of the

access barriers faced by disadvantaged groups. It provides a list of common pitfalls to avoid and building blocks to consider throughout the climate change planning and implementation process to ensure equitable outcomes.

Two Pledges Unmet: Ensuring a Just Transition and Leaving No One Behind

The 2030 Agenda and the Paris Agreement provide strong and complementary sets of guidance on ensuring social equity in climate action, but these remain insufficiently reflected in climate policies.

The Paris Agreement recalls the "imperative of a just transition of the workforce," which should not be limited to the energy sector and heavy industry. This commitment involves offsetting any negative impact on workers and communities and promoting decent green jobs for all in shifting toward sustainable and resilient economies. Current just transition strategies focus on supporting reconversion of workers and local economies after the phaseout of carbon-intensive power industries, primarily coal. Countries need to expand such efforts to all other sectors affected by decarbonization pathways and address the social implications of transformative adaptation. More research and forward-looking assessment of future labor markets is much needed in low- and middle-income countries.

The pledge to "leave no one behind" is a powerful complement to the notion of just transition, but the climate community is not sufficiently aware of it. Guided by human rights obligations and a capability approach to development, this pledge reflects the universal ambition of the 2030 Agenda to ensure "that all human beings can fulfil their potential" (UNGA 2015). This ambition requires designing climate action to address deprivation and expand people's capabilities and ability to make choices about their own lives. Through this pledge, world leaders not only endorsed historic commitments to end extreme poverty and reduce inequalities by 2030 but also agreed to "endeavour to reach the furthest behind first" (UNGA 2015). This pledge calls for prioritizing the poorest and disadvantaged in all policy interventions so they can experience faster improvements in their well-being than those who are better off (Stuart and Samman 2017). This approach requires putting the pursuit of social equity at the center of climate action, both to avoid any harm and to provide strong benefits to the least well-off.

Large but Untapped Opportunities to Tackle the Climate and Inequality Crises Together

Adaptive and low-carbon measures affect key factors of human development. The literature review shows that priority climate actions have particularly strong impacts on six factors that influence human development, defined as people's freedom to satisfy their needs and achieve ends they value: health; access to energy, water, and transport services; jobs and livelihoods; an affordable cost of living; and political, social, and cultural participation.

Climate actions have disproportionate effects on the least well-off, for better or for worse. Climate actions have greater consequences, positive or negative, for lower-income and disadvantaged groups who have fewer resources and less access to opportunities. Disadvantaged groups vary across contexts but typically include the poor, women, children, youth and the elderly, members of ethnic and religious minorities, indigenous people, people with health problems and/or disabilities, migrants and displaced people, and rural populations. Table ES-1 identifies the main benefits and burdens from climate actions that disproportionately affect lower-income and disadvantaged groups in the six sectors studied.

Table ES-1 | **Disproportionate Impacts of Climate Action on Lower-Income and Disadvantaged Groups**

	BENEFITS	BURDENS AND BARRIERS
Health	▪ **Lower risk of death, injury, and disease** related to disasters, pollution, food, water and energy insecurity, and transport crashes ▪ **Better access to health services** with the expansion of renewables and public transport	▪ **Higher risk of being left behind in adaptation efforts** ▪ **Disproportionate displacement to unsafe resettlement sites** in many adaptation and green infrastructure projects ▪ **Greater health risks in poorly regulated green industries**
Access to energy, water, and transport services	▪ **New access to clean energy, piped water, and new transport options in underserved areas** ▪ **More reliable and resilient energy, water, and transport services** ▪ **Lower energy poverty and better housing** resulting from energy efficiency gains ▪ **Decreased travel time** for long commuters with mass transit and in compact cities	▪ **Inequitable access to sustainable and efficient energy, water, and transport systems** (unavailable or unaffordable) ▪ **Greater energy precarity** because of more expensive energy services ▪ **Reduced access to city centers** with bans on fossil fuel–powered vehicles
Jobs and livelihoods	▪ **New job opportunities for working-class and rural people** in renewables, energy efficiency, recycling, and climate-smart agriculture sectors ▪ **Improved livelihoods for farming, fishing, and forest communities** with natural resources that are protected and sustainably managed ▪ **Greater productivity and income for farmers** ▪ **More decent jobs for waste pickers and garment and energy workers** ▪ **Greater gender equality** in some sectors	▪ **Higher risk of job loss for people with low education who are insufficiently represented and protected**, especially poor, informal, farm, and female workers ▪ **Loss of livelihood** because of displacement, restricted access to protected forests and lands, new regulation, and/or new distribution of roles in green agriculture and productive projects
Affordable cost of living	▪ **Cheaper housing and utility bills** thanks to improved and more efficient energy, water, and construction ▪ **Cheaper food and goods** due to resource-efficient production systems, shorter supply chains, and a circular economy ▪ **Reduced transportation expenses** with more mass transit and shared mobility	▪ **Rising energy prices and transport fares** with carbon taxes, removal of fossil fuel subsidy, a shift to renewables, or technology costs ▪ **More expensive sustainable and organic products** due notably to higher labor, input, and technology costs ▪ **Increased land value, real estate prices, and rent** with new green mobility, parks, greenbelts, and energy retrofit
Political, social, and cultural participation	▪ **New opportunities to engage in decision-making** ▪ **Better access to information and knowledge** ▪ **Preservation of the social fabric and cultural identity** of communities whose habitat and livelihoods are protected ▪ **Greater solidarity and social inclusion**, including in sharing, local, and circular economies ▪ **Valued or revived traditional knowledge** for adaptation, land restoration, or a circular economy ▪ **Greater access to social and cultural activities** with greater mobility and better energy ▪ **Reduced risk of social tensions and conflicts**	▪ **Further exclusion from decision-making** in projects that overlook power asymmetries and inequalities ▪ **New information and knowledge barriers** to civic activities ▪ **Loss of traditional practices, expertise, sense of dignity and meaning** with the end of carbon-, resource-intensive, or climate-vulnerable activities ▪ **Unraveling of the social fabric** because of green gentrification, closing local industries, and out-migration ▪ **Higher risk of losing social networks and cultural heritage** because of disproportionate displacement in adaptation and green infrastructure projects

Source: WRI authors based on literature review.

Climate actions usually change the ways development opportunities are distributed across society, and they can do so fairly or unfairly. Since such actions affect relatively more disadvantaged groups, actions designed in a progressive way to provide equitable opportunities for all can help reduce existing inequality. Conversely, climate measures harming the least well-off or leaving them behind can widen the gap between the haves and the have-nots.

Low-income and disadvantaged groups can benefit the most from the protection and opportunities offered by climate actions—but they also face the greatest barriers to accessing these gains. Existing deprivation and social inequality—in the form of insecure land rights and discrimination, for example—limit these groups' ability to engage and make them more vulnerable to disruptions. Climate actions can also maintain these barriers and introduce new obstacles. The higher price of clean technologies and services, and the knowledge and skill required to use them, often put benefits out of reach for many. Low-income households are also the most affected by an increase in energy and mobility prices that can follow the introduction of carbon taxes or green technologies.

Like other policies, climate interventions are conceived in the framework of current power, economic, and social structures, which tend to maintain inequality and put the least well-off at higher risk of being harmed and left behind. A lower access to climate decision-making often excludes disadvantaged groups from opportunities and makes them more likely to bear the negative consequences of climate interventions. The unfair distribution of adaptive solutions and sustainable infrastructure also follows patterns of spatial injustice, leaving remote and deprived areas underserved and less protected. Biased enforcement of land use regulations often explains why poor people are disproportionately relocated by adaptation and green infrastructure projects.

As a result, the least well-off can face a "triple injustice." Although they contribute the least to greenhouse gas emissions and are the most vulnerable to climate change impacts, they often bear the brunt of the social costs of adaptation and mitigation and have a lower share in their benefits.

Corrective and supporting measures can offset, and even reverse, negative impacts, but they are insufficiently adopted and often badly planned. Country experience shows that well-designed, targeted, and timely corrective and accompanying measures can cancel and compensate regressive impacts and even result in net benefits to the poor and disadvantaged groups. Yet these measures are often neglected, adopted too late, or insufficiently directed to those who need them most. Climate actions also generate revenues that can be used to invest in measures enabling the least well-off to benefit from the transition. For instance, the reform of fossil fuel subsidies and carbon pricing could generate as much as US$2.8 trillion in revenues in 2030 (NCE 2018), which could be invested in public programs, social protection, and targeted support helping groups at risk of being harmed or left behind by climate policies.

Fairer climate actions will be essential to achieve greater ambition of mitigation and adaptation goals. These actions can expand people's capacity to act on climate, build the resilience of society more effectively, and attract greater public support.

Seven Pitfalls That Can Lead to Regressive Impacts

Beyond context- and project-specific factors, seven pitfalls in climate change planning commonly lead to socially regressive impacts:

"Win-win" discourses that overlook the distribution of benefits across the society. Climate policy planners can have a generic discourse on potential "win-wins" without adequately considering how benefits and costs are likely to be distributed across population groups. Developed in response to misconceptions and interest-driven narratives on inevitable trade-offs between jobs, well-being, and climate action, "win-win" and "green growth" discourses can overlook potential harms for some social groups. By assuming that the benefits will be universal, public officials and planners sidestep politically difficult choices about the redistribution of risks and resources. In the absence of explicit goals related to social equity, climate interventions can be captured by profit-seeking motivations (e.g., in the case of real estate development) and prioritize wealthier groups to the detriment of lower-income and disadvantaged groups.

Biases in climate change policymaking that do not prioritize the most vulnerable. The goal of prioritizing the least well-off may be perceived as conflicting with the urgency to scale mitigation and adaptation measures. Climate policy choices can perpetuate and even exacerbate inequalities as a result of the following factors:

- Incentives promoting the uptake of low-carbon technologies and practices are often targeted to prioritize the biggest emitters.
- It is usually cheaper and more efficient to invest in climate-resilient and low-carbon infrastructure in the most populated and economically valuable regions rather than in less strategic, remote, and sparsely populated rural areas.
- A preference or even mandatory requirements for new low-carbon and resilient technologies can raise costs and put these technologies out of reach for small producers and low-income consumers.

Lack of engagement of disadvantaged groups and procedural injustice. The lack of voice of affected communities in decision-making is a major factor leading to the unequal distribution of risks and benefits. Three main problems are reported: a top-down approach that favors "expert" opinion and disregards local knowledge; a power-blind approach using business-as-usual consultations facilitated by authorities, engineers, or private developers and ignoring power asymmetries; and a one-size-fits-all approach that fails to consider the specific constraints and needs of disadvantaged groups to access decision-making (including language differences and digital poverty).

Insufficient impact assessments and consideration of factors contributing to existing inequalities.

Weaknesses include the assumption of co-benefits most commonly associated with given climate measures; the absence of distributional impact analysis; a focus on a few economic variables, especially income and wealth, that overlook a wide range of other economic, social, and cultural impacts influencing human development; and lack of understanding of vulnerability factors that explain the extent of the benefit or harm climate actions can bring to some social groups.

Lack of data on those left behind. Collecting disaggregated data "by income, gender, age, race, ethnicity, migratory status, disability, geographic location and other characteristics relevant in national contexts" (SDG 17.18) is a requirement for differentiated impact assessment, but it remains challenging for most countries. This data gap can hinder the design of interventions that fit the needs of vulnerable groups.

Inadequate funding. Climate actions targeting historically underserved neighborhoods and remote rural areas can entail higher upfront costs. Scarce public finance, the significant share of property taxes in local revenues, and reliance on private actors who prefer short-term return on investments make the mobilization of adequate funds challenging.

Lack of coordination with other policy areas. Climate policies and actions are part of a much larger tapestry of policies that must be looked at together to ensure benefits for the least well-off and disadvantaged groups. Their outcomes depend on national macroeconomic and fiscal orientations, social policies, and other sectoral strategies. The lack of an overarching poverty- and inequality-reduction strategy that includes climate action and insufficient coordination across agencies and levels of governance can reduce or even cancel out the benefits that climate interventions could generate for poor and vulnerable groups.

Building Blocks for Equitable Climate Actions

Ensuring that climate action contributes to enhanced social equity requires major shifts in business-as-usual climate planning processes. When we examine successful experiences, six building blocks emerge for equitable climate actions. Figure ES-2 unpacks these building blocks into concrete measures that stakeholders from national and local governments, businesses, trade unions, and civil society can implement through the climate change planning cycle.

1. PRIORITIZE: MOVE BEYOND A SOCIAL CO-BENEFIT APPROACH TO PROACTIVE PLANNING FOR EQUITY

Planners of climate interventions need to shift from viewing social equity as a potential bonus co-benefit of low-carbon and adaptive solutions to prioritizing benefits for lower-income and disadvantaged groups in a proactive manner. Ensuring social equity in climate action cannot be an afterthought. This prioritization at the core of the "leave no one behind" pledge has major implications for the whole planning process and may require countries to revise their guidance on developing climate policies.

2. **EMPOWER: ENABLE ONGOING DIALOGUE AND PEOPLE-CENTERED CLIMATE PLANNING**

A just transition and equitable climate actions largely rest on an open, transparent, and ongoing discussion about the changes needed in society and stakeholders' empowerment in decision-making, with close attention to the most vulnerable. This requires no longer considering people as mere "beneficiaries" of climate action and letting them make choices on measures that affect their lives so that these decisions meet their needs and preferences. Ensuring effective participation can involve addressing barriers, including illiteracy, power asymmetry, information gaps, and technology. The most successful experiences move away from business-as-usual consultations and instead closely collaborate with local actors to organize public participation, institutionalize participatory approaches to climate change planning, and set up deliberative processes such as citizens' juries, councils, and assemblies on climate action. Changes needed for low-carbon economies, including shifts to distributive renewable energies, shorter supply chains, and a local circular economy, also enable and catalyze more decentralized, community-led decision-making.

3. **ASSESS: PERFORM A THOROUGH SOCIAL EQUITY IMPACT ASSESSMENT**

This paper highlights key steps to perform a thorough equity impact assessment, including the identification of the barriers that can prevent disadvantaged groups from enjoying equal access to opportunities (e.g., social norms, technologies, institutional processes). Transparent information on these impacts and challenges is essential for public support and mobilization. Investments and capacity building are needed in most countries to improve the collection of disaggregated data, including from nongovernmental sources.

4. **IMPROVE: SELECT, REVISE, AND COMPLEMENT CLIMATE MEASURES USING A SOCIAL EQUITY LENS**

Equity considerations can significantly change the way climate actions are prioritized and refined. They usually involve withdrawing some harmful measures, revising others, and adding corrective and accompanying measures that can offset harms and enable disadvantaged groups to access opportunities. Four elements particularly matter in planning corrective measures: coordination with relevant public institutions, levels of governance, and nonstate actors, especially in addressing structural barriers (gender inequality); the combination of policy, fiscal, and financial instruments (e.g., special fares, fiscal bonuses, capacity building); the targeting of the most affected groups (e.g., with eligibility criteria); and the timely introduction of measures that don't have immediate effects.

5. **FINANCE: TARGET RESOURCES AT UNDERSERVED GROUPS**

Conscious planning to allocate resources to disadvantaged populations should be better mainstreamed in climate finance. Some instruments typically used for climate finance can be tailored to ensure social equity (e.g., equity criteria to use green bonds, earmarking revenues of green fees, and taxes for underserved areas). New innovative funding models mainly tested in high-income countries (e.g., green impact bonds, land-based financing) have a significant potential to be scaled up more widely. In any case, national and local government and local communities have an important role to play to guide private investments toward underserved populations.

6. **ADJUST: MONITOR EQUITY IMPACTS TO ENHANCE PROGRESSIVE OUTCOMES**

Impacts on those at risk of being left behind need to be monitored throughout the implementation and evaluation of climate policies to allow for adjustments and additional compensation. The participation of impacted groups is essential to understanding of effects on the ground, especially when there is uncertainty around climate change impacts and the relevance of some solutions to local communities.

The worldwide crisis that the pandemic has generated has heightened the urgency of making social justice central to climate action. Governments and other decision-makers will need to move beyond the rhetoric of social co-benefits and just transition and embrace the hard work of ensuring that climate and ecological transformations are owned and driven by local communities. They will need to prioritize support, opportunities, and benefits for low-earners, workers in precarious jobs, women, young people, minorities, and other groups at risk of being otherwise affected.

Figure ES-2 | **Planning Measures to Advance Equitable Climate Action**

Identification

PRIORITIZE

Move beyond a social co-benefit approach to proactive planning for equity

- Adopt explicit overarching goals related to poverty and inequality reduction, and just transition.
- Define inclusive planning processes and engagement frameworks to deliver just outcomes (transparency, inclusiveness).

EMPOWER

Enable ongoing dialogue and people-centered climate planning

- Identify groups at risk of exclusion and facing access barriers to decision-making.
- Embrace participatory and deliberative approaches to climate planning.
- Work with local community leaders, networks, and NGOs to empower disadvantaged people.
- Leave space for and support decentralized, community-led planning.

Design

ASSESS

Perform a thorough social equity impact assessment

- Identify vulnerabilities to climate actions (context, forward-looking analyses).
- Engage with local communities to identify perceived risks.
- Assess distributional impacts of a climate plan or project beyond income, while considering constraints experienced by vulnerable and disadvantaged groups.
- Evaluate the effectiveness of existing policies in offsetting harms.

IMPROVE

Select, revise, and complement climate measures using a social equity lens

- Select actions based on their progressivity; drop actions with regressive impacts that cannot be offset.
- Revise climate actions to neutralize negative impacts and foster benefits.
- Complement climate actions with corrective and accompanying measures in coordination with all other relevant actors (e.g., public agencies, project developers).

FINANCE

Target resources at underserved groups

- Introduce progressivity and social goals in climate finance.
- Incentivize private finance to invest in deprived areas.
- Tap the potential of innovative finance to deliver on climate and social equity.

Monitoring evaluation

ADJUST

Monitor equity impacts to enhance progressive outcomes

- Define indicators of social impacts with representatives of affected groups.
- Regularly monitor equity impacts, including through surveys of affected groups.
- Adjust climate interventions accordingly.

INTRODUCTION

Climate change and rising inequality are posing ever-growing, interrelated threats to our societies. Both have roots in unbalanced economic systems that overlook social and environmental impacts. Recognition is growing that these massive challenges have to be tackled jointly. In recent years, public mobilizations around the world have called for climate justice for all. At the same time, climate actions that are perceived as unfair are increasingly being rejected in a context of increasing protests against social injustice globally. Given the widespread impacts of the COVID-19 pandemic and ensuing economic crisis, governments will need more than ever to put people and social benefits at the center of ecological transitions to address structural vulnerabilities, enhance society's resilience, and secure public support for climate action. However, climate policy discussions still reflect major knowledge gaps on the effects of climate actions on social equity and needed corrective measures.

A Vicious Cycle: Rising Inequalities in Times of Climate Change

The climate and inequality crises have long been addressed separately, but a growing body of literature analyzes their linkages. While climate change exacerbates social injustices, increasing evidence shows that high levels of inequality can also hamper and even undermine adaptation and mitigation efforts (Laurent 2015; Islam and Winkel 2016; Thorwaldsson 2019).

Differences in vulnerability to climate disasters and climate action arise from uneven distribution of development gains. The Intergovernmental Panel on Climate Change (IPCC 2014) highlights that "people who are socially, economically, culturally, politically, institutionally, or otherwise marginalized are especially vulnerable to climate change and also to some adaptation and mitigation responses." The 1.3 billion global poor lack access to resources, infrastructure, the social safety net, and the financial system to cope with and adapt to climate change impacts, while often being more exposed to environmental hazards (Boyce 2007; Mohai et al. 2009; UNEP 2015; Islam and Winkel 2016; Hallegatte and Rozenberg 2017). In 2019, 55 percent of the world population still had no access to social protection (Alston 2019; UN 2019). Even with significant progress against poverty between 1990 and 2015, the numbers of extreme poor keep growing in many of the low-income countries most vulnerable to climate change (World Bank 2018c). Stagnant real incomes of sizeable segments of society also increase climate vulnerability (Alston 2019). Even in member countries of the Organisation for Economic Co-operation and Development (OECD 2019), the incomes of low-income households have barely increased in three decades, despite the rising prices of goods and services.

Climate change affects everyone, but it hits lower-income countries and populations the hardest (IPCC 2018). The 1 billion people living in extreme poverty, Indigenous Peoples, and local communities dependent on agricultural or coastal livelihoods are disproportionately affected (IPCC 2018). In many ways, the climate crisis is the new frontier of inequality and threatens the future of human rights. The UN rapporteur on poverty and human rights warned in 2019 against a global climate apartheid "where the wealthy pay to escape overheating, hunger and conflict while the rest of the world is left to suffer" (Alston 2019). Even under the "best-case scenario" of 1.5°C warming, hundreds of millions will face food and water insecurity, migration, disease, and death (Alston 2019). In 2017, 38 million more people suffered from hunger than in 2015 because of climate change and conflicts that are often related to climate (UN 2019). Estimates predict that, by 2100, the average income in the poorest 40 percent of countries could be 75 percent lower than in a world without climate change (Burke et al. 2015b).

Social inequalities also hinder climate change mitigation efforts. Stark difference in lifestyles are associated with rising and unsustainable consumption because they generate aspirations to achieve what is regarded as a higher living standard, such as preferences for cars over mass transit (Laurent 2015; Dorling 2017; Hamann et al. 2018). Huge power asymmetry creates major conflicts of interest. In the past 40 years, 1 percent of the population has received 27 percent of the benefits of global growth, while the poorest half of the world's population has gained only 12 percent (Alvaredo et al. 2018). In the past 15 years, the share of national output going to labor has been declining globally in favor of capital (UNDESA 2016; Narayan et al. 2018). As of 2019, the world's 26 wealthiest individuals owned as many assets as the poorest 3.8 billion people (Lawson et al. 2019). Powerful corporations and wealthy individuals with a large stake in the status quo actively oppose climate measures and even invest in turning opinion against public action (Boyce

2007; Laurent 2015; Coalition for Urban Transitions 2019). Those atop the income and wealth distribution ladder think they can adapt to climate changes, which may reduce their willingness to change their lifestyle and support climate action. In turn, distrust of governments among segments of society who have shared little in rising prosperity can spark the rise of far-right groups that often revoke climate measures (Burgoon et al. 2019; Thorwaldsson 2019).

High levels of inequality and power asymmetry also increase the risk of unfair distribution of costs and benefits of climate measures. The IPCC (2018) estimates that overall benefits from climate policies for inequality reduction are higher than potential trade-offs, but results are very context-specific. Although climate actions have net positive impacts for society, if poorly designed, they can harm some social groups. Studies on the distribution of the costs and benefits from environmental policies have long shown that those who are deprived of development gains and the chronically disadvantaged tend to bear the greatest burden and be excluded from opportunities (Okereke 2011; Chancel 2017). For instance, governments have a history of prioritizing wealthier areas for protection rather than more vulnerable ones (Burke et al. 2015b). Unfair outcomes from poorly designed climate actions produce a triple injustice, leaving or even pushing behind the least well-off, who are typically the most affected by climate change impacts that they contribute the least to causing.

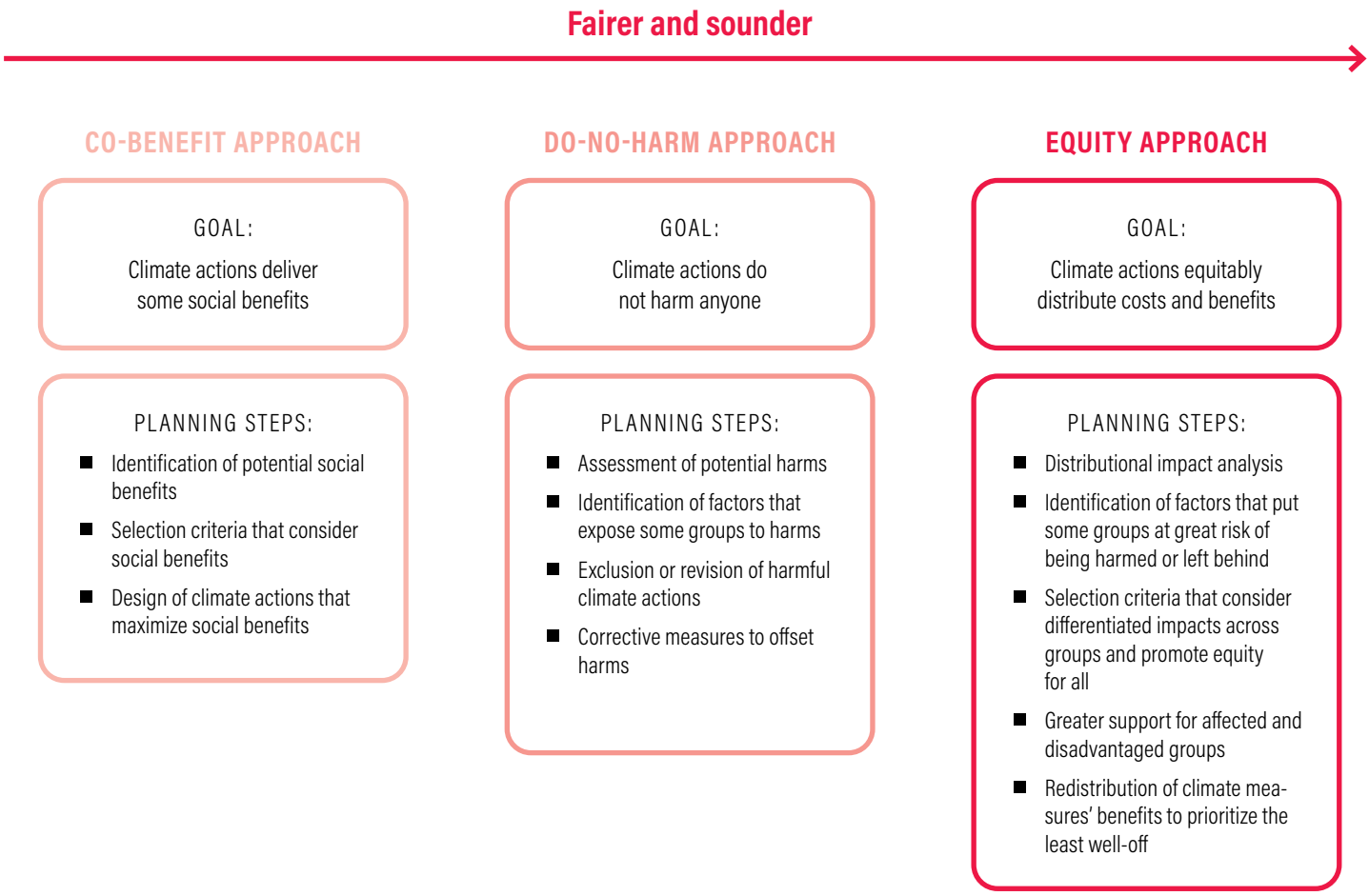
A Dual Goal: Climate Action That Ensures Social Equity

Ensuring social equity in climate action would help drive faster and deeper change to avoid the worst impacts of the climate crisis. Climate actions with substantial benefits for lower-income and otherwise disadvantaged groups could build resilience of societies more effectively, help scale up mobilization in implementation, and mainstream the uptake of sustainable goods, services, and practices. There is growing recognition of the importance of equity in climate action to avoid perpetuating inequalities and enhance social cohesion, as shown by the endorsement of an "equity pledge" in 2019 by 37 large cities—including New York, Paris, Nairobi, and Seoul—to advance fair climate action (C40 2018).

The fairness of climate action is more than ever a key factor for public acceptance (IPCC 2014; Robins and Rydge 2019). Climate measures placing a greater burden on lower-income earners are at high risk of being pushed back, as shown in 2019 by protests in France and Ecuador against fuel tax increases. The demand for social justice is one of the common threads in the mass protests that erupted in 47 countries (a quarter of the world) in 2019, often following increases in the price of necessities (BBC 2019; Hribernik and Haynes 2020). This concern for equity is also at the core of growing public movements on climate. Across the world, marches, civil disobedience, and litigation against governments and fossil fuel companies base their claims for urgent climate action on human rights and social justice. Both the French and UK citizens' assemblies on climate emphasize in their final reports (released in June and September 2020, respectively) that "fairness" should be a core principle of climate action (Citizens' Convention on Climate 2020; Climate Assembly UK 2020).

The equity goal has major implications for climate policy planning. An equity approach to climate action goes beyond co-benefit and do-no-harm approaches, which emphasize social gains and the prevention of harms, respectively, without necessarily looking at the distribution of these benefits and costs across population groups, considering income and other development indexes. Equity is about promoting fairness for all in a proactive way, considering existing social inequality. It means not treating everyone equally because not everyone starts at the same point. Therefore, equitable climate policies and projects do not affect all social groups the same way. They provide least well-off and chronically disadvantaged groups with greater protection and support, because they are the most vulnerable to climate change impacts and at higher risk of being left behind. Planning for equitable climate actions involves additional measures to prevent the perpetuation of social inequality and to contribute to its reduction. Figure I-1 presents the goals and basic planning steps that the three approaches to social impacts entail for climate policy planning. It shows a graduation in the fairness they seek to achieve and the robustness of the impact assessment and design process they involve.

Figure I-1 | **Three Approaches to Social Benefits in Climate Policy Planning**



Source: Authors.

Opportunities to Enhance Both Equity and Climate Outcomes: The "Just Transition" and "Leave No One Behind" Pledges

Increasing attention to the challenge of equity in climate action has been spurred by climate policymakers' growing focus on the need for a "just transition" of the workforce, which was reflected in the Paris Agreement. These concerns echo the pledge to "leave no-one behind" in the 2030 Agenda for Sustainable Development. While the two commitments emerged in distinct policy arenas, they pursue the same overall objective: ensuring that the major transformations needed to build a sustainable future benefit everyone and do not create inequalities but rather help enhance social equity. Four years after the endorsement of the two pledges, there is a lack of understanding of the ways the two notions overlap and how they can be translated into climate action. The long-standing separation between the development and climate expert communities partly explains this (Bouyé et al. 2018).

The Paris Agreement reflects progress made in the past decade in the way climate discussions have framed equity and its relationship to inequality. Three main issues have guided these discussions: the determination of the international burden-sharing in global climate action, which has long been the focus of climate negotiations[1] but is outside the scope of this paper; the implications of highly differentiated vulnerability to climate impacts across countries, population groups, and generations, recognized in the Paris Agreement with an emphasis on the immediate needs of particularly vulnerable developing countries and on a "gender-responsive, participatory and fully transparent approach" to adaptation; and the distribution of the costs and benefits that climate action entails—an issue that had long been overlooked (IPCC 2007, 2014; Klinsky et al. 2015).

On this third issue, the agreement draws attention to the costs and benefits that climate actions can generate for the poor, for disadvantaged groups, and for workers. It builds on the IPCC's (2007) call to inform climate policy decisions with rights-based and capabilities-based approaches to development and to promote social equity (IPCC 2014). It embeds climate action "in the context of sustainable development and efforts to eradicate poverty" (UNFCCC 2015, Article 2.1) and recalls countries' "obligations on human rights, the right to health, the rights of indigenous peoples, local communities, migrants, children, persons with disabilities and people in vulnerable situations" as well as "gender equality, empowerment of women and intergenerational equity" (UNFCCC 2015, preamble).

The agreement casts a spotlight on the disproportionate burden that climate transition can place upon workers and emphasizes the "imperatives of a just transition of the workforce and the creation of decent work and quality jobs" (UNFCCC 2015, preamble). This requirement echoes the "Guidelines for a Just Transition towards Environmentally Sustainable Economies and Societies for All" from the International Labor Organization (ILO 2015a).

There is growing momentum for a just transition, but this commitment is insufficiently reflected in national climate plans. At the 24th Conference of Parties (COP24), in 2018, the Polish presidency proposed a Solidarity and Just Transition Silesia Declaration that calls for pursuing climate transitions in line with the SDGs, especially those on decent work and inequality reduction (COP24 Presidency 2018). At the 2019 Climate Action Summit, nearly 50 countries committed to develop just transition plans to protect workers and promote decent jobs in transforming their economies, and the United Nations launched a new Climate Action for Jobs initiative. However, most long-term zero-emission development strategies submitted to the UN Framework Convention on Climate Change (UNFCCC) lacked concrete plans for achieving a just transition (Ross and Fransen 2017); only South Africa, Chile, Norway, and Suriname mentioned the objective of a just transition in their first or second nationally determined contributions (NDCs) (ClimateWatch n.d.).

The aim of promoting equity while shifting toward sustainable development is also at the core of the 2030 Agenda and is reflected in its central pledge to "leave no one behind." The 17 Sustainable Development Goals (SDGs) have been defined as comprehensive, far-reaching, people-centered, and "integrated in nature" to reconcile economic development, social equity, and environmental sustainability (UNGA 2015). They derive from both the legacy of the Millennium Development Goals (MDGs), primarily on basic social needs, and the UN Conference on Sustainable Development—or Rio+20. Unlike the MDGs, the 2030 Agenda dedicates a goal to climate action, the 13th, and mainstreams it across the other goals to promote policy coherence. In total, 43 SDG targets support mitigation and adaptation actions while contributing to poverty and inequality reduction (Bouyé et al. 2018). Since the SDG targets are defined as "indivisible," SDG 13 has to be pursued in synergy with all the other goals—including SDG 1 on ending poverty, SDG 10 on reducing inequality, and SDG 8 on achieving full and productive employment and decent work for all—that involve a just transition (UNGA 2015).

The pledge to leave no one behind calls for a proactive approach to inequality reduction in advancing the 17 goals, which has major implications for climate action. Through this pledge, world leaders aim to achieve the SDGs for "all nations and peoples and for all segments of society," with no goal met unless it is met for everyone. To this end, countries committed to eradicate extreme poverty and reduce inequalities by 2030, and to "endeavour to reach the furthest behind first" (UNGA 2015).

The pledge to leave no one behind has recently been introduced into climate policy discussions that increasingly attend to just transitions and to the need to link implementation of the 2030 Agenda and the Paris Agreement (OECD 2018a; Workers and Trade Union Major Group 2018; Bouyé et al. 2018; UN 2019). However, the question of how to translate this commitment into climate policymaking remains neglected (OECD 2018a). While many NDCs and national adaptation plans (NAPs) refer to poverty and inequality reduction, few have framed climate actions that explicitly address these goals. As of the first quarter of 2020, only 61 NDCs address gender issues (ClimateWatch n.d.), and most consider women as a vulnerable group, not as actors (WEDO 2019). Only 58 NDCs emphasize the resilience of the poorest, and 9 mention social security mechanisms.

Countries have a great opportunity to better align their climate actions with these two pledges as they prepare their second round of NDCs in 2020. These commitments are also essential to anticipating the social impacts of climate transitions and planning for proactive and corrective actions as countries formulate long-term low-emissions development strategies (referred to as LTS).

About This Paper

This paper seeks to help planners of climate actions reconcile the twin imperatives of scaling up climate change mitigation and adaptation and reducing poverty and inequality. It aims to deepen knowledge of the implications of the just transition and leave no one behind pledges for climate policy and planning and to improve understanding of ways to avoid socially regressive impacts and enhance equity.

The paper helps fill gaps in the literature on climate change and social equity. The existing literature mainly pursues two research objectives: identifying socially and gender-differentiated impacts of climate change and showcasing examples of win-win solutions that advance climate outcomes while reducing poverty and inequalities. These approaches have blind spots on both the problem and solution sides. There are critical gaps in knowledge, data, and evidence on the negative impacts of ill-designed mitigation and adaptation actions on the poorest and disadvantaged groups and the policy gaps and underlying power dynamics that can explain these impacts. Relatedly, there is a lack of understanding of the key ingredients for more equitable climate actions that enhance social equity.

This paper is designed primarily to inform stakeholders involved in the design of climate interventions for mitigation, adaptation, or both, as well as the development and review of climate actions embedded in nationally determined contributions (NDCs), long-term low-emission development strategies (LTS), national adaptation plans (NAPs), national and subnational development plans, and climate policies and projects. The analysis focuses on equity impacts of climate measures that have been identified by the scientific and climate literature as priorities to meet the global mitigation and adaptation goals of the Paris Agreement in the industry, energy, transport, city, agriculture, and forestry systems. These measures are also top priorities in countries' NDCs and LTS. The audience includes all planners of climate measures, among them climate experts from environment ministries and institutions who lead the formulation of climate plans, policies, and projects, as well as actors from sector ministries, local authorities, nongovernmental organizations (NGOs), and businesses that need to set climate goals and/or develop climate projects.

The paper is organized as follows. Part 1 examines how the just transition and leave no one behind pledges complement and reinforce each other to embed equity in climate change planning. Building on relevant research and policy discussions in both the development and climate spaces, Part 1 unpacks the policy implications of the two pledges and provides guidance for climate policy design.

Part 2 assesses the extent to which current efforts to advance climate action ensure social equity. It screens equity impacts of climate actions reported in the literature for six priority systems—industry, energy, transport, cities, agriculture, and forestry—through the lens of the two commitments. It focuses on a set of climate measures that have been identified as priorities to meet the Paris goals, both by the scientific community and the first NDCs. The literature reviewed includes global and local, thematic, and project-related publications, which either provide ex-ante estimates of impacts or evaluate postimplementation impacts.

This analysis considers the equity impacts of selected climate measures in looking at the distribution of the costs and opportunities they present across social groups. Impacts are identified as "progressive" when climate measures minimize costs for low-income and disadvantaged groups and differentially benefit these groups; impacts are identified as "regressive" when climate measures place a disproportionate burden on low-income and disadvantaged groups while providing them with few benefits compared to other social groups. The analysis identifies factors that can explain observed impacts, including access barriers that prevent disadvantaged groups from benefiting from climate actions. It also highlights corrective measures that prevent or offset regressive impacts, as well as support measures that aim to enhance benefits for disadvantaged groups. When data and analyses are available, Part 2 provides indications of the relative effectiveness of these measures and policy lessons, including examples of how climate policies have been (re)designed to enhance social equity.

Part 3 summarizes lessons learned about the most frequent impacts of climate action on social equity to inform climate change planning. These elements include a typology of climate action impacts on social equity; a summary of the main regressive and progressive impacts identified; and a typology of access barriers faced by disadvantaged groups and corresponding support measures.

Part 4 highlights the pitfalls in climate change planning most frequently associated with regressive impacts across the six systems. Part 5 proposes building blocks to design equitable climate actions that emerge from the literature review. Part 6 summarizes the main takeaways.

PART 1. IMPLICATIONS OF THE LEAVE NO ONE BEHIND AND JUST TRANSITION PLEDGES FOR SOCIAL EQUITY IN CLIMATE ACTION

The leave no one behind and just transition pledges can reinforce each other to put social equity at the core of climate action. They provide complementary guidance to design climate interventions that do not disproportionately burden the workforce and the least well-off and instead provide them with greater rights and opportunities. Both involve shaping climate policy goals and planning processes in ways that pursue social justice.

1.1. Achieving a "Just Transition": Ensuring Equity for the Workforce and Communities

The term *just transition* was coined by trade unions as part of their strategy to protect workers in industries affected by environmental policies. It draws on a convergence between the workers and environmental movements, promoted by the Oil, Chemical and Atomic Workers International Union (OCAW) in the 1960s, to highlight employment opportunities in a cleaner economy and the need to support workers in environmental reforms. The concept was used for the first time in 1995 by Les Leopold, also within the OCAW, to underscore that fairness dictates that adjustment costs involved in the ecological transition cannot be borne disproportionately by workers. Rather than rejecting transformations, the concept aims to establish a strategy for driving them in a way that is socially just.

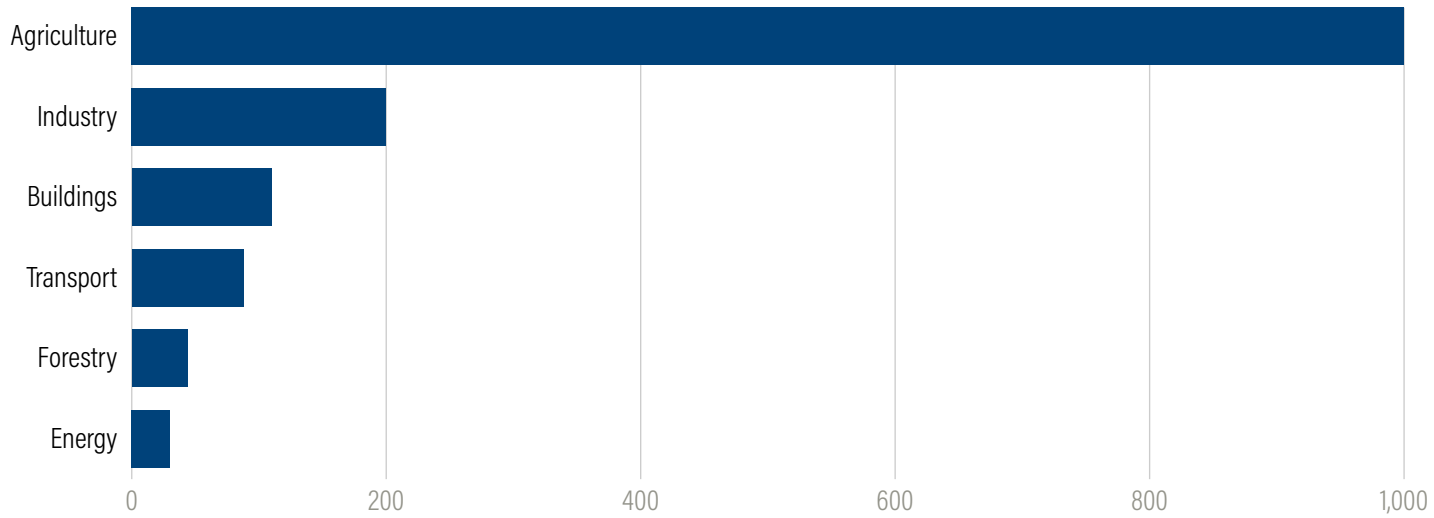
The notion of just transition initially focused on supporting workers in sectors shrinking or restructuring due to climate mitigation policies, especially fossil fuel extraction and use and manufacturing. The concept has gradually broadened to address all potential disruptions for workers and communities that can occur as climate change impacts hit economies and societies transition to sustainable activities for both mitigation and adaptation (Smith 2017; Robins and Rydge 2019). Some authors also use "just transition" in more general terms, calling for fairness for all, not only for workers, with attention to vulnerable groups (Eisenberg 2019). This latter definition overlaps with the equity approach that this paper proposes based on the "leave no one behind" pledge.

There is growing recognition of the need to better address climate change impacts on workers and the implications of necessary adaptation (ILO 2019). The ILO (2018) estimates that 1.2 billion jobs—40 percent of total world employment—depend on ecosystem services that are vulnerable to climate change. Excessive heat reduces productivity by 2 percent, equivalent to 80 million jobs annually (ILO 2019). Water scarcity, sea level rise, biodiversity loss, and ocean acidification also greatly affect working conditions, production, income, job creation, and labor migration (Hallegatte et al. 2013; ILO 2019). As climate change impacts intensify, adaptation will require rapid restructuring in all sectors, especially in agriculture (Carter et al. 2018; Anderson 2019; ILO 2019). Needed changes range from the uptake of resilient practices to relocation of vulnerable production systems and shifts to other activities.

Nearly 1.5 billion people—over half of the global workforce—are estimated to hold jobs in sectors strategic to achieving carbon neutrality and climate resilience (Figure 1.1) (UNFCCC 2016). While just transition policies are mainly developed in the energy industry, the largest numbers of workers at risk are in the agriculture and fishing sector and include a majority of the world's poorest. These figures likely underrepresent informal workers, who account for 50 to 80 percent of urban employment and create from 25 to 50 percent of the nonagricultural gross domestic product (GDP) in low- and middle-income countries (Chen and Beard 2018), primarily in the manufacturing, construction, transportation, and waste sectors.

At the core of the notion of just transition is the imperative to ensure the rights and well-being of these workers in decarbonizing and adapting the economy. In its resolution on combating climate change, the 2010 congress of the International Trade Union Confederation defined a just transition as an integrated approach to sustainable development in which social progress, environmental protection, and economic needs are pursued together and human rights and gender equality are achieved (ITUC 2010).

Figure 1.1 | **Global Direct Employment in Strategic Sectors for Climate Action**



Source: UNFCCC (2016).

This goal requires minimizing and offsetting the negative effects that climate change, adaptive solutions, and low-carbon transformations have on workers and communities. Impacts on workers range from changes in pay levels and career prospects to redefinition of jobs, skill sets, and work methods, and to loss of jobs, income, and sense of dignity. These impacts can lead to multiple deprivations, reduced well-being, and impoverishment (ILO 2018; UNFCCC 2020). Cascading impacts on local communities and economies are also far-reaching. The loss of economic activities and income can start a vicious cycle in which declining tax revenues result in fewer public services, investments, and opportunities; out-migration; and destruction of the region's social fabric and cultural capital. Impacts on workers in supply chains in affected sectors at the national level and across borders shouldn't be overlooked either.

A just transition should also provide social equity by promoting sustainable activities. Studies show that a shift to a sustainable economy will result in the net creation of 18–37 million additional jobs by 2030 (ILO 2018; NCE 2018). Equity will require ensuring the quality and the accessibility of these opportunities.

The ILO defines green jobs as both environmentally friendly and decent. Green jobs preserve or restore the environment and/or help adapt to climate change impacts through sustainable production processes and the creation of green products or services (ILO 2015a). They also need to align with the four pillars of the Decent Work Agenda, including labor rights, decent employment and income, social protection, and social dialogue (ILO 2015a).

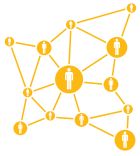
Promoting equitable access to these opportunities is essential. Job creation is likely to vary across sectors and social groups and to occur at different times and in different places from jobs lost in carbon- and resource-intensive industries. While countries can have different definitions of what exactly green jobs entail (Cedefop 2019), and while prospects will vary across regions, overall, the sectors seeing the greatest gains will include agriculture, renewable energy, energy efficiency, sustainable transport, and green construction (ILO 2019). Workers who lose their jobs in restructuring sectors and disadvantaged groups can face many barriers to accessing green opportunities, including low levels of education, health issues, and lack of mobility, explained by poverty or family responsibilities (e.g., care of aging parents) (Smith 2017; ILO 2018).

ILO (2015a) guidelines and guidance from other organizations highlight eight pillars of just transitions needed to ensure that low-carbon and adaptive transformations create and upgrade jobs, further social justice, and reduce poverty (Smith 2017; Robins et al. 2018; ILO 2018; Preston et al. 2019). Figure 1.2 summarizes these consensual recommendations.

Figure 1.2 | **Eight Pillars of Just Transitions**

ANTICIPATION
Assessment of the long-term impacts of climate change and national climate transitions on employment and local economies across sectors; disclosure of systemic risks by investors; forward-looking labor market studies

SOCIAL DIALOGUE
Inclusive decision-making processes at national or local levels bringing together labor and business representatives, and potentially government and civil society



POLICY COHERENCE
Strong coordination across the economic, environmental, social, education, and labor sectors; coordination at both the national and global levels to address implications for supply chains and spillover effects of national transitions

COMMUNITY RENEWAL
Investment in affected local economies and communities to foster economic conversion and diversification, and generate decent jobs and livelihoods with a focus on lower-income and otherwise disadvantaged workers

DECENT WORK
Legislation and regulations promoting decent work and quality jobs in green economic sectors

GENDER EQUALITY
Policies, legislation, and local measures that protect women's rights and harness economic transformation in support of greater gender equality

SOCIAL PROTECTION
Safety nets and other financial transfers compensating workers for lost wages and pensions, local authorities for lost revenues, and companies for lost asset value; specific attention to informal workers without social protection

WORKERS' RECONVERSION
Training to reskill directly affected workers and enhance the skills of others for new employment opportunities in green sectors, with a focus on lower-income and otherwise disadvantaged workers

Source: Authors.

1.2. Leaving No One Behind: The Imperative to Prioritize Equity in All Policy Interventions

In the preamble to the 2030 Agenda, world leaders "pledge that no one will be left behind" in putting the world onto a sustainable development path (UNGA 2015). This commitment was first proposed as a "big transformative shift" to address root causes of why millions of people are locked out of development progress (HLP 2013). The United Nations underscores the need for a "transformation of deeply rooted systems—economic and political systems, governance structures and business models—that are often based on unequal distributions of wealth and of decision-making powers" (UNCDP 2018). The 2030 Agenda provides guidance to turn this pledge into action, with major implications for the way climate actions are designed, selected, and implemented.

The pledge to leave no one behind is guided by human rights obligations and a capability approach to development (Box 1.1). It derives from three interrelated goals that need to be better mainstreamed in climate action (OECD 2018a): achieving human development in all its forms as the ultimate goal; ending poverty, especially extreme poverty, by 2030; and reducing inequality.

Box 1.1 | The Conceptual Foundation of the Leave No One Behind Pledge: The Capabilities Approach to Development

Developed by Nobel laureate Amartya Sen and philosopher Martha Nussbaum, the capabilities approach has changed the discussion on development since the 1980s and led to the formulation of the Human Development Index in 1990 by the UN Development Programme. Five key features of this approach are essential to understand what "leave no one behind" means in practice and how climate action can achieve social equity:

Human development is the end goal. The capabilities approach shifted the focus of discussion on development from progress in economic growth to advancing human well-being and freedom.

Human development is about expanding people's freedoms. Sen (1985) defines capabilities as people's freedoms to achieve and make their own choices about their lives. This emphasis on free agency enhances the understanding of the nature and causes of development by shifting primary attention away from means (e.g., income) to ends that people value. From this perspective, poverty is seen as the deprivation of people's capabilities—freedoms—to satisfy their needs.

Capabilities are multiple and nonsubstitutable. Poverty and human development are multidimensional, and not simply monetary. They are influenced by multiple, nonincome capabilities, including health, education, personal security, political voice, and social relationships. A holistic approach to these capabilities is needed: they reinforce each other but cannot substitute for one another.

Capabilities are unequally distributed. What people can positively achieve is influenced by economic systems, political liberties, social rules and powers, and enabling conditions to realize rights. For instance, gender discrimination shapes the achievements and choices of women. This approach spurs identification of what is preventing people from developing and exercising their capabilities.

Policies need to focus on the most vulnerable. The approach spurs policymakers to give priority to those who either lack capabilities or may see their capabilities eroded because they are affected by potentially intersecting exclusion factors, such as living with a disability in a remote rural area.

The 2030 Agenda pursues human development as a universal right and an end goal, aiming to "ensure that all human beings can fulfil their potential" (UNGA 2015). The leave no one behind pledge is the corollary to this aim. It is introduced on the basis of the fundamental value of human dignity, grounded in the Universal Declaration of Human Rights and creating a positive obligation upon all states to respect, protect, and realize every individual's inalienable rights (UN 1948). The SDGs are defined as "zero" goals to end deprivations and achieve equal rights for all. Their 169 targets address all the forms of poverty and capabilities people need to shape their lives. The SDG targets are presented as "indivisible" because these capabilities are nonsubstitutable (UNGA 2015).

Affirming clearly that human development is the end goal of climate action can change the narrative and priorities of some climate policies. This aim requires designing climate measures that expand people's rights and capabilities. It requires not assuming long-term benefits for humankind without considering immediate impacts for people (Agyeman 2008). It also stresses the importance of situating climate actions in the context of all the other sustainable development goals, recognizing their interconnectedness. For instance, women may not benefit from activities introduced with climate interventions if they do not have access to resources, financial services, education, and decision-making.

From the outset of the 2030 Agenda, world leaders also recognized "that eradicating poverty in all its forms and dimensions, including extreme poverty, is the greatest global challenge and an indispensable requirement for sustainable development" (UNGA 2015, preamble). Leaving no one behind in climate action means keeping this goal in focus to avoid any negative impacts on the poor, prioritizing adaptive solutions that build their resilience, as explicitly required in SDG Target 1.5, and harnessing the potential of all other climate measures to address causes of deprivation.

Leaving no one behind also means fighting inequalities in access to rights and opportunities, which are heavily dependent on socioeconomic status, marginalization, and discrimination. The 2030 Agenda underscores that "enormous disparities of opportunity, wealth and power" (UNGA 2015) will not decrease without proactive policies, including the adoption of necessary policy and legal instruments, such as social protection systems and universal health coverage. Reducing inequalities is addressed in SDG 10 and mainstreamed throughout the

other goals. This goal must be better embedded in climate plans, with concrete measures in all sectors (OECD 2018a).

While views can differ on what specific measures the "leave no one behind" pledge should entail, there is wide recognition that the four following principles are crucial, including in the context of climate action (Stuart and Samman 2017; Klasen and Fleurbaey 2018; OECD 2018a).

1. IDENTIFY WHO IS AT RISK OF BEING LEFT BEHIND AND WHY WITH DISAGGREGATED DATA

The leave no one behind pledge spurs policymakers to understand the characteristics that make some people vulnerable and explain why they are chronically underserved. The 2030 Agenda draws attention to women, children, youth, people with disabilities, people living with HIV/AIDS, the elderly, Indigenous Peoples, refugees, and internally displaced persons and migrants (UNGA 2015). These characteristics, especially when they intersect (e.g., a young women with disabilities), are important factors of vulnerability to climate change and to some adaptation and mitigation actions (IPCC 2014).

This assessment involved the collection of disaggregated data "by income, gender, age, race, ethnicity, migratory status, disability, geographic location and other characteristics relevant in national contexts," as required by SDG Target 17.18. The UN Statistical Commission developed requirements for data disaggregation when identifying policy priorities for different vulnerable population groups (IAEG-SDGs 2019). Drawing on this analysis and the 2030 Agenda, Table 1.1 shows population categories most at risk of being harmed and left behind, including in climate action.[2]

2. END ALL FORMS OF DISCRIMINATION

The 2030 Agenda underscores that all states have a responsibility "to respect, protect and promote human rights and fundamental freedoms for all, without distinction of any kind as to race, colour, sex, language, religion, political or other opinion, national or social origin, property, birth, disability or other status" (UNGA 2015). In the context of climate action, this commitment involves proactively addressing all forms of discrimination that can exclude some people from the benefits of climate policies or unfairly subject them to their costs.

3. EMPOWER DISADVANTAGED GROUPS AND ENSURE PROCEDURAL JUSTICE

The leave no one behind pledge does not aim simply to provide everyone with resources to meet their needs. It also puts strong emphasis on empowering disadvantaged groups to access policy space and have a voice in decisions

Table 1.1 | **Data Disaggregation to Identify Groups at Risk of Being Left Behind**

DIMENSIONS	CATEGORIES	GROUPS TYPICALLY LEFT BEHIND
Income level	Income categories	The bottom 40% of the population, in terms of annual income
Gender	Biological sex (male, female, intersex) and sexual identity (heterosexual, gay, lesbian, bisexual, transsexual)	Women and nonheterosexuals
Age	Segmentation by age depending on the type of impact considered	Children, youth, and the elderly
Ethnicity and beliefs	Belonging to majority or minority cultural, linguistic, and ethnic groups, including indigenous groups; and beliefs, spanning religion, political, or other opinion	People belonging to minority groups
Migration status	Locals, expatriates, documented or undocumented migrants, refugees, and asylum seekers	Migrants and displaced people
Disability and health status	State of mental and physical health	People with disabilities and those living with HIV/AIDS
Geographical location	Spatial distribution between rural or urban areas; type of ecosystem (e.g., wetland, marine, arid, forest, mountain)	People living in rural areas and climate-vulnerable regions

Source: WRI, based on the 2030 Agenda and work from the Inter-agency and Expert Group on Sustainable Development Goal Indicators (IAEG-SDGs 2019).

that affect them. As the UN review of SDG 16 at the High Level Political Forum in 2019 recalled, SDG Target 16.7, "ensuring inclusive, participatory, and representative decision-making," adds a procedural dimension to the principle of leaving no one behind (UNDESA et al. 2019). There is a specific need to remove barriers that prevent disadvantaged groups from actively participating in climate policymaking.

4. PRIORITIZE DISADVANTAGED GROUPS

For policy planners, the biggest shift required by the leave no one behind pledge is to systematically prioritize actions for disadvantaged groups. With the 2030 Agenda, countries agreed to "endeavour to reach the furthest behind first" (UNGA 2015). The aim is to enable the chronically underserved to progress at a faster rate than those who are better off (Stuart and Samman 2017). Many SDG targets reflect this goal, such as Target 10.1: "Progressively achieve and sustain income growth of the bottom 40 percent of the population at a rate higher than the national average" (UNGA 2015).

This goal follows the recognition that proactive policies are needed to overcome entrenched inequalities that deprive disadvantaged groups of opportunities and cause them to lag further behind. Trickle-down economics, assuming that rising incomes at the top end of the spectrum lead to more jobs and higher wealth at the lower end, have largely proved to be inadequate (Stuart et al. 2016). Upward social mobility, stagnant in much of the world (Narayan et al. 2018), has even become harder in OECD countries: it would take four to five generations (about 150 years) for descendants of children born into a poor family in 2018 to reach the average level of income in their country (OECD 2018b).

The pledge also builds on evidence showing that targeting the furthest behind is an efficient way to reduce poverty and inequality (Tardieu and Viard 2015), in addition to universal programs (UNCDP 2018; Klasen and Fleurbaey 2018). For instance, infant mortality reduction programs of the UN Children's Fund are more effective when they target the children most entrenched in poverty than when they target children in average poverty (Carrera et al. 2017). Analyses of challenges in MDG implementation show that poverty eradication policies that focus on the poverty headcount as opposed to the poverty gap can favor those just below the poverty line to the detriment of those worse off.

This prioritization of the furthest behind has major consequences for climate policy design. It involves consciously devising policies that aim to benefit first those who might otherwise be overlooked or even harmed by climate actions. For some climate policy planners, this goal may lead to trade-offs with the urgency of maximizing the impact of climate action. Climate interventions prioritizing the furthest behind, who typically live in suburbs and remote rural areas with little infrastructure, can be more costly and reach fewer people. As Part 5 will explore, comprehensive climate strategies supported by various sources of finance are needed so that policy priorities do not compete for resources.

1.3. Combining Both Commitments to Achieve Greater Social Equity

The just transition and leave no one behind pledges approach social equity from different perspectives that complement and reinforce each other in the context of climate policymaking. As shown in Table 1.2, their objectives, scope, and beneficiaries converge only to some extent. A just transition protects workers and local communities and ensures equitable access to opportunities. The leave no one behind pledge aims to overcome barriers that hold the poorest and chronically disadvantaged back from protection and development benefits offered by climate action.

Leaving no one behind in designing just transitions requires taking specific actions to support vulnerable workers and communities, including analyses of the characteristics that put some people at higher risk of losing their jobs and income, addressing specific skill deficits and other disadvantages that hinder them from accessing green decent jobs, and providing greater adjustment support to these workers. Similarly, bringing the imperative of just transition into policy discussions on the implementation of the 2030 Agenda, and especially of SDG 8 on promoting full employment and decent work for all, would help align economic and employment policies with Paris goals and anticipate sectoral transformations.

Table 1.2 | **Mutual Reinforcement of the "Leave No One Behind' and "Just Transition" Pledges in the Climate Policy Context**

	LEAVE NO ONE BEHIND	JUST TRANSITION
Goals	Designing climate measures with the aim of providing equal rights and opportunities for all, and prioritizing benefits for disadvantaged groups to help reduce poverty and inequality	Equitably managing impacts on workers and communities of the shift toward low-carbon and climate-resilient economies
Scope	Cross-sectoral, relevant for all policy areas	Primarily job- and labor-related issues
Impacts	Any kind of impact from climate action that can enhance or diminish people's capabilities and alleviate, perpetuate, or aggravate poverty and inequality	Impacts on jobs and income, labor markets and working conditions, and related direct and indirect impacts on the well-being of workers and their communities
Population	Lower-income, chronically disadvantaged, and marginalized people	The workforce, dependent communities, and local economies
Narrative	Guided by human rights, climate action is a condition for ensuring human development prospects and preventing worsening poverty and inequality. Climate action should prioritize vulnerable and disadvantaged groups to provide equal access to rights and capabilities.	Workers don't have to bear a disproportionate cost of a transition to a low-carbon, climate-resilient economy. Just transitions are essential to sustain the well-being of affected workers and communities, and offer them equal opportunities to green, decent jobs.

PART 2. ANALYSIS OF EQUITY IMPACTS OF CLIMATE TRANSITIONS IN SIX SYSTEMS

The major transformations needed to shift toward low-carbon and resilient economies principally occur in six systems: industry, energy, transport, cities, agriculture, and forestry. Drawing on a large literature review, Part 2 analyses the extent to which priority climate actions in these systems achieve social equity. Impacts are classified as progressive when they impose no or minimal cost on disadvantaged groups and benefit them greatly compared with other social groups. They are classified as regressive when they impose a heavier burden on disadvantaged groups and/or fail to provide them with the opportunities given to other groups. This analysis also addresses pathways of impacts and the barriers that prevent the least well-off from enjoying the opportunities offered by climate actions. In addition, it presents the main corrective and accompanying measures that countries adopt to offset regressive impacts and foster benefits for disadvantaged groups, with examples of good practices. Summary tables capturing the main findings of Part 2 are provided in Appendix A.

2.1. Industrial Transformations: Impacts on Workers and Communities

Industry employs about 23 percent of the global workforce, often with inadequate economic security, safety, equality of opportunity (WESO 2019), and a gender wage gap of 32 percent (WEF 2016). Industrial transitions toward low-carbon and resilient production systems can have massive impacts on the income and well-being of workers' jobs, local communities, and consumers. Priority transformations encompass a switch to clean and efficient energy, major reductions in material use and waste,[3] and a phaseout of the most polluting industries. A key strategy in these efforts is the promotion of a "circular economy," aimed at designing resource-efficient, durable, and upgradeable products; creating circular flows involving product reuse, repair, or recycling; and enhancing product use (Preston et al. 2019). Adaptation of industries will require more resilient infrastructures, sound waste management, and the closure or displacement of factories that lose essential inputs such as water or are too exposed to climate risks. Shortening supply chains is also a trend that supports more sustainable, resilient, and potential circular economies, with a lower carbon footprint and reduced risk of disruption (*Economist* 2019).

Carbon-intensive sectors where transitions are most pressing include extractive industries (oil, gas, and mining industries), heavy industries (iron, steel, cement, and chemicals, including plastics), the automobile industry, and the apparel industry. Some of these sectors are also notorious for not providing decent jobs. For instance, most coal workers earn low wages and are exposed to significant health risks. In all mining countries, a surge of cases of pneumoconiosis, an incurable respiratory disease commonly called black lung, is reported due to insufficient regulation (Han et al. 2018; Vishwanathan et al. 2018). In 2018, one-tenth of veteran coal miners in the United States suffered from black lung (Blackley et al. 2018). Likewise, the vast majority of the 75 million garment workers (80 percent of whom are young women) earn low wages and work in unsafe conditions. With a shift of production to lower-income countries in the 1990s, productivity improved but wages decreased (ILO 2017a). In Bangladesh, garment workers earn 3.5 times less than the estimated decent wage (Reichart and Drew 2019). Health hazards are particularly high since only 1 percent of the thousands of chemicals used to dye clothing have been approved. Depending on how they are driven, climate transitions could offer more decent jobs or leave many low-skilled and vulnerable workers behind.

Despite these major social challenges, the literature assessing the social impacts of these transitions has major gaps in terms of sectors, geographies, factors, and types of impact considered. Research focuses mainly on employment impacts of low-carbon transitions in extractive industries and, to a lesser extent, heavy and transport industries, primarily in high-income countries. While low- and middle-income countries are very reliant on carbon- and resource-intensive sectors, most of them lack estimates of the number of job losses and new opportunities that can result from climate transition. Studies of the impacts of circular economy strategies have only marginally covered social effects, including on employment and health (Gower and Schröder 2016; Merli et al. 2018; WHO 2018a). There are few analyses of the challenges for informal workers, although they are among the groups most at risk. In addition, the social implications of adaptive strategies are largely overlooked, including in highly vulnerable low- and middle-income countries (ILO 2019). Overall, the studies focus on impacts on jobs and neglect other implications for workers, local populations, and consumers.

Main progressive impacts

Opportunities in low-carbon industries, including in renewable energy, building efficiency, and the circular economy, are already important sources of job creation and are projected to generate a net gain of 18 million jobs by 2030 globally (ILO 2018). With adequate regulation, these opportunities are better jobs for lower-income and disadvantaged workers than those in polluting industries, as examples in the energy, automotive, apparel, and circular economy sectors illustrate.

Employment in the renewable energy sector grew by 8.1 percent a year between 2012 and 2016 (IRENA 2017). Together with the energy efficiency sector, renewables could generate about 30 million jobs by 2050 (IRENA 2018). In many countries, this could offset job losses in declining energy industries, and, with targeted support, benefit affected workers. For instance, the European Union plans to deploy clean energy in coal regions to create 315,000 jobs, far higher than the number of jobs lost in coal, with a priority given to former coal workers (Kapezati and Ruiz 2020). Jobs in clean and efficient energy sectors also tend to have lower educational requirements but better salaries and safer working conditions than those in fossil fuel industries. In the United States, the majority of these jobs require less than a college degree, and their median wages are 13 percent higher than median wages across the broader economy (Muro et al. 2019). For example, an operations engineer in the coal industry could expect to earn about 10 percent more working as a solar energy manufacturing technician (Pearce 2016). In addition, the energy transition offers opportunities for greater gender equality: in 2019, the share of women in the renewable energy workforce (32 percent) was higher than in the oil and gas industry (22 percent) (IRENA 2019).

In the transport sector, estimates for job creation from the adoption of clean vehicles vary, but most agree that the net effect on jobs economy-wide is positive. The net job creation is driven by the introduction of new actors in the value chain (battery manufacturers, charging station installers, research and development) and by the complexity of some technologies (Todd 2013; Stenning 2018). The European Climate Foundation found that shifting toward efficient and electric vehicles will create a net increase of 500,000–850,000 jobs by 2030. By 2050, this sector could create 2 million additional jobs and 1

percent of EU GDP while supporting a reduction in vehicle emissions by 83 percent (ECF 2017). In the United States, electromobility could create 52,000–109,000 net jobs per year (Melaina et al. 2016).

The global impact of climate policies on jobs in heavy industries is unclear, as it will depend largely on opportunities offered to workers and their ability to adapt their skills to greener technologies (ILO 2014a, 2014b; OECD 2017). The OECD (2017) estimates an 8–9 percent increase in jobs in the steel and iron industry by 2030 compared to a business-as-usual scenario. In the cement industry, increased energy efficiency is expected to create jobs in the short term but to keep only higher-skilled jobs in the longer term (ILO 2008). More jobs could be created along the supply chain for materials, services, and products. In Indonesia, the ILO estimates a 31 percent increase in jobs in more efficient and greener cement power plants (from 9,600 to 12,650) and a 60 percent increase in jobs in the supply chain (from 614,550 to 987,150) between 2015 and 2020 (ILO 2014b).

In the apparel industry, the promotion of sustainable practices is often associated with increased economic performance and major improvements in the income and/or working conditions of the garment workforce (BoF and McKinsey 2019). A reduction in the use of chemicals decreases health risks for garment workers, local communities, and wearers of clothes (MacArthur Foundation 2017). The creation of apparel from sustainably sourced fabrics with long-lasting value often has higher production costs, including wages. A shift toward sustainable and circular fashion also offers new job opportunities at various education levels, from positions for bioengineers, textile chemists, and circular designers to others for repairers and sellers in the rent, lease swap, and secondhand market.

A circular economy is expected to create 6 million jobs globally in waste management, the reprocessing of materials, and services like rental and repair (ILO 2018). In the European Union, the recycling, repair and reuse, rental, and leasing sectors had hired 4 million workers by 2016 and could create an additional 1.2–3 million jobs by 2030 (WRAP 2015). These jobs are usually stable because they involve complex disassembly, recycling, and repair tasks that cannot be easily performed through automation and artificial intelligence (Preston et al. 2019). They often support a traditional culture of repair and reuse in low-income communities. In several low- and middle-income economies, the promotion of a circular economy is an opportunity to improve the income, access to social protection, and working conditions of waster pickers and other informal, vulnerable workers in the repair sector, notably by integrating them into formal recycling systems (ILO and UNEP 2012; Gower and Schröder 2016; Preston et al. 2019). For instance, Brazil's National Solid Waste Policy aims to provide 75 percent of waste pickers with social protection while recycling 45 percent of solid waste by 2031. The estimated 19 million waste pickers in the world who have informal and hazardous jobs with incomes below the poverty level would significantly benefit from such protection (ILO 2017b), as would repairers exposed to hazardous substances (Gower and Schröder 2016).

Across sectors, major health gains related to safer working conditions, materials, and reduced environmental pollution and waste are observed and tend to primarily benefit poor workers (WHO 2018d).

Greener products can also translate into significant savings for consumers, because they are locally sourced, made from recycled material, or are more durable and repairable. Waste reuse and transformation offer a great potential for both job creation and consumer savings. For instance, in Benin, transforming waste into plastic bricks has made housing 48 percent cheaper (Allam and Jones 2018).

Main regressive impacts

If poorly planned and regulated, industrial transitions can leave many workers and communities behind, and make working conditions worse. Social challenges raised by the development of new green activities are particularly high for low- and middle-income countries, where many obstacles can hamper the promotion of green, decent jobs, including low access to finance, technology gaps, large informal economies with low levels of protection, and government failures (Preston et al. 2019).

In some regions, the creation of opportunities in clean and efficient energy sectors may not offset losses in fossil fuel industries, estimated at 440,000 jobs globally in 2015–16 alone (IRENA 2017). This is particularly significant challenge for China, where many of the 6 million coal workers have low levels of education and health problems. The Middle East and Africa could see small net job losses as a result of their dependency on fossil fuel extraction

(ILO 2018). In many contexts, workers affected by job losses and/or disadvantaged by existing inequality do not enjoy equitable access to new jobs in clean energy. For instance, in the United States, less than 10 percent of the workers in this sector are Black, a low rate compared to all occupations nationally.

In the automotive industry, shifting toward electric vehicles (EVs) put many current jobs at risk because EVs require fewer parts and less maintenance than internal combustion engine (ICE) vehicles (Fraunhofer Institute for Industrial Economics 2018; FTI Consulting 2018). This is a concern in countries like the United States, which as of 2018 counted over 700,000 workers in automobile repair and maintenance (U.S. Bureau of Labor Statistics 2018). The use of electric batteries also raises health concerns along the supply chain. To take an example, 60 percent of the world's cobalt, an essential mineral for the manufacturing of these batteries, is found in the Republic of the Congo, where mining operations are usually unsafe and involve child labor (UAW 2019; Stenning 2018).

In sectors supporting circular economy approaches, the main concerns are unintended adverse health effects. They are principally associated with exposure to chemicals and hazardous materials, such as bisphenol A and brominated flame retardants and emissions from composting waste. The disposal of e-waste also exposes sanitation workers to health risks (Gower and Schröder 2016; WHO 2018a). Such risks disproportionately affect poor and informal workers, including children, who are often beyond the reach of effective labor regulation and safety standards. Beyond these health challenges, the transport of secondhand products and waste to lower-income countries for reuse also competes with local production, reducing job creation. Several East African countries have considered banning used clothing imports because they undercut domestic apparel production and local job prospects (Preston et al. 2019).

In the apparel sector, most jobs losses are associated with transboundary impacts of decisions made by global firms and are complex to assess. The increasing shift of garment industries from offshore locations in Asia toward nearshore and onshore locations tends to support shorter supply chains and higher wages in high-income countries, but it can hamper job creation in lower-income countries and also potentially, because of automation, in nearshore or onshore locations (BoF and McKinsey 2019). Most studies of sustainable, "slow," and "circular" fashion overlook social impacts for garment workers in middle- and low-income countries (Conlon and Barraja 2019).

A shift to sustainable production patterns can also adversely affect consumers. Greener may not mean cheaper. Spending $40 on a quality T-shirt that is ethically sourced and can last for three years might be a sounder choice than buying one for $15 that lasts for six months, but it is still a greater initial expense. Although survey-based studies indicate that a growing portion of consumers say they are ready to pay more to satisfy environmental, ethical, and quality concerns, in practice, sustainability is still far from being a key consideration in purchasing decisions (GFA et al. 2019) and can be unaffordable for many.

Main corrective and accompanying measures

Job losses and potential worsening of working conditions are not automatic consequences of climate measures. They reflect inadequate policies and investments. A growing number of countries have adopted just transition strategies to support industrial transitions. While these experiences focus largely on employment in the coal industry, they highlight four building blocks for successful transitions that can be relevant for all sectors: anticipation, social dialogue, protection, and investment in transformations.

Anticipation: Assessing social risks and opportunities over the long run

Driving just transition strategies requires forward-looking planning and thorough assessment of the social implications of industrial changes over the short and long terms to inform policy choices at the macro- and sector levels. Anticipation is essential to reshape long-term investment decisions effectively; put in place labor, economic, and education policies that can take time to show results; and enable people to prepare and adapt through gradual transitions.

Comprehensive assessments of social impacts look at effects on workers, in both directly affected firms and subcontractors along the value chain, local economies and communities, and job markets and consumers

across national economies. The ILO Green Jobs Assessment Institutions Network (GAIN 2017) proposes a methodology to quantify the effects of green policies on employment, looking at both risks and opportunities. The use of disaggregated data, by gender, race, and informal work, among other characteristics, is essential to analyzing how existing disadvantages can exacerbate vulnerability to impacts on livelihoods and to identify needs for specific support. Transboundary issues and spillover impacts in other countries should also be better considered in order to minimize potential social costs overseas.

Impacts associated with decarbonization strategies need to be assessed along with the implications of other major industrial transformations—such as digitalization, robotization, artificial intelligence, 3D printing, and nanotechnology—to get accurate estimates of future job losses, opportunities, and needed green skills. Robotization itself could result in the loss of 20 million jobs, the equivalent of 8 percent of the global manufacturing workforce, but it is also expected to create 58 million net jobs by 2022 (Oxford Economics 2019).

Preparing the workforce of the future is a major challenge to provide equal opportunities for all. Country experience reveals several success factors, including labor market information systems; regular forward-looking analyses of green skills needed rather than one-off studies; strong coordination between ministries and agencies for economy, employment, education, environment, and climate; effective institutions for social dialogue; reform of education systems that support new teaching expertise, curriculum, vocational education, and life-long learning; and monitoring with disaggregated data (Strietska-Ilina et al. 2011; Cedefop 2019). As skill shortages hinder a just transition in many green sectors, including clean and efficient energy and buildings, especially in sub-Saharan Africa and South Asia (Strietska-Ilina et al. 2011; GAIN 2017), the creation of dedicated institutions, such as India's Skill Council for Green Jobs, can help identify and support skills needed in green sectors, in partnership with business and unions.

Social dialogue: Defining a just transition through formal multistakeholder processes

Dialogue among all relevant stakeholders is a major success factor for designing a just transition that addresses workers' concerns and specific needs. Stakeholders typically include trade unions and other workers' representatives, businesses, national government officials, and local constituencies. Micro-, small-, and medium-sized enterprises and people working in the informal economy must be better represented.

An increasing number of countries institutionalize social dialogue on just transitions. The establishment of a dedicated entity to coordinate the discussion and negotiation of a formal agreement can help ensure inclusive, transparent, and accountable processes with a clear mandate, rules of procedures, and timeline. The form of such entities greatly varies, from ad hoc task forces and working groups to platforms, special commissions, and councils. Examples include the federal Task Force on Just Transition for Canadian Coal Power Workers and Communities and Germany's Commission on Growth, Structural Change, and Employment.

The formalization of the negotiation outcome in the form of contracts among stakeholders, with clear commitments and timebound targets, can facilitate the implementation of the agreed plan. For instance, the adoption of a "Social Contract for Low-Carbon Transitions" in California helped set climate policy targets promoting social equity and include them in state legislation. Spain's Strategy of Just Transition also requires the adoption of "just transition agreements" by the government, unions, and businesses in all regions affected by the phaseout of carbon- and resource-intensive industries. The just transition agreement signed in October 2018 for mining regions suggests that this clear and rule-based process helped build trust among stakeholders.

A growing number of initiatives at the global, regional, and national levels foster the sharing of experiences in designing a just transition. For example, the Powering Past Coal Alliance galvanizes social dialogue and helps manage the transition in over 70 signatory countries, subnational jurisdictions, and companies.

Protection: Ensuring social security and decent jobs

The protection of workers' rights and livelihood in an industrial transition requires the adoption of social policies, safety nets, and labor regulations.

Adequate social protection and allocation mechanisms need to be identified early on and differentiated based on

affected groups' vulnerability, life expectancy, capabilities, and preferences. Specific support is needed for workers who may not easily benefit from reskilling and get another job, because of their age, health and physical condition, education, or unwillingness or inability to move to another region. This support can entail early retirement, financial compensation, and support for a professional transition. It should be context-specific and tailored to individual situations. For instance, many coal workers have health problems that make them unable to take up other jobs. In Spain, the just transition agreement signed in October 2018 for coal regions proposes early retirement for workers over 48 years old.

Because green jobs are not automatically decent jobs, pioneer countries adopt legislation to protect workers' rights in new sustainable sectors. The Philippines' Green Jobs Act requires the creation of green jobs that provide fair income, safety, and social protection and that respect labor rights and social dialogue, in line with the ILO's decent work agenda (Senate of the Philippines 2015). As the example of Brazil's legislation for waste pickers illustrates, countries can harness sectoral transitions to enhance workers' rights. Additional regulations are essential when greener production and recycling processes can expose workers to higher risks. In sectors related to the circular economy, for instance, greater information is needed on component materials and safety regulations regarding waste site management and material recycling and repairing, for the removal of harmful substances, for instance. Product design standards and regulations could also allow for easy disassembly and recycling of materials (WHO 2018a).

Specific policies and incentives are also needed to remove barriers preventing disadvantaged groups from accessing green jobs. They include gender and social analysis in green job sectors, legislation addressing discriminatory social norms, potential quotas, new training requirements and capacity building, specific training for vulnerable groups, and accountability procedures (Muro et al. 2019; ILO 2015a.

Investment in transformations: Supporting successful reconversion for workers, local economies, and affected sectors

In affected regions, training and reskilling programs are essential components of the assistance provided for workers who have lost or will lose their jobs (NCE 2018; Neslen 2018). Accompanying measures, such as affordable, quality childcare, are needed to enable all workers to attend these training sessions.

Comprehensive transition plans also provide for investments in the conversion of local economies. They usually support alternative economic opportunities in green sectors, including renewable energy, environmental restoration, ecotourism, enabling infrastructures, and public services. They can include the relocation of public agencies to boost employment, local businesses, and community renewal.

Countries mobilize a wide range of financial instruments to support economic reconversion, nascent green industries, research development, and skills training, including public investments, grants, procurement programs, and fiscal and duty incentives. For instance, the Philippines' Green Jobs Act provides a special deduction from taxable income of up to 50 percent of such expenses and tax- and duty-free importation of capital equipment (Senate of the Philippines 2015). A growing number of countries also have set up dedicated just transition funds. China created a US$15 billion fund to support coal- or steel-sector overcapacity after stopping the work of over 150 coal-mining factories (NCE 2018; Myllyvirta and Danqing 2017). The European Commission also announced in 2020 the establishment of a Just Transition Mechanism, including a dedicated fund.

Such transition can take time. Box 2.1 showcases the experience of Walbrzych, a city in Poland's Silesia coal region, which is experiencing a revival thanks to new investments in green sectors and social infrastructures after decades of decline after the closure of the mines in the mid-1990s.

Box 2.1 | From Decline to Rebirth: Lessons from a Difficult Transition and Opportunities Offered by a Green Economy

The successive reconversion plans of Walbrzych, a city in southern Poland, provide valuable lessons about the challenges and opportunities that can follow the phaseout of carbon-intensive industries. While the city's economy was based on mining and other polluting industries for more than 500 years, the closure of the coal mines in the mid-1990s took less than three years. Despite a transition strategy for the 3,000 affected workers, the unemployment rate rose from 5–6 percent to 38 percent after the mines shut down. Economic and social restructuring programs did not achieve their goals and a reskilling program had poor results, partly because many miners had health problems and could not get new jobs. The cost of the program was much higher than budgeted, while the city's budget was shrinking because of lower revenues from income taxes. The implications of the closure were much broader than job losses. The out-migration rate sharply increased and the city remained socially, geographically, and culturally divided.

Twenty years later, the promotion of a low-carbon, green economy has offered opportunities to turn the page on postindustrial decline. Walbrzych joined a special economic zone that set climate targets, including a 100 percent plastic-free goal and a transition to an 80 percent share of electric vehicles. The region receives investments for new green sectors. The European Investment Bank lent the city about €14 million to finance green urban infrastructure, building retrofits for energy efficiency, upgrading of public spaces, and revitalization of underserved areas, including with more social housing.

Source: Bureau of the COP24 Presidency (2019).

2.2. Energy Transitions: Impacts on Energy Access and Affordability

While hundreds of millions of people suffer from energy poverty because they lack energy services or cannot afford them, the global energy transition offers major opportunities to achieve universal access to affordable, reliable, sustainable, and modern energy (SDG 7). The world has to switch from reliance on fossil fuels, concentrated in a few countries and associated with high competition and energy dependency, to renewable energy sources, which are more equally distributed, incur no fuel costs for electricity production, and enable a decentralization of the grid. This is a major promise for the 840 million people who lack electricity access and the 2.8 billion who rely on traditional biomass for cooking (IEA et al. 2019). This transition also would enhance the energy efficiency of the global economy by two-thirds by 2050 (IRENA 2018), significantly reducing energy bills. In 2019, some 285 million people could not afford a subsistence level of electricity consumption (30 kilowatt-hours per month). Fuel poverty is also a major challenge for OECD countries and usually intersects with income poverty, poor housing, medical needs, and other discrimination (UNDESA 2019). In the United States, one out of three households struggles to pay energy bills, about half of them identifying as Black, more than 40 percent as Latino (EIA 2018a). Twenty-five million reported foregoing food and medicine in 2015 (EIA 2018b).

The literature on energy transitions increasingly considers the social impacts of the measures that most directly affect consumers—clean energy expansion, reforms of consumption fossil fuel subsidies, carbon pricing, and home energy efficiency programs—but significant gaps in understanding remain. Analyses of distributional impact are rare and when available focus only on income. The progressivity of green fiscal reforms and incentive schemes supporting the uptake of clean energy and energy efficiency is still insufficiently assessed, partly because of a lack of data (IEA et al. 2019). Despite gaps, country experiences tend to show that clean and efficient energy solutions can significantly benefit poor households but also that these solutions are not yet made sufficiently available and affordable (IEA 2019a).

Main progressive impacts

Energy transitions can benefit lower-income and disadvantaged groups when aligned with reducing energy poverty, serving as a powerful catalyst for wider social and economic development.

The expansion of renewable energies has helped reduce the number of people without electricity access to less than 1 billion in 2016. Between 2011 and 2017, the number of people benefiting from off-grid solutions, including mini-grids and stand-alone systems, grew from 20 to 152 million (REN21 2019). Decentralized systems are likely to remain the most cost-effective solutions for a majority of the new connections (IEA 2017a). Most of the people using them are poor residents of remote rural areas where extension of the national grid is too expensive (IEA et al. 2019). For example, in Myanmar, 61.1 percent of the bottom expenditure quintile have access to electricity through off-grid energy solutions compared to 34.5 percent of the top 20 percent (IEA et al. 2019). These solutions provide a wide array of social benefits for rural populations, including refrigeration, improved lighting quality, better health, greater access to water and public services, increased school retention, higher income for small and medium-sized businesses, and improved irrigation systems thanks to solar pumps, resulting in greater food security (REN21 2019).

The share of the global population with access to clean cooking solutions increased from 57 percent to 61 percent between 2010 and 2017 (IEA et al. 2019). These options significantly lower the risk of respiratory diseases and could avert 3.8 million deaths caused by indoor air pollution annually, half of them among children under five years of age and most others among women (WHO 2019).

Women and children tend to benefit most from modern energy, especially through reduced health risks and improved access to healthcare, water, and other public services (IRENA 2019). Access to modern energy frees up time spent fetching fuelwood and water and processing food manually. However, the extent to which this time can be dedicated to leisure, education, and income-generating activities depends on the situation of women's and children's rights (Enel 2019; ENERGIA 2019).

For households connected to the grid, an increase in the share of renewables in national energy production along with other improvements in energy systems also helps make electricity more affordable and reliable (Kojima and Trimble 2016; Morrissey 2017). The gains could benefit most of the 400 million people in low-income, landlocked, or island countries where an electricity connection costs more than one month's income and blackouts remain frequent (IEA et al. 2019).

Enhancing energy efficiency, whether of buildings or appliances, is a powerful way to reduce home energy bills and poverty. In Europe, where about 50 million people cannot keep warm and afford other energy services (Thomson and Bouzarovski 2018), it is estimated that a 10 percent increase in home energy efficiency reduces the energy poverty rate by 2.1 percent (Omic 2019). Gains can be substantial. For example, every year 35,000 households benefit from the U.S. Weatherization Assistance Program, saving an average of $283. Health improvements can also represent as much as 75 percent of the total return on energy efficiency programs for low-income households (Ugarte et al. 2016). Children and people with a disability or medical conditions are the first beneficiaries (Grave et al. 2016; ACOSS et al. 2017). Energy efficiency solutions also enable poor households to better afford other necessities, which improves nutrition, health (including reduced stress), mobility, and economic and social inclusion (Goodall 2013; van Renssen 2014).

Fossil fuel subsidies have been reformed in about 50 countries since 2015 (Merrill and Quintas 2019), and up to 57 carbon-pricing initiatives (carbon tax and emissions trading schemes) had been adopted by 2018 (Ramstein et al. 2019). If well designed, these measures can be neutral for low-income households' budgets and even yield benefits for them. In some contexts, they stop illegal fuel diversion to high-priced black markets (Yemtsov and Moubarak 2019). In all countries, they generate significant revenues, estimated at US$2.8 trillion globally in 2030, which can be recycled to affected households and reinvested in public priorities (NCE 2018; World Bank 2019a; Ramstein et al. 2019). It is estimated that replacing a $100 fossil fuel subsidy with a universal cash transfer would raise the net income of those in the bottom 20 percent of the income distribution by $13 while reducing the income of the top 20 percent by $25 (World Bank 2019a). Recycling schemes taking into account that low-income households spend a larger share of their budget on energy and have less access to sustainable mobility than the richest quintiles can be very progressive. In the Canadian provinces opting for the federal carbon tax, 70 percent of households receive more money than they pay in tax. These reforms can also boost sustainable jobs. In British Columbia (2019), the carbon tax has favored the creation of 68,165 green jobs since 2010.

Main regressive impacts

When social impacts are overlooked, energy transitions can create two-tiered systems that leave the poorest behind (ACOSS et al. 2017).

Clean energy remains out of reach for many. The costs of solar home systems (Tellez et al. 2017; Paulos 2017; Harrison and Adams 2017; *Economic Times* 2019) and clean cooking solutions (HEDON 2014; Tellez et al. 2017; Vigolo et al. 2018) are still high in many places, and flexible payment mechanisms remain too expensive for the poorest (Box 2.2). The average cost of a solar photovoltaic (PV) system was US$120 in Kenya in 2017, equivalent to 5 percent of a poor family's annual income (Harrison and Adams 2017), and $11,920 in the United States—24 percent of the median annual income of low-income Latino households and 30 percent of that of Black households (U.S. Census 2017). Other access barriers include lack of awareness of potential benefits of clean energy (Ouedraogo 2019; Seetharaman et al. 2019), low levels of education (Poddar and Chakrabarti 2016; Jagger and Jumbe 2016; Inayatullah et al. 2017) and gaps in technology, local skills, and regulations in underserved areas (Weston et al. 2016; Gueye 2018; Skierka 2018; ESMAP 2019; Ouedraogo 2019; Seetharaman et al. 2019).

Clean energy options often reach women last, especially when energy programs are gender-blind (IRENA 2019). While decentralized solutions offer opportunities to engage women in design, delivery, and operations (IRENA 2019), female-headed households have lower access to electricity than male-headed households in rural areas (IEA et al. 2019). Women face many specific access barriers, including discriminatory cultural and social norms (factor number one across countries), inequity in ownership of assets, and lack of financial means, knowledge, and training (Enel 2019; IRENA 2019). Experts also warn against assumptions about women's nurturing roles that perpetuate and deepen gender inequality. Lack of security in remote field locations is also an obstacle to women's participation (IRENA 2019).

In several contexts, expansion of renewable energy has been associated with skyrocketing electricity prices (EIA 2014; Palmer 2015; Thalman and Wehrmann 2020). The paradox between plummeting wholesale prices and soaring retail prices is mainly explained by higher electricity system costs due to the intermittent nature of solar and wind, and regressive government support for renewable energies.[4] Such support, including feed-in tariffs, was the main driver of the 71 percent increase in household electricity prices in the European Union between 2008 and 2015 (Palmer 2015; European Commission 2019). In 18 European countries, including Germany (Box 2.3), energy prices have increased faster than incomes of the bottom 20 percent in the past decade (Omic 2019). Electricity prices also rose 28 percent in California during its solar energy build-out from 2011 and 2018 (EIA 2019). Incentives financed by electricity bills affected households more than industry, which usually benefits from lower taxes, and had a disproportionate effect on low-income households.

Households that struggle to pay their energy bills also have the biggest access barriers to greater energy efficiency, because they cannot afford upgrades, may rent, and/or may lack full information on potential benefits (Ugarte et al. 2016; Ntourous 2017; EDF 2018; Smith 2019). Low-income households often do not own their homes, which creates a split incentive:[5] the landlords with the capital are not responsible for the energy bills and may not be inclined to invest in energy retrofits. While some energy-saving options (e.g., efficient light bulbs) may be within reach for lower-income households, they have little incentive to invest in insulation or other upgrades (Lewis and Smith 2014; EDF 2018; Ugarte et al. 2016). In France, half of financial support for home retrofits goes to the top 20 percent of households (IGF and CGEED 2017). In the United States, only 18 percent of electric efficiency expenditures and 34 percent of natural gas efficiency spending targeted low-income households in 2014 (Cluett et al. 2016).

Poorly designed fossil fuel subsidy reform and carbon pricing can significantly affect low-income households for whom clean options are unavailable, inaccessible, or unaffordable. They increase energy and mobility prices and involve trade-offs with other necessities (World Bank 2019a; Piketty 2018). Worldwide, low-income groups often reside in suburban and rural areas, where they have fewer public transport options and are dependent on cars or minibuses. Unsuccessful efforts, including the partial reinstatement of fossil fuel subsidies by the Nigerian government after violent protests in 2012 (Moyo and Songwe 2012; Atansah et al. 2017) and the withdrawal of the carbon tax that had triggered the yellow vest protests in France in 2018 despite strong public support for climate action (Piketty 2018; Cigainero 2018; Saujot et al. 2019), highlight a failure to ensure transparency, anticipate regressive impacts, and plan corrective measures before the introduction of a reform.

Box 2.2 | **Flexible Payment Mechanisms: A Success That Still Needs to Reach the Poorest**

The rentability of solar photovoltaic enables private companies to offer flexible payment mechanisms, sometimes called pay as you go (PAYG), including longer-term loans, smaller deposits, and grace periods without service interruption after missed payments (Waldron and Zollman 2017; Ockwell et al. 2019). Combined with digital payment, these mechanisms support financial inclusion. In 2019, PAYG solutions covered 22 percent of the global sales of solar energy services (REN21 2019). They served 700,000 households in Kenya alone (World Bank 2018b). However, these mechanisms are not affordable for many. The average daily cost of $0.40 corresponds to about 20 percent of the $2 average daily income of poor East African farmers. PAYG users in rural areas are typically better-off individuals who are employed, farmers able to sell surplus, or owners of small and medium-sized businesses (Collings and Munyehirwe 2016; Lepicard et al. 2017; Harrison and Adams 2017). The variation in interest rates for microloans and payment terms across off-grid energy companies and countries suggests room for leveraging further flexible payment mechanisms.

Corrective and accompanying measures

Placing equity at the core of energy system transformations and innovative financial mechanisms can help increase the benefits for the least well-off, as illustrated by examples of renewable and home energy efficiency programs and green fiscal reforms.

ENSURING ACCESSIBILITY AND AFFORDABILITY OF CLEAN ENERGY OPTIONS

Progress in electrification becomes harder as the focus shifts to people living in the most remote areas, marginalized urban communities, and the displaced (IEA et al. 2019). Without a significant increase in targeted investments, capacity building, awareness-raising, and other accompanying measures, 650 million people may be left behind in 2030, 90 percent of them in sub-Saharan Africa (IEA et al. 2019); 2.3 billion people may also remain without access to clean cooking facilities in 2030 (IEA 2019a).

One way to increase government funding is to replace fossil fuel subsidies benefiting richer consumers with pro-poor energy programs. For instance, India used the budget space left by such a reform to introduce a subsidy for clean cooking fuel in 2014. This support had transferred US$10 billion to 177 million low-income consumers through direct cash payments as of 2017 (Mittal et al. 2017; World Bank 2019a). Innovative and targeted offers are also needed to make flexible payment mechanisms affordable for the poorest (Box 2.2). Additional support from development assistance will be key.

Awareness and education campaigns, such as those by the Sustainable Energy for All (SEforAll) initiative and the Global Alliance for Clean Cookstoves, are equally essential to reach the poorest. They explain the widely divergent states of knowledge about renewables: 96 percent of respondents know about solar lights in Kenya, 47 percent in Zambia, and just 20 percent in Senegal (Harrison and Adams 2017).

The obstacles faced by women and marginalized groups should also be removed. Several organizations, including IRENA and UN Women (IRENA 2019) and the Climate Investments Funds (Nelson and Kuriakose 2017), provide guidance for gender-sensitive approaches to energy programs, including gender diagnostics, arrangements enabling meaningful participation in decision-making, and targeted capacity building and financial support. SEforAll's People-Centered Accelerator platform shares good practices to bring women and marginalized populations into energy decision-making (SEforAll n.d.).

In countries that have already achieved universal access to electricity, ensuring that energy transitions do not increase electricity prices is the main challenge. This requires sound assessment of the impact on end consumers of governments' renewable energy support. Innovative funding models can also make clean energy cheaper. For instance, energy auctioning—competitive bids placed by energy producers—has emerged as a cost-effective alternative to government subsidies (IRENA 2016; Kruger et al. 2018). Launched in 67 countries in 2016, these auctions led to record-low tariffs for solar or wind in countries as disparate as Chile, Morocco, and Zambia (IRENA 2016; Kruger et al. 2018). Their success still depends on context-specific factors, including economic health, energy policy targets, other market

signals, and guarantees to investors (IRENA 2016; Kruger et al. 2018).

Publicly owned energy cooperatives also lower the costs of clean energy, as the case of Germany illustrates (Box 2.3). In democratizing energy ownership and reducing transaction costs, cooperatives have often helped expand the benefits of energy transitions, build public acceptance, and scale up uptake of renewables (Eichermüller et al. 2018; Wierling et al. 2018). While their forms and services (e.g., solar PV, district heating) vary greatly, they all pursue nonprofit goals beyond the distribution of dividends—such as energy affordability, social inclusion, and community spirit—and can have a positive impact on women's economic empowerment (REScoop 2016; Eichermüller et al. 2018). However, partly because of the lobbying of powerful utilities defending centralized energy systems, cooperatives face multiple obstacles, including weak financial support, cumbersome administration, and slow connection to the grid, which limits their potential in low-income communities (Wierling et al. 2018).

Box 2.3 | The Role of Citizen Cooperatives and Energy Auctioning in Reducing the Cost of Energy Transitions: Lessons from Germany

Germany's experience shows that both citizen energy cooperatives and energy auctioning can reduce electricity prices, but that regulations are needed to avoid competition. In 2000, the national energy act required that 40–45 percent of electricity consumption come from renewable sources by 2025 and imposed a levy on customers' electricity bills to finance feed-in tariffs and attract investment toward renewables. The steady increase in this levy, from less than 5 percent to almost one-fourth of the retail price in 2017, was the main driver of a 40 percent rise in electricity price and higher disconnection rate among poor households—330,000 low-income households in 2016. Citizen-owned cooperatives, grouping independent citizens to finance renewable power projects, have been a leading force in this transition and helped mitigate its price impacts for many consumers. Accounting for up to 46.6 percent of all installed renewable capacity in 2012, they reduced transaction costs and energy prices for their members.

After several reforms of the feed-in-tariffs system, in 2015 the government started to pilot energy auctioning for granting solar licenses to further reduce the burden on consumers. This new scheme had encouraging results, as the price of solar-based electricity dropped by 20 percent between 2015 and 2016 (IRENA 2016). Citizen energy cooperatives were initially given an advantage in renewable auctioning and came out as big winners in the first round of auctions. However, these advantages were suspended until 2020 because of a lax legal definition that allowed large company bidders to benefit from a large volume of tenders under the "cooperative" label. With reduced support payments, this switch to auctions for new capacity is making it harder for cooperatives to contribute to the expansion of renewables.

Sources: BMWI (2019); Morris (2016); Wehrmann (2017).

Community solar programs are another innovative way to bring cheaper clean energy to renters and low-income households. These programs enable consumers who cannot install solar panels at home to purchase a share of a solar installation and enjoy reduced energy bills. For instance, after having noticed that 75 percent of solar rebates were received by high- and middle-income families, the city of Austin, Texas, created such a community program targeting hard-to-reach low-income households, multifamily affordable housing, and nonprofits (Shaver 2019).

HARNESSING ENERGY EFFICIENCY TO REDUCE ENERGY POVERTY

Most incentives to support building renovation and/or appliance replacement mainly benefit middle-class households, in high-income countries (IEA 2019a; World Bank 2016). The literature highlights several ways to better target assistance programs at low-income households (Economidou and Bertoldi 2015; Bird and Hernández 2012; Cluett et al. 2016; Ugarte et al. 2016; ACOSS et al. 2017; Reames et al. 2018):

- Eligibility criteria aligned with the national reality of energy poverty and potentially tested through consultations. The criteria include energy affordability (income/energy expenditure), eligibility for social welfare, a range of socioeconomic groups, health issues, and housing standards (often overlooked), among others.
- A mix of regulatory, information, fiscal, and financial instruments tackling various access barriers, instruments that all have pros and cons in terms of equity and can complement each other (Table 2.1).
- Mutually beneficial solutions for landlords and tenants to overcome split incentives.

- A single entry point provided for households through a strong collaboration between government and utilities (Box 2.4): fuel-blind efficiency programs (gas and electricity), packages that take into account both housing and equipment efficiency, and/or a one-stop-shop model for multiple services, including energy audits, connection with contractors, and a list of financing options.
- Combination with other assistance programs (e.g., income support, energy bill assistance, social tariffs for electricity) to ensure consistency in eligibility and information requirements.
- Partnership with affordable housing organizations and local social support services, including for awareness-raising and energy efficiency education.
- Engagement with housing rehabilitation agencies to address housing deficiencies (safety, health issues, etc.) that prevent the completion of energy efficiency upgrades.
- Partnerships with retail stores to ensure availability of efficient appliances in underserved areas.

Table 2.1 | **Advantages and Disadvantages of Energy-Efficiency Instruments for Low-Income Households**

TYPE	INSTRUMENTS	ADVANTAGES	DISADVANTAGES
Information—regulation	**Information centers**	Free technical and financial advice on energy savings	Targeted communication needed
	Energy efficiency standards	Greater equality in access to efficient housing baseline for tenants' request for upgrades	Funding of upgrades unresolved
	Energy labeling	Indication of future energy bills	Lack of harmonization Risk of inaccuracy
	Individual metering	Data on energy consumption	Issue of upfront costs unresolved
	Energy audits	Suggestions to improve appliances, habits, and housing	Funding of upgrades unresolved
Fiscal	**Value-added tax reduction**	Immediate discount	Weak financial support
	Tax credit or relief	Offsets some upgrade costs Possible eligibility criteria	Issue of upfront costs unresolved
Financial	**Energy efficiency assistance programs**	Direct payment covering a percentage or all upgrade costs Possible eligibility criteria	Possible paperwork and delay in getting refund; risks of barriers (e.g., split incentive)
	Subsidized share equity schemes	Free loan in return for a share of any profits at house sale or repayment of the loan	Inaccessible for renters Proactive communication needed
	Property tax assessment	Loans financed by governmental bonds, repaid through property tax Longer payback periods	Inaccessible for renters Complex
	Energy bill financing	Utility loan, upgrades repaid through energy bills Cost spread over time	Complex setup Potential reluctance of utility
	Equipment leasing	Cost spread over time	Project size limitations

Sources: Yemstov and Moubarak (2019); online public information on government websites.

Box 2.4 | Making Energy-Efficient Houses Cheaper: Examples from Maryland and Mexico

The state of Maryland implemented the EmPOWER Maryland program with all gas and electric companies to reduce per-capita electricity consumption by 20 percent by 2020 relative to 2007. Based on eligibility criteria, the program offered low-income households a wide range of options, such as home energy assessments and rebates for lighting, appliance, and energy improvements like insulation and air sealing (EPA 2017). The program is cost-effective: for every dollar spent by utilities or participants, about $2.08 of benefit is generated (PSCM 2019). Since its launch, the program has enabled 29,548 low-income households to save a total of $8.4 billion in lifetime energy bills (Baatz and Barrett 2017).

In Mexico, EcoCasa aims to fund 50,000 efficient, affordable houses by 2020 to enable households to save around $200 in energy bills per year. The program had already exceeded its 2019 goal of 27,600 houses in 2016, saving 1 million tons of carbon dioxide equivalent while improving households' well-being (Government of Mexico 2018). Supported by development partners, the program brings together banks and government agencies, including those for inclusive housing markets, mortgage financing, urban policy, and worker pension funds. It channels low-cost funding to housing developers adopting green building practices and finances "green" mortgages for the purchase of energy-efficient houses. The program thus lowers the cost of both developing and acquiring efficient houses. EcoCasa has inspired other countries' efforts, including Peru's (Monge 2018).

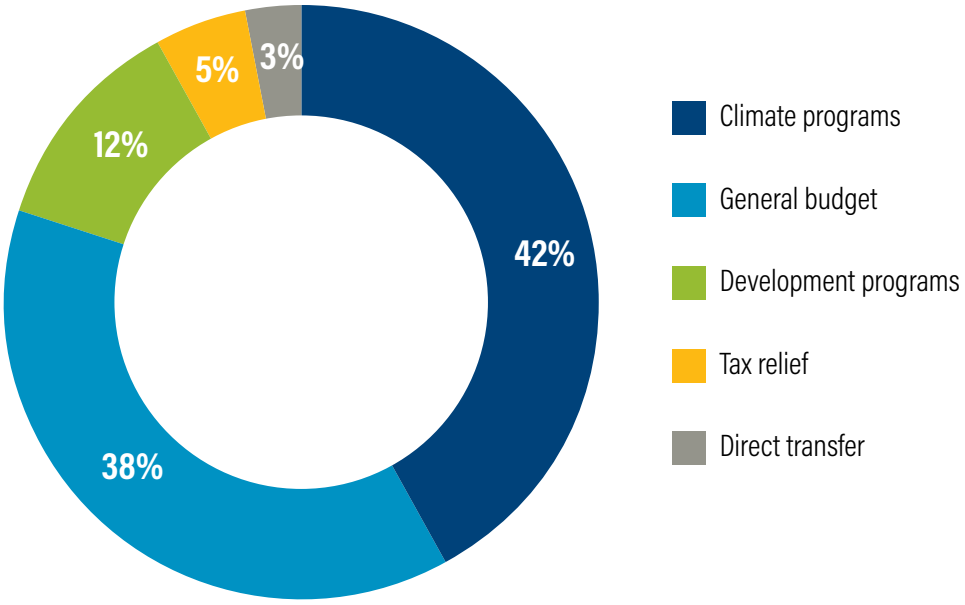
DESIGNING EQUITABLE FOSSIL FUEL SUBSIDY REFORMS AND CARBON PRICING

Carbon pricing and the removal of fossil fuel consumption subsidies can be revenue-neutral and even beneficial for low-income households when they are carefully planned. Lessons learned through successful and unsuccessful reforms underscore the importance of six planning steps to ensure equitable outcomes (Atansah et al. 2017; Piketty 2018; World Bank 2019a; Yemtsov and Moubarak 2019):

- Identifying which groups are at risk of being particularly affected, through a distributional impact assessment considering income and other factors that can influence impacts, such as location, socioeconomic status, culture, age, gender, and race.
- Evaluating the extent to which existing social programs, safety nets, and other relevant public policies can mitigate regressive impacts on workers and households, especially those in low-income groups.
- Identifying the most effective revenue-recycling options to benefit affected groups.
- Coordinating with other ministries and agencies to design other offsetting and support measures needed across fiscal, climate, energy, transport, and social policies, including to ensure low-income households' access to alternative clean energy and transport options.
- Developing transparent communication with the public, including dialogue with concerned parties.
- Adjusting reforms to address public concern and introducing compensatory measures *before* the fossil fuel subsidy reform and carbon-pricing scheme go into effect.

Overall, there is room to increase the progressivity of these reforms through a more strategic use of the revenues they generate. In the case of carbon pricing, as Figure 2.1 shows, a large portion of the revenues is allocated to climate programs and general budgets, and a small share to development programs, tax relief, and direct transfers to exposed industries and households.

Figure 2.1 | **Global Allocation of Carbon-Pricing Revenues**



Sources: World Bank (2019a).

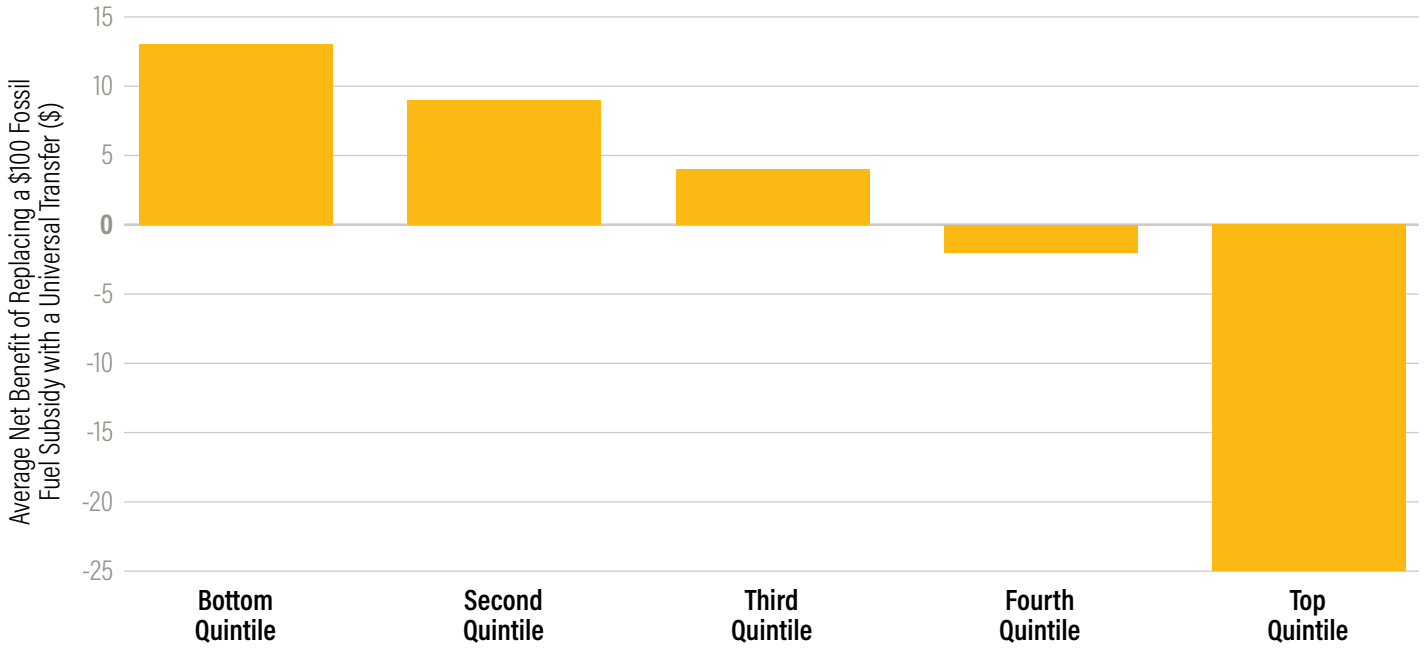
Allocation to the general budget can help reduce public debt and/or enhance flexibility in spending the revenues. However, this option might not be transparent for the public and can raise concerns if no link is shown with spending on public priorities, social safety nets, or the ecological transition (Beuermann and Santarius 2006; Dresner et al. 2006; Klok et al. 2006; Carattini et al. 2018).

Tax relief has different equity impacts depending on options. A decrease in income taxes may not offset the rise in consumption taxes for low-income earners, who may not pay income tax at all. At the same time, a redistributive approach to tax cuts enables the transfer of wealth from businesses and richer consumers to lower-income groups. In British Columbia, businesses pay 70 percent of the carbon tax and receive 65 percent of the revenue through tax cuts, while individuals pay 27 percent and receive 35 percent (British Columbia 2016).

Evidence suggests that direct payments are particularly effective in compensating low-income households, even with a small share of the revenues, and are perceived as fairer (Rentschler and Bazilian 2016; Atansah et al. 2017; Jain et al. 2018; World Bank 2019a). They can target low-income households, pensioners, and people who have high electricity bills for medical reasons. Even when they do not differentiate across households, they provide more relative benefit to lower-income households than richer households (World Bank 2019a), as shown in Figure 2.2 for subsidy reforms.

Significant benefits are also associated with development programs (e.g., education and health), adaptation measures benefiting vulnerable groups, and targeted incentives allowing low-income groups to transition to low-carbon consumption (e.g., clean energy and home energy efficiency retrofit). Empirical and survey-based studies show that allocations for these programs are popular (World Bank 2019a).

Figure 2.2 | **Equity Impact of Direct Payments to Offset Fossil Fuel Subsidy Removal in Low- and Middle-Income Countries**



Source: Arze del Granado et al. (2012).

2.3. Sustainable Mobility: Impacts on Disadvantaged Groups' Connectivity

A global shift to sustainable mobility options can step up progress toward "universal access to safe, affordable, accessible and sustainable transport systems by 2030" (SDG Target 11.2), tackling transport poverty in its four dimensions: absence of infrastructure, unaffordability, inaccessibility, and exposure to externalities such as air pollution. Mobility options with the lowest environmental impact—public transit, walkable streets, bike paths, and shared mobility—are those that could benefit most people who cannot afford private vehicles. They can better protect pedestrians, cyclists, and motorcyclists, who account for half of the people killed on the world's roads every year (77.5 million) (WHO 2018a). Climate-resilient transport infrastructure is also most needed for the 1 billion people in low-income countries who lack access to all-weather roads (Jennings 2016). Improved vehicle efficiency and electrification hold great promise for reducing transport costs and air pollution, from which lower-income residents suffer disproportionately. Upgrades or new design of sustainable transport also offer opportunities to improve accessibility for people with disabilities, an estimated 1 billion worldwide (World Bank 2019b). The literature shows that in most countries a more proactive and comprehensive approach to transport poverty is needed to harness these opportunities and reach disadvantaged groups, especially lower-income workers, women, and people with disabilities.

Main progressive impacts

Deployed in underserved areas, sustainable mobility options not only decrease deprivation related to mobility poverty, especially for rural populations in low-income countries (del Rio at al. 2017; Stolper and Rankin 2016; Starkey and Hine 2014), but can also help reduce health and income inequalities.

The least well-off reap the greatest health benefits from emission-free mobility options (e.g., biking, electric and other clean vehicles), including reduced fatalities, respiratory diseases, cancers, and stress, since they are the most exposed to air pollution, noise, and the risk of transport accidents (Hajat et al. 2015; Pratt et al. 2015; World Bank 2018c; WHO 2019). Where public transport networks are well developed, transport-related injuries are more than 80 percent lower (Gouldson et al. 2018).

Low-income, suburban residents usually enjoy the greatest reduction in travel time enabled by the expansion of mass transit (Gouldson et al. 2018; Day et al. 2018), as

is the case in most of the 170 cities that introduced bus rapid transit (BRT) in 2019 (BRTdata 2019). For instance, in Bogotá, Colombia, poor residents save more travel time (18 minutes per trip) with the BRT than middle-income commuters (10 minutes) (Hidalgo and Yepes 2005). This freed-up time is associated with higher quality of life and greater productivity (King 2013). In some contexts, flat-fare pricing promotes BRT usage among the poor by reducing the cost of longer trips below those of traditional modes of transport (Scholl et al. 2016). The half of the world's urban residents (47 percent, including 82 percent in sub-Saharan Africa) who do not have convenient access to public transport enjoy these benefits the most (UNSD 2019).

In some contexts, electric buses are also associated with lower fares, full accessibility, modal integration, and/or free internet connectivity. Deployed in 2019, the electric buses in Santiago, Chile—the second-largest fleet in any city outside China—come with universal accessibility, low flooring, greater security and comfort, free onboard Wi-Fi, and USB charging units. All the bus stops include LED lighting, USB chargers, and bicycle parking—significant benefits for long commuters. Although these buses initially cost twice as much as former diesel buses—around $300,000 each—savings on fuel and maintenance make them 70 percent cheaper to run, which allowed the city to reduce passenger fares (Azzopardi 2020).

Shared mobility, including bike-sharing, car-sharing, and ride-sourcing programs, can particularly benefit people who do not own cars, lack access to public transport, or need complementarity options to address the first- or last-mile problem—the long distance that separates a transit station from a starting point or final destination (Kodransky and Lewenstein 2014; Litmann 2015; Shaheen et al. 2017). Informal car-sharing has been widespread in regions underserved by public transport, with low car ownership and sharing culture in Africa (Movmi 2019). Increasingly available motorcycle and three-wheel ride options are the most affordable for lower-income people in low- and middle-income countries (Movmi 2019). People under 30 seeking to avoid the costs of car ownership are frequent car-sharing users in many countries (Jakobsson Bergstad et al. 2017). Women use ride-hailing services more often than car-sharing, mainly for safety reasons and to access places not served by public transport. They account for more than 40 percent of riders in Egypt, Mexico, South Africa, and the United Kingdom, and for 57 percent in Indonesia (Uteng et al. 2019). Table 2.2 presents the pros and cons of shared mobility programs for low-income commuters.

Table 2.2 | **Advantages and Disadvantages of Shared Mobility Programs for Low-Income and Disadvantaged Groups**

BARRIER	ADVANTAGES	DISADVANTAGES
Lack of infrastructure	First- and last-mile partnerships between public transit operators and ride-sourcing Transit for lower-density areas	Problem of long walking distance unsolved Higher operating costs in lower-density areas
Long travel and wait time	Late-night ride and shuttle services Commuter carpooling services	Wait- and travel-time volatility on congested roadways Unpredictable wait times due to supply fluctuations
Cost	Possible subsidies for low-income users Multiple payment options	Direct and indirect costs—smartphone, internet Credit/debit card payment High cost for longer distance and peak-demand trips
Digital poverty	Possible permanent stations or multimodal hubs with Wi-Fi access	Need for internet access and a smartphone for most long-distance car-sharing systems
Accessibility and safety	Voice-activated mobility app features	Maintaining legacy technology access Safety risks for people with disability, elderly, women
Social and cultural	App interface minimizing profiling possible Targeted outreach possible App information in user's native language	Possible discrimination, prejudice, language barriers Limited security assistance

Source: Adapted from Shaheen et al. (2017).

Sustainable transport creates direct employment opportunities for workers. In Bogotá, Colombia, the BRT system created 1,900–2,900 net permanent jobs in operations, in addition to 1,400–1,800 temporary jobs in construction (Hidalgo and Gutiérrez 2013). In South Africa, the BRT system created 15,000 construction jobs and helped informal minibus drivers transition to formal employment (McCaul 2012).

Well-developed public transit systems and infrastructure for cycling and walking boost GDP and generate considerable savings that can be reinvested in public priorities (Mountford et al. 2018; Litman 2019). They could unlock an economic opportunity worth close to US$11 trillion by 2050, based on energy savings alone (Zhao et al. 2016). They can also avoid massive costs associated with congestion—with $100 billion projected for 2022 in the United States (Partnership for New York City 2018).

The uptake of EVs is expected to free up significant revenues for governments and consumers. They reduce reliance on foreign oil and cut the national energy bill, revenues that can be invested in supporting the purchase of EVs by public entities or private consumers (Todd 2013; Stenning 2018; ECF 2017). EVs can also reduce utilities' electricity prices through a system referred to as Vehicle to Grid (V2G). By charging at night when electricity is cheaper due to low demand, EVs can then feed the grid with electricity that is cheaper (and often cleaner) during late afternoon, when demand and electricity tariffs are high (MacDougall 2018; Nelder et al. 2016).

Main regressive impacts

Clean transport options can also maintain, and even exacerbate, inequality in access to mobility. Low-income households living in underserved areas, women, the elderly, people with disabilities, and minorities tend to use these options less than other social groups. Common barriers are related to geographical location, income, transport accessibility, gender inequality, cultural norms, and greater vulnerability to safety risks (Bhatt et al. 2015; Venter et al. 2017; Oviedo et al. 2019; Rizzo 2019).

The literature reports uneven spatial distribution of green mobility options between wealthy and underserved areas. BRT routes are usually built first near city centers to serve economically valuable districts (Delmelle and Casas 2012; Jaramillo et al. 2012; Venter et al. 2017; Maliwa 2019). Potential trade-offs between universal access and system efficiency partly explain this gap: deploying public transport or shared mobility schemes in low-density areas can lead to lower profitability.

Efficiency and cost savings associated with clean public transit do not often result in lower transport fares because governments, developers, and/or operators cover their capital and operational cost (Carrigan et al. 2016; Ayomiafuwape 2017; Rizzo 2019) and maximize the efficiency and/or profitability of the transport system (Jaffe 2015; Shaheen et al. 2017; Litman 2019). In Dar es Salaam, Tanzania, a two-way commute with mass transit costs the equivalent of 30 percent of average daily income (Rizzo 2019). In New York City, United States, more than 300,000 working poor spend over 10 percent of their family budget on transit (Stolper and Rankin 2016). In many low- and middle-income countries, average BRT fares are not lower than other bus fees and remain unaffordable for the poor (Venter et al. 2017; Oviedo et al. 2019). Although BRTs are presented as pro-poor mobility options, data on riders show that they benefit more middle- than lower-income users (Jaramillo et al. 2012; Delmelle and Casas 2012; Carrigan et al. 2016; Lynn et al. 2016; Venter et al. 2017; Maliwa 2019).

Many public transport systems also fail to ensure accessibility and safety for disadvantaged groups. People with disabilities suffer from lack of accessibility, assistance, enabling regulation, and modal integration (WHO 2018b). They also face higher safety risks due to discrimination (World Bank 2019b). Women, who often rely more on mass transit than men, are also more exposed to physical and verbal aggression (Thomson Reuters Foundation 2014; Deeb 2018; Orozco-Fontalvo et al. 2019). A failure to adequately consider the gendered experiences of transit users limits planners' ability to understand and meet women's needs in mass transit (Bhatt et al. 2015).

Low-income people, women, and minorities are underrepresented among users of shared mobility options, who are mostly wealthy white men with high levels of education (Kodransky and Lewenstein 2014; Shaheen et al. 2017). Access barriers reported include out-of-reach or expensive-to-reach geographical location, low income, digital poverty, physical limitations, lack of information, and cultural or social norms (see Table 2.2) (Kodransky and Lewenstein 2014; Shaheen et al. 2017). With a few exceptions in Northern Europe, men use green shared mobility and micromobility options and drive shared cars more than women, for cultural and safety reasons (Kawgan-Kagan 2015; Jakobsson Bergstad 2017; CoMoUK

2019; Gauquelin 2020). Studies analyzing the low usage rate of bike-sharing systems by people of color, including in cities that expand docking stations in their neighborhoods, highlight a wide range of barriers, including a lack of information on discount programs and concerns about liability and hidden fees, lack of protective gear, and higher perceived risk of being the victim of crime and harassment (Agyeman and Claudel 2017; McNeil et al. 2017).

EVs are still out of reach for most low-income households (ACEA 2019). Falling prices of batteries have not yet translated into lower prices as automakers opt for larger batteries and the secondhand market for EVs remains very limited. Globally, 45 percent of EV buyers who bought long-range EVs make more than $200,000 a year (Berman 2019). In France, the price of Renault's Zoe EV starts at €32,600, more than 25 times the net monthly minimum income (Auverlot et al. 2018). Home charging stations are also challenging for people who live in multiunit housing.

Given access barriers to sustainable mobility, fuel taxes, registration fees, zoning restrictions, and bans against ICE vehicles can create a double injustice for low-income, rural, and otherwise disadvantaged riders and drivers. There are growing protests against rising fuel taxes globally (Piketty 2018; Cigainero 2018). Low-emission zones could also exacerbate health inequalities by displacing traffic from city centers to suburban, lower-income areas that already suffer from higher air pollution (Just Transition Commission 2020).

Job losses among poor drivers are frequent regressive impacts observed. In the absence of careful planning in low- and middle-income countries, many drivers of informal buses lose their jobs when cleaner and more efficient alternatives such as BRT systems are introduced (Carrigan et al. 2016; IFT 2019). The mandatory replacement of taxi and bus fleets with cleaner but costlier vehicles can price out poor drivers and riders. For instance, in the Philippines, the replacement of old jeepneys with clean and efficient vehicles by July 2020 could endanger the livelihood of 600,000 jeepney drivers, who are some of the poorest people in the country, and come with a significant fare increase (Yen Yan n.d.). In high-income countries, the transition to autonomous vehicles could also lead to millions of lost jobs among delivery, heavy-truck, bus, and taxi drivers (Oxford Economics 2019).

Other harms experienced by underserved neighborhoods include increases in residential property prices and subsequent outmigration of lower-income residents (green gentrification) following the expansion or upgrade of mass transit (Venter et al. 2017). Such increases were observed in Seoul (Cervero and Kang 2011) and Quebec City, where residential property prices increased by 3–7 percent (Dubé et al. 2011).

Corrective and accompanying measures

With good practices, mass transit systems, shared mobility, and, in a few contexts, private EVs can be made available, affordable, accessible, and safer for lower-income and disadvantaged groups.

EXPANDING ACCESS TO PUBLIC TRANSPORT

The most affordable mass transit systems include reduced-fare programs targeting different vulnerable groups. These include dual pricing schemes with lower fares for low-income or long commuters; free access for children and sometimes students; and lower fares during off-peak hours, often for elderly and disabled commuters (Venter et al. 2017).

A growing number of cities and transport companies are committing to a target of 100 percent accessibility for people with disabilities. Successful practices of inclusive design, including those used for Delhi's BRT and for UK transport systems, show the importance of collaboration by public agencies for accessibility, transport companies (Frye 2013; Samarthyam 2019), and antidiscrimination campaigns (Government of the United Kingdom 2018).

Transport projects increasingly tailor safety strategies to the specific risks faced by women. As illustrated in Cairo (Box 2.5), these strategies typically plan for cameras, staff training on safety measures, service kiosks with a phone line, and prevention campaigns. They also aim to provide more efficient services to limit vehicle crowding and wait time. Women-only buses or metro cars have been introduced in countries as various as Mexico, India, and Japan (World Bank 2016b).

While concerns grow about the social impacts of car-sharing, innovative social impact business models stand out for their focus on the needs and constraints of low-income travelers. In different ways, they shift the focus of sharing options from profit-making based on upper- and middle-class demand to the provision of innovative public transport in underserved rural and suburban areas, as cheap, accessible, and easy-to-use as mass transit or bike-sharing systems (Box 2.6).

Box 2.5 | Evidence-Based, Gender-Sensitive Safety Strategy for Mass Transit: Lessons from Cairo

Cairo public authorities developed a strong evidence-based gender-sensitive strategy in partnership with UN organizations and the Institute for Transportation and Development Policy. A 2013 study conducted by UN Women found that most women felt unsafe in public transport and opted for more expensive and time-consuming options. Surveys and data collection helped mapped challenges, including overcrowding, harassment, multiple transfers, long waits and travel times, high fares, and unsafe driving practices. The design and operation of the bus rapid transit (BRT) system included a wide array of response measures. These include women-only areas in each bus and seating for pregnant women, security cameras on BRT buses, a complaint and redress system, a larger BRT fleet to meet passenger demand, an integrated electronic fare system to simplify transfers, safety training for drivers and staff, and more women staff members in mass transit to improve the sense of security for women passengers (Deeb 2018).

Box 2.6 | Car-Sharing as Public Transport Option: Experience from France and California

The French company Ecov offers local governments an innovative car-sharing system as a public transport solution for underserved suburban and rural areas. This service mixes the concepts of hitchhiking and car-sharing to transform the single-passenger car model into a cheap means of public transport on key corridors, including for daily short-distance rides. It does not require a smartphone or early planning. Consumers have only to walk to a permanent station equipped with a connecting terminal, on which they enter their destination and pay for the trip. They receive a printed ticket that their driver will use to receive half of the payment. Drivers are alerted of their prospective rider on Covoit bollards on the road and their phones (Ecov 2019).

BlueLA is an example of electric car–sharing program with self-service kiosks, similar to a bike-share system, financed by the state of California with carbon-pricing revenues (emissions trading system). Launched in 2017, the service charges qualified low-income households and those benefiting from public assistance $1 monthly and $9 per hour. It provides free fuel, parking, and insurance. As of spring 2019, BlueLA had expanded to 40 stations, 200 charging points, and 100 cars in Los Angeles (BlueLA 2019).

PRIVATE ELECTRIC VEHICLES AFFORDABLE FOR LOW-INCOME EARNERS

While many countries reasonably prioritize investments in electric public transit to make green mobility accessible to all (ITDP 2019), a few pioneer, higher-income governments, including those of China, Norway, and California, are showing how to make EVs more affordable for low-income earners. They deploy a range of incentive instruments from national and local funding sources, directed toward both manufacturers and consumers.

Studies highlight room to better tailor incentive schemes to the needs and constraints of low-income consumers. Vouchers and instant rebates are the most effective incentive for low-income drivers, as Table 2.3 indicates. Exclusive targeting at low-income consumers increases the equity and cost-effectiveness of vouchers. The most progressive incentive schemes for low-income households are funded by large polluters. For instance, California pays for its vouchers and rebates through cap-and-trade dollars collected from polluters and supports EV purchases by low-income consumers (Box 2.7).

Table 2.3 | Advantages and Disadvantages of Common Electric Vehicle Purchase Incentives for Low-Income Consumers

INCENTIVE	ADVANTAGES	DISADVANTAGES
Vouchers and "point of sale" rebates	Immediate reduction in upfront costs, interest rates, and monthly payments Targeting possible	Targeted information campaign still needed
After-purchase rebates	Effective discount Targeting possible	Paperwork Several-week delay to get benefit
Sales tax exemption	Immediate reduction	Limited discount Reduces revenues of local governments
Tax credit	Discount; rare targeting	Usually favors higher-income individuals with tax liability
Reduced registration fee	Discount	Targeting impossible Limited discount

Source: Author.

Box 2.7 | **Making Electric Vehicles Accessible to Low-Income Households: Lessons from California**

California accounted for nearly half of electric vehicles (EVs) sold in the United States in 2018, and purchasers included thousands of disadvantaged households. Long-time proactive support from the state and local electricity providers explains this success. California's Clean Vehicle Rebate Project provides households earning an income inferior or equal to 300 percent of the federal poverty level with higher rebate amounts, up to $7,000 for the purchase of EVs. In 2018, 30 percent of the 300,000 consumers who benefited from the state rebates were low-income households (20.5 percent) or otherwise disadvantaged (9 percent).

Local electricity providers propose financial assistance on top of federal and state tax incentives. For instance, Sonoma Clean Power partners with dealerships that provide income-eligible customers with a discount and 0 percent financing up to 72 months in exchange for active marketing of EVs. Customers save an average of $11,000, and some report paying as little as $90 per month. Sonoma Clean Power also promotes publicly available, faster chargers and provides incentives for residential chargers. Its *Electric Vehicle Buyer's Guide* provides guidance on how to apply for financial incentives and use charging options.

Sources: CARB (2019); Sonoma Clean Power (n.d.).

2.4. Sustainable Cities: Impacts on Sociospatial Inequalities and Social Inclusion

Cities are at the forefront of the fight against climate change and inequalities, and these threats are strongly related. Home to more than half of the world's population, and probably two-thirds by 2050, cities generate about 70 percent of greenhouse gas (GHG) emissions (McKinsey and C40 2017) and are increasingly vulnerable to climate change impacts. Most of the estimated 820 million people threatened by sea level rise live in cities (86 percent) (IPCC 2018), and 650 million people in 500 cities will be at risk of water shortages by 2050 (Rosenzweig et al. 2018). The urban poor will bear the brunt of climate impacts. By 2050 over 215 million of them will be exposed to extreme heat (Rosenzweig et al. 2018). Climate vulnerability increases with the rising poverty, unemployment, food insecurity, and ecosystem degradation that accompany rapid urbanization and urban sprawl in many middle- and low-income countries. Combined with historic injustice and exclusionary zoning practices, inadequate affordable housing provision forces low-income residents to live in underserved neighborhoods, with fewer services and greater exposure to crime and environmental risks (e.g., flood or landslides). They often rely on expensive private service provision or do without services at all (Mahendra and Seto 2019). Worldwide, an estimated 1 billion people, one in four urban dwellers, live in crowded slums without adequate access to clean water, sanitation, durable housing, and/or secure tenure. This number could double by 2050 because the growth of informal settlements outpaces urban growth by a wide margin (UNCT Toolkit 2019).

Urban climate priority measures could help tackle growing poverty and inequality in the access to affordable and decent housing, basic services, and opportunities. These include supporting energy building retrofits and residential renewable energy; investing in clean transport options while restricting use of ICE vehicles; adopting regulations to adapt and densify land use; promoting waste recycling; and expanding green infrastructure such as permeable pavements and green spaces to reduce climate risks (McKinsey and C40 2017; Global Covenant of Mayors for Climate and Energy 2019).

Since the other sectoral parts of this paper already address many of the progressive and regressive impacts that these actions can generate, this part focuses on their sociospatial distribution across wealthy and underserved neighborhoods. It highlights the prevalence of the profit-seeking strategies, power asymmetries, and poor consultations that often perpetuate inequality. Social goals need to be factored into cities' climate projects early on to prioritize underserved neighborhoods, ensure people-centered planning, and mobilize relevant financing.

Main progressive impacts

Sustainable cities concentrate many of the major social benefits mentioned in other sectoral parts of this paper. For example, urban low-carbon measures could support 87 million jobs annually by 2030 and create US$23.9 trillion in opportunities by 2050 (Coalition for Urban Transitions et al. 2019). Cities that prioritize low-income residents in deploying low-carbon and adaptive solutions leverage these opportunities to redress urban sociospatial inequalities.

Sustainable cities can offset gaps in services and reduce climate risks in more exposed neighborhoods. Many cities prioritize communities most exposed to climate risks, providing them with more resilient infrastructures and

protection against extreme weather (Chu et al. 2015). Adaptive solutions that extend a public piped network, improve water efficiency, and provide direct subsidies or allowances provide more reliable and affordable water for the urban poor, who are typically the most vulnerable to water stress given their location at cities' edges, poor connection to public water systems, and the price of private services (Mahendra and Seto 2019).

Residents suffering from energy poverty can also benefit most from energy building retrofits. For instance, enhanced energy-efficient retrofits for residential buildings in the European Union would create over 1 million jobs between 2015 and 2030 and increase the disposable income of households in the lowest income quintile by almost 5 percent (Day et al. 2018).

There are multiple examples of sustainable transport projects designed to better connect remote poor neighborhoods (including efforts in Chicago, Memphis, Bogotá, and Rio de Janeiro). Only half (53 percent) of urban dwellers have convenient access to transport, and residents at cities' edges spend twice as much money and three times as much time commuting as families in city centers (Mahendra and Seto 2019).

There is growing evidence that upward mobility is significantly greater in compact cities than in sprawling areas (Ewing et al. 2016). Compact cities tend to make public services and infrastructure cheaper and more efficient, improve access to jobs, services, and opportunities, and favor social mingling across class and cultural lines (Coalition for Urban Transitions et al. 2019). Realizing these benefits requires careful planning to avoid greater congestion, pollution, infectious disease transmission, and crime, and regulation of housing prices, whose increase is often associated with higher density (Coalition for Urban Transitions et al. 2019).

The urban poor living at cities' edges, who now face long commutes and high exposure to pollution, will enjoy disproportionate health gains as a result of climate action. Reduced air pollution and congestion, deployment of public transport, safer and energy-efficient housing, adaptive solutions, improved sanitation, and enhanced water security all result in lower health risks, longer life expectancy, and more disposable income, especially for the most vulnerable. Research shows that urban climate policies could prevent 1.3 million premature deaths annually by 2030 (Day et al. 2018).

Main regressive impacts

The literature highlights an uneven distribution of climate hazards, adaptive solutions, and sustainable infrastructure across neighborhoods, and low usage rates of this infrastructure by disadvantaged communities (Nesbitt et al. 2019). Three broad types of negative impacts explain these inequalities: (1) climate projects can neglect underserved neighborhoods; (2) projects to manage climate risks or locate sustainable infrastructure can displace poor residents disproportionately—a dynamic sometimes referred to as "green dispossession"; and (3) projects can lead to "green gentrification," characterized by the gradual replacement of low-income residents by wealthier residents after the introduction of sustainable and resilient infrastructure and amenities. These impacts are not exclusive to each other.

In the first case, affluent areas, sometimes described as "green enclaves," concentrate green amenities while poor and self-built settlements have large unmet needs (Shatkin 2004; Hodson and Marvin 2010; Letelier and Irazábal 2018). This follows a well-documented pattern of urban environmental injustice: the siting of polluting forms of land use, such as incinerators, hazardous waste sites, and power plants, in or near poor neighborhoods (Mohai et al. 2009), while green amenities typically benefit wealthier residents (Kabisch and Haase 2014; Anguelovski et al. 2016).

In the second case, urban climate interventions disproportionately displace poor residents without compensating them for their losses (Feldman and Geisler 2012; Ghertner 2015; Anguelovski et al. 2018; Doshi 2019). The projects in question involve housing destruction, relocation, or conversion. They are related to climate risk management, natural area protection, the construction of mass transit infrastructure (urban rail, metro, and BRT lines), green refurbishment projects, and building energy retrofits.

Displacements can involve economic, social, and cultural forms of dispossession and more pronounced marginalization. The urban poor tend to receive lower financial compensation, especially when they live in informal settlements without property rights and legal protection. Most resettlement sites are further away from jobs and lack adequate housing and services while being exposed to higher climate risks (Patel et al. 2015; Anguelovski et al. 2018; Keenan et al. 2018). Evictees

often experience loss of income and long commutes to original work locations. Women suffer the greatest loss of income and lack of security in new sites (Anguelovski et al. 2016; Doshi 2019). Displaced residents also lose their social networks and community assets, which can significantly impact their well-being and can reduce access to jobs and opportunities (Bouzarovski et al. 2018). "Double trauma" is also noted for rural-to-urban migrants who initially fled poverty, climate change impacts, or conflicts (Anguelovski et al. 2018).

The fact that poor people often reside in higher-risk areas only partly explains these disproportionate impacts. There is strong evidence of uneven enforcement of land use regulations and assessment of location opportunities for green infrastructure (Ghertner 2015; Anguelovski et al. 2018; Doshi 2019). High numbers of evictions occur in low-income, minority, and marginalized communities, while economically valuable and wealthy areas experience minimal disruption. Flood mitigation interventions have displaced millions worldwide (Feldman and Geisler 2012; Anguelovski et al. 2018), while private property development along vulnerable waterfronts, flood flow zones, and floodwater retention areas has surged. Multiple factors explain such biases in the application of regulations and use of eminent domain, including market-oriented development, slum-clearance, land-grabbing strategies (including after climate disasters), and procedural injustice.

In the third case, low-income residents are priced out of historically underserved neighborhoods because resilience-oriented and/or sustainable infrastructure projects (building retrofits, mass transit, parks) increase property values and the cost of living. While "voluntary," these moves can involve negative impacts similar to those associated with forced displacements. The growing literature on "green gentrification" shows that climate projects that do not consider the needs of current residents can create socioeconomic exclusion and cultural alienation (Anguelovski 2015; Sze and Yeampierre 2018; Hamilton and Curran 2018; Bouzarovski et al. 2018). Some scholars argue that there has been a shift in ecological urban planning from the community-led green projects of the 1970s and 1980s, which aimed at reclaiming neighborhoods, toward a development-oriented greening, which seeks to attract high-end amenities for the benefit of wealthy residents, business districts, and tourists (Irazábal 2009; Leichenko 2011; Macdonald and Keil 2012; Agyeman 2013; Anguelovski et al. 2016). For instance, owners and investors can consider energy retrofits as opportunities to extract greater value out of the housing stock and thereby change the social profile of tenants (Bouzarovski et al. 2018).

Climate interventions are more likely to affect poor residents when public goals take a back seat to economic interests, including real estate development, economic competitiveness, rent-seeking strategies, prioritization of tourism growth, and replacement of informal settlements. This prevalence can be partly explained by cities' limited revenues, constraining their investment choices, and increasing reliance on private investors, who usually prioritize economically valuable districts for high return on investments. Most cities in low- and middle-income countries struggle to provide adequate compensation to displacements and preserve affordable housing while ensuring that land prices are competitive for investors (Coalition for Urban Transitions et al. 2019). Given the importance of property taxes and land sales in local revenues, cities can also be inclined to support luxury developments and upgrades of neighborhoods (Coalition for Urban Transitions et al. 2019).

Most regressive urban climate projects neglect low-income and disadvantaged residents in decision-making. Business-as-usual forms of consultations, through questionnaires (Kabisch and Haase 2014) and meetings facilitated by elite groups or project engineers, often fail to engage the poor and exacerbate power asymmetries among stakeholders (Yiftachel 2000; Anguelovski et al. 2016; Sze and Yeampierre 2018). Local evaluations, including survey-based studies, also report ignorance of alternatives proposed by local residents for sustainable infrastructure design (Anguelovski et al. 2016).

The specific access barriers that prevent or discourage disadvantaged residents from using green amenities are also often overlooked. These barriers include social norms and discrimination impacting the mobility and safety of women, racial minorities, people with disabilities, and marginalized groups in urban areas; financial constraints putting green amenities out of reach; insufficient information about new services; and lack of knowledge, for instance about how to assess climate risks.

Climate projects may not cater to the needs and preferences of low-income and disadvantaged communities because the pursuit of private profit tends

to focus developers on demands from wealthier groups. Limited analyses of the social structure of neighborhoods and inadequate consultations result in the preferences of poor residents being overlooked. For instance, in a study of the Templehof park in Berlin, immigrant communities were found to use parks less when amenities are tailored to the preferences of native and wealthier residents for sports activities, at the expense of seating, shaded areas, and semistructured spaces reserved for relaxation and socializing (Kabisch and Haase 2014).

Corrective and accompanying measures

Proactive measures to tailor climate interventions to the specific needs, financial resources, and preferences of underserved residents usually result in greater social inclusion. Taking such measures requires strong political leadership protecting interests of the least well-off, people-powered planning, and innovative funding models.

PRIORITIZING UNDERSERVED NEIGHBORHOODS AND URBAN POOR

Efforts to make cities more sustainable need to prioritize the concerns of disadvantaged residents, as highlighted in the New Urban Agenda (UNGA 2016). Many cities, including the signatories of the Climate Equity pledge for inclusive green cities, integrate climate action and social inclusion in their policy agendas (C40 2018). Municipal governments need to display bold political leadership to protect the long-term public good over short-term economic interest.

City governments can play an important role in enhancing equity in the distribution of climate projects: commissioning independent studies to identify the needs, preferences, and constraints of disadvantaged residents; prioritizing districts that are most exposed to climate risks for resilience-oriented interventions; locating sustainable infrastructure and services in underserved neighborhoods that need them most while planning to prevent green gentrification; and upgrading informal settlements with climate-smart water, sanitation, and infrastructure projects, rather than relocating them. Distributional impact analyses factoring in the costs of existing inequality can help address apparent trade-offs between efficient use of public funding and prioritization of remote and other low-income communities.

Cities can address many obstacles faced by disadvantaged groups through a combination of policy, regulatory, financial, and information instruments. For instance, to increase the use of sustainable transport by low-income residents, local governments can provide subsidized fares for BRT and other mass transit, improve street lighting (including on bike paths), and develop outreach campaigns. In projects involving displacement, local governments can guarantee fair enforcement of adaptive land use regulations and commission independent assessments of climate risk mitigation, nonrecoverable risk areas, and property values. Cities that fairly indemnify evictees ensure legal protections (Doshi 2019).

Many regulations, safeguards, and instruments needed to ensure social equity and inclusion in climate projects require strong collaboration with national governments. For instance, while local governments can set land use regulations and building codes, improve the land cadaster, recognize tenure rights, and include social housing projects in refurbishment plans, national land reform, housing programs, and incentives for social housing also play a major role in shaping housing markets (Coalition for Urban Transitions et al. 2019).

PEOPLE-POWERED PLANNING

The engagement of low-income residents and marginalized communities in project planning is essential to develop relevant solutions for underserved neighborhoods. Innovative participatory approaches and community-led and people-owned planning can increase the public acceptance, social benefits, and effectiveness of climate projects.

Successful public participation often relies on trusted messengers, knowledge of local organizations, and involvement by social scientists. The engagement of community leaders and neighborhood groups, including faith-based organizations, is essential to successful outreach toward disadvantaged people and their inclusion in decision-making (C40 2016; Ecotrust and PolicyLink 2017). The experience of Quito (Box 2.8) shows that partnerships with local NGOs and universities can inform technical studies with traditional and indigenous knowledge. Local NGOs can tailor projects to the specific needs and constraints of disadvantaged communities. In New York City, for example, UPROSE, a Latino community-based organization, has brought a racial justice lens to climate resilience planning in a Brooklyn neighborhood, resulting in expansions of public parks and bus lines for the benefit of all residents (Hamilton and Curran 2018).

Box 2.8 | **An Inclusive Approach to Climate Change: Vulnerability Planning in Quito**

The city of Quito, Ecuador, has been a pioneer in combining "street" knowledge, technical expertise, and political leadership. To inform the first Climate Change Strategy in 2008 and the Climate Change Action Plan 2012–2016, the municipality organized workshops in underserved neighborhoods to collect information about perceived climate impacts and local debates on needed climate policies with a local nongovernmental organization and youth climate champions. In 2010, a Climate Change Panel was created to build knowledge alliances among municipal officials, academic institutions, and citizens. Local universities worked with indigenous groups and landslide-prone communities to inform vulnerability studies. A citizens' committee discussed climate projects to enhance benefits for these populations. Recommendations were also considered from the Youth National Convention on Climate Change on the implementation of climate projects.

As a result, the Climate Change Action Plan and its implementation prioritized adaptation projects that have improved infrastructure and service delivery in the poorest neighborhoods and informal settlements, building upon indigenous and traditional practices of urban agriculture, ecosystem protection, water harvesting, and land management.

Sources: ELLA (2013); Chu et al. (2015).

When designed to ensure equal participation, with targeted communication, support measures, and inclusive processes, new modes of citizen participation help empower hard-to-reach low-income communities in decision-making on local climate projects (Agyeman and Claudel 2017; Su and Mercedes 2017; Citizenlab 2018). These practices include citizen-deliberation processes such as assemblies and juries that bring together a representative sample of the urban population in a growing number of cities (across Europe, Australia, Canada, the United States, and Argentina) to design climate measures and/or projects (Center for Climate Assemblies n.d.; Jefferson Center n.d.; Smith 2019; Involve 2020). Participatory budgeting in which citizens have a say on a portion of the municipal budget to select and finance climate projects have also helped integrate adaptation and mitigation in local projects that meet citizens' needs and mobilize financial resources for climate projects, when they explain the potential of the projects and trade-offs (City Finance Lab 2019).

Initiatives like Slum/Shack Dwellers International's "Know Your City" program (Byrne et al. 2018), the Urban Community Resilience Assessment (Rangwala et al. 2019), and the Eco-citizen World Map project in Peru, Morocco, Nepal, and Colombia (Ecocity Builders n.d.) also empower residents to collect crowdsourced community data, identify vulnerability and at-risk neighborhoods, and prioritize investments to improve access to basic services, especially water, energy, food, and waste, as well as community resilience.

The growth of community-led projects around the world also harnesses the potential of climate transitions to build more inclusive cities. A growing literature on the "urban commons"[6] shows that innovative forms of collective ownership can sustainably manage urban places, assets, and resources while expanding access to them by disadvantaged residents and enhancing economic and social inclusion (Borch and Kornberger 2015; Agyeman and Claudel 2017; Shareable 2018). The great sectoral variety of these projects addresses all aspects of cities' transition, including renewable energy and efficient housing cooperatives, recycling hubs and repair cafés, projects redistributing surplus food to people in need, public platforms for citizen-led water management, and community land trusts (Shareable 2018). These community projects have various forms of governance and resource pooling but rely on similar principles: sharing, distributive justice, participatory decision-making, and partnerships with local authorities and numerous local actors.

EQUITY GOALS IN GREEN FINANCE

Many urban improvements, such as improved freight logistics and solid waste management, are sound investments and would pay for themselves in less than five years. The return on the US$1.8 trillion investment needed per year will be worth $2.8 trillion in 2030 and $7.0 trillion in 2050 based on cost savings alone (Coalition for Urban Transitions et al. 2019). Nonetheless, urban green projects face funding shortages, especially when they target underserved neighborhoods. City experience shows new opportunities to enhance the equity of traditional revenue streams and to use innovative instruments to fund inclusive climate projects. These investment models are very project-specific and vary greatly according to local government financial performance and capacities. The most innovative models

to share risks and benefits are still scarce in low- and middle-income countries. Table 2.4 presents the most frequent and promising financial instruments.

Cities need to ensure that national incentives do not become subsidies for gentrification. For instance, the U.S. New Markets Tax Credit for businesses investing in underserved areas has been used for climate projects with widely different impacts for poor residents depending on engagement by cities and local communities (Freedman 2015). Good coordination with national governments and scrutiny by local actors are needed to direct national resources (e.g., thematic programs, funds, incentives) toward inclusive climate projects (C40 2016).

Other instruments can be designed to steer investment toward green projects in low-income neighborhoods. Property taxes and various types of user fees for public services can be earmarked for such purposes. Green bonds can be introduced with explicit equity criteria. In the case of the state of California's general obligation bonds used to fund parks in underserved neighborhoods, these criteria included standards for outreach to minority, low-income, disabled, and tribal communities; provision of training and job opportunities for disadvantaged communities; a partnership with local, tribal, and nonprofit organizations to expand park usage; and measures to prevent green displacement and counteract its effect (Eldridge et al. 2019).

Environmental, social, and other sustainability impact bonds are increasingly used to fund projects that are difficult to finance, as in the U.S. city of Atlanta (Box 2.9). This innovative form of pay-for-success debt financing shares risks among municipalities and investors: investors receive a return based on the performance of the project tracked by an independent party. If the project falls short, the city saves money in its budget. If the project overperforms, investors get a higher return and the city is likely to have lower financing costs for similar projects going forward. In Washington, DC, impact bonds have funded green infrastructure projects, including a green jobs initiative that has trained local workers in green infrastructure construction, inspection, and maintenance.

Box 2.9 | Investing in Social Equity and Inclusion: The Atlanta BeltLine

Initially promoted by a local citizens campaign, the Atlanta BeltLine is a $2.8 billion project to turn 22 miles of rusting freight rails into a ribbon of trails and parks connecting 45 neighborhoods and thereby promote economic and social development.

The city is on track to achieve its 2030 targets set in 2005 for job creation (30,000 permanent jobs and 48,000 one-year construction jobs) and social housing (5,600 affordable units). Job creation efforts focus on economically distressed commercial corridors, with targeted information for residents about job opportunities. As of 2018, about 15,000 full-time jobs and 33,450 construction jobs had been created. Mobilization of various state and local financial sources, including $12.5 million in special bonds issued by a local affordable housing trust fund, secured 2,642 affordable units by 2019.

The greenbelt projects are also tailored to the specific needs of the residents affected. In 2015, a study was performed to capture disparities in the neighborhoods' demographics, education, health status, and community assets. The study paid specific attention to the Westside neighborhoods, which are predominantly African American and struggle with high rates of poverty (37 percent) and crime, as well as poor access to food, goods, and public services. The study recommended focusing the greenbelt projects on safety, health, nutrition, and education, in partnership with local health centers, faith-based institutions, and organizations with outreach programs. The need to address fears of a rising cost of living and future displacement was also considered (Mosaic Group 2015). While affordability remains under scrutiny, this initiative has mitigated risks of gentrification and improved livelihoods for low-income neighborhoods.

As part of the investment in Westside neighborhoods, in 2019 the city began funding green infrastructure to reduce the risk of flooding, improve water quality, and enhance the quality of life. The projects are financed by $14 million in environmental impact bonds, the first of their kind to use a public offering allowing residents to invest in improving their city.

Sources: Atlanta BeltLine (2018a, 2018b); Mosaic Group (2015).

Land-based financing is another innovative model that can be used to mitigate risks of gentrification. With this instrument, local governments can secure a share of higher property values associated with investments in sustainable infrastructure, and use this revenue to compensate local residents and avoid displacements (Coalition for Urban Transitions et al. 2019; Colenbrander et al. 2018).

Public engagement in financial decisions has succeeded in embedding social goals in climate projects. In the United States, community-benefit agreements commit developers to provide affordable housing, green space, or other amenities. Some cities, like Detroit, require the establishment of community-benefit agreements for projects seeking public support above a certain threshold (Eldridge et al. 2019). In California, community engagement in the design of the Greenhouse Gas Reduction Fund resulted in clear policy language to ensure that a portion of the revenues of cap-and-trade would be dedicated to disadvantaged communities. Some of the revenues have been used to fund urban forestry projects in low-income communities, with the explicit goal of hiring local residents (Ecotrust and PolicyLink 2017).

The challenge of financing is acute in low- and middle-income countries, where there is a lack of fiscal decentralization, institutional capacity,[7] and enabling regulations and investment environment. Only one in five C40 cities is able to borrow from the national government, and only one in four is able to issue municipal bonds (C40 2016). These cities are more reliant on international development to supplement local revenues. While a very small share of multilateral climate finance[8] is channeled to the local level, reforms in the Green Climate Fund and the Adaptation Fund can facilitate cities' access (Causevic and Selvakkumaran 2018; Colenbrander et al. 2018). Development banks increasingly use risk mitigation instruments and grants to leverage private investments for low-carbon infrastructure projects and can propose grant components to finance socially oriented interventions in climate projects (AFD 2019).

Table 2.4 | **Social Equity Aspects of Some Common Funding Models for Inclusive Climate Projects**

FUNDING MODEL	ADVANTAGES	DISADVANTAGES
Fees, charges	Control access to scarce assets Progressivity—greater contribution from users with higher ability to pay	Potential barrier to lower-income residents that worsens inequities
Developer fees, incentives	Increased guarantees of public benefit from private development	Strong design and enforcement needed
Earmarked property taxes	Reliable revenue, wealth redistribution No competition between climate projects and other public services	Potential burden on lower-income property owners
Standard green bonds	Possibility of adopting equity criteria that help redistribute resources to areas in greatest need	Lack of standard certification Require capacity to design bankable projects with good credit ratings
Impact bonds	Attractive for impact investors Incentives for strategic planning and high-performance delivery	Limited market in low-income countries
Community ownership	Engagement of local community in the management of local places and resources	Likely limited investment capacity
Community land trusts	Protection of shared community goals—affordable housing, open green space	Capacity needed in local communities, including to finance acquisition of land
Agreement with communities	Commitment from government and/or developer to deliver on social goals	Efforts to ensure transparency and equal participation needed

Source: Authors, using and completing data from Eldridge et al. (2019).

2.5. Climate-Smart Agriculture: Impacts on Poor Farmers

Low-carbon and adaptive solutions in agriculture will have major implications for the world's ability to end extreme poverty and curb inequality by 2030. About 85 percent of multidimensionally poor people live in rural areas and nearly two-thirds of the world's extreme poor earn a living from agriculture and livestock herding (Alkire et al. 2014). The agriculture sector already absorbs 84 percent of damage and losses caused by drought (FAO 2019a), and climate change impacts on the productivity of crops, livestock, and fisheries are becoming increasingly severe around the world (FAO et al. 2017).

While climate measures in agriculture vary greatly by socioeconomic, agroecological, and climatic contexts, the umbrella term of *climate-smart agriculture* (CSA) has emerged to encompass all mitigation and adaptation actions that increase productivity and climate resilience, reduce GHG emissions, and enhance food security and human development (World Agroforestry Center 2011). The concept of CSA does not prescribe any specific package of actions, which range from adjustment in crop-management practices (e.g., improved water management, soil carbon and nutrient management, dietary changes for livestock) to the transformation of agricultural production systems (e.g., shifts in cultivar varieties, agroforestry) (Deressa et al. 2009). CSA practices differ widely depending on climatic conditions. For instance, crop rotations may produce lower yields under average climatic conditions but higher yields under conditions of high rainfall variability (FAO 2016).

While "equity" is recognized as an important CSA component, empirical studies of CSA's distributional effects and ex-post assessments of benefits are lacking (Karlsson et al. 2018; Westermann et al. 2018). Several studies note that CSA practices tend to be promoted as technical fixes, with a strong emphasis on "win-win" solutions and without a full assessment of potential trade-offs and recognition of the heterogeneity among farmers (Beuchelt and Badstue 2013; Karlsson et al. 2018; Chandra et al. 2018; Taylor 2018; Hellin and Fisher 2019). Studies show, however, that farmers' ability to benefit from CSA solutions depends to a large extent on their access to necessary knowledge and resources. Disadvantaged groups, including the poorest farmers and women, face the greatest access barriers. While the best way to address these barriers is context-specific, international experience reveals building blocks that increase the likelihood that the least well-off will benefit from CSA interventions.

Main progressive impacts

To the extent that small-scale farmers are able to adopt mitigation and adaptation measures, they can benefit from enhanced productivity and/or reduced variability of yields, helping to raise and/or smooth out their incomes, improve food security, and create jobs (Sperk et al. 2017; ILO 2018; Hansen et al. 2019). These benefits are crucial since growth in the agriculture sector is two to four times more effective than other sectors in raising incomes among the poorest (World Bank 2018c).

Agricultural adaptation and mitigation practices based on agroecology, which aims to replace chemicals with biology—natural interactions between plants, soils, animals, and the environment within agricultural systems—can be particularly accessible to lower-income farmers and reduce the need to purchase fertilizers and pesticides (FAO 2019b). Used globally on over 370 million acres, conservation agriculture involving reduced tillage often improves biodiversity, water retention, soil health, and protection against erosion while lowering the need for water use and fertilizers (FAO 2016; Lal 2019; Deines et al. 2019). Similarly, disease and insect or pest control through agroecology, relying on predatory insect-feeding animals (e.g., spiders, birds, and frogs), tend to provide benefits for human health by reducing the spread of diseases and the emission of hazardous chemicals (Patz and Hahn 2013; Black and Butler 2014; FAO 2019a). The use of anaerobic digesters—which break down organic matter such as animal or food waste to produce biogas and biofertilizer—can enable savings through lower input use and higher resource use efficiency while creating new income opportunities (Laramee and Davis 2013; Garfí et al. 2019; FAO 2019a).

Gains in efficiency in the use of agricultural inputs and natural resources also benefit poorer farmers. Integrated water management can positively impact the livelihood and well-being of the close to 1 billion people affected by hunger (IPCC 2019). Some studies estimate that widespread adoption of nitrogen-efficient practices alone could reduce the number of people at risk of undernourishment by more than 100 million by 2050 (Rosegrant et al. 2014). For example, in Bangladesh,

fertilizer deep placement with "briquettes" placed in the soil after the paddy is transplanted, instead of broadcast application, has been shown to decrease nitrogen losses by 40 percent while increasing yields by 25 percent, which also improves farmers' income and reduces GHG emissions and water pollution (Gaihre et al. 2015; Miah et al. 2016). Reducing postharvest losses has also proved to be an essential way to improve incomes and food security (Searchinger et al. 2018; FAO 2019a).

Adaptation through changes in cropland management—especially planting dates, cultivar choice, and irrigation—have the potential to increase yields by an estimated 7–15 percent (FAO 2019a). The adoption of heat-tolerant varieties, principally in maize, and the diversification of production systems usually increase farming households' income and contribute to more nutritious diets (Romeo et al. 2016; Islam et al. 2018; Jones 2017; FAO 2016; FAO 2019b). Diversification through decentralized aggregation, processing, and distribution, which increases the resilience of regional food systems, can create jobs and new income sources (Lamine et al. 2012; FAO 2019b).

Climate information systems (crop calendars, seasonal forecasts, and early warning systems) contribute to efficient use of agricultural inputs, reduce crop losses, increase productivity, and improve farmers' preparedness and responsiveness to climate risks (Dobardzic et al. 2019). Early warning systems also enhance the timeliness, predictability, and adequacy of social protection benefits and, by enabling timely adaptation, reduce insurance premiums (IPCC 2019).

Agricultural mitigation and adaptation actions can offer an opportunity to redress gender-differentiated vulnerability. Women constitute up to 43 percent of the agricultural labor force (FAO 2016) but tend to have lower access to and control over land, resources, credit, extension services, and decision-making power within farming households (Mersha and van Laerhoven 2016; Beuchelt and Badstue 2013). When deployed in gender-sensitive ways, many of these practices can improve women's welfare and reduce gender inequality by reducing women's workloads, enhancing their participation in decision-making, or introducing new economic opportunities (Eichermüller et al. 2018; Khatri-Chhetri et al. 2019; IPCC 2019).

Main regressive impacts

When farmers' differing capacities to adapt to climate change and adopt new practices, technologies, or crops are overlooked, the introduction of CSA measures can disadvantage poor farmers and herders and increase poverty, inequality, and vulnerability to climate impacts (Lovo et al. 2015; Emerick et al. 2016; Hellin and Fisher 2019; IPCC 2019). A wide range of access barriers can affect the ability of poor farmers to adopt and benefit from climate-smart agriculture practices, as Box 2.10 illustrates.

Low-income farmers are often asset-poor, with limited access to land and other productive resources. Climate interventions that neglect these implications of poverty reproduce and even exacerbate inequality. For instance, using arable land to grow crops for bioenergy can compromise poor farmers' access to arable land and their food security (Hunsberger et al. 2014; Roy et al. 2018; FAO 2019a). Cross-slope soil conservation practices such as live-vegetation barriers and stone walls take land out of production, which is challenging for poor smallholders, especially if productivity improvements on remaining land are insufficient to raise incomes (Hellin and Fisher 2019). Similarly, irrigation schemes may create new inequalities based on water availability and disruption of grazing patterns (IPCC 2019).

Insecure land tenure can weaken farmers' incentives and capacities to adopt new methods because of the long-term investments associated with land and soil improvement and management (Beuchelt and Badstue 2013) and the difficulty of accessing credit without land as collateral. Land ownership is a major barrier for women, who account for only 15 percent of landowners around the world (FAO 2017).

Many climate-smart and conservation agricultural practices incur significant setup and maintenance costs and can take considerable time before delivering benefits (World Agroforestry Center 2011). For instance, reduced tillage provides corn farmers with full benefits after 11 years (Deines et al. 2019). Poor small-scale farmers are not well-placed to wait for those benefits, unless they are able to find an income stream to sustain their food and other consumption needs in the interim.

CSA practices can also be knowledge-intensive, presenting barriers to farmers who are disadvantaged in education or where extension services are not available or suitable. Technology choices are subject to credit, labor, and land constraints, which may put adaptation and/or mitigation options out of reach.

Differences in men's and women's responsibilities, rights, and access to productive resources partly explain why, in general, women in rural areas are more vulnerable to the impacts of climate change and climate actions than men (Quisumbing et al. 2014; Peterman et al. 2014; IPCC 2019). Patriarchal structures and gender norms that produce inequalities in land rights, security of tenure, and decision-making can pose multiple barriers to women's participation in agricultural mitigation and adaptation actions (Mersha and van Laerhoven 2016; IPCC 2019). Some interventions can therefore cause women farmers to lose control over the market niches, resources, and products they manage once these become more lucrative (Beuchelt and Badstue 2013). These barriers also explain why adaptation measures that provide an opportunity to address gender-differentiated vulnerability in agriculture may perpetuate and even exacerbate gender inequalities (Nelson and Huyer 2016).

In addition, mechanization may, in some cases, free up time for additional economic or social activities, but in others it may reduce work opportunities, especially for poor or vulnerable rural workers (Beuchelt and Badstue 2013; FAO 2019b). In some cases, meanwhile, labor-intensive agroecological practices run the risk of increasing women's labor burden or the use of child labor (Beuchelt and Badstue 2013; FAO 2019b).

Pursuing incremental measures to "climate-proof" agricultural systems may pose a long-term risk to farmers' food security and livelihoods (Carter et al. 2018). Evidence from Vietnam shows that flood-protection infrastructure may benefit some farmers by allowing them to intensify production but disadvantage poorer farmers who rely on flooding for fertilization (Chapman and Darby 2016; Chapman et al. 2016; FAO 2019b).

Corrective and accompanying measures

Country experience shows that many access barriers can be overcome with targeted support, capacity building, improved information, enhanced access to affordable credit, and improved land access and tenure security. CSA approaches need to move beyond a focus on the resilience of production systems to greater emphasis on the resilience of farm households, considering also opportunities for off-farm employment and livelihoods (Hellin and Fisher 2019).

Box 2.10 | **Ethiopian Farmers Face Barriers to Adaptation**

Research on adaptation by farmers in Ethiopia's Nile basin points to several factors that inhibit adaptation, including lack of information, lack of access to credit, shortage of labor, shortage of land, and poor potential for irrigation. The findings also highlight strong differentiation by gender, income, and age, with the poorest, women, and young farmers being the most disadvantaged.

EDUCATION. Heads of household with higher levels of educational attainment are more likely to implement adaptation measures.

GENDER. Male-headed households have a wider range of adaptation options available as a result of gender norms, rules, and practices (Mersha and van Laerhoven 2016).

AGE OF THE HEAD OF HOUSEHOLD. Older heads of household are more likely to implement adaptation measures (due to accumulated knowledge and experience).

ACCESS TO EXTENSION AND CREDIT. Access to credit and extension services increases the capacity to adopt adaptation measures (e.g., soil conservation, using different crop varieties, planting trees).

ACCESS TO INFORMATION. When informed about the weather and climate (temperature, rainfall), households are more likely to adapt by using different crop varieties.

FARMER INCOME. Income significantly and positively impacts farmers' decisions to engage in adaptation measures.

Source: Deressa et al. (2009).

INCLUSIVE DECISION-MAKING AND IMPLEMENTATION

Inclusive decision-making plays a crucial role in highlighting and addressing farmers' needs and vulnerabilities and identifying the best options and solutions adapted to local circumstances, resources, and production systems, as well as in building buy-in (Luo et al. 2017; Carter et al. 2018; IPCC 2019). Engagement and capacity building that target disadvantaged groups, including women, youth, and poor farmers are key to improving economic and social inclusion (Stiem-Bhatia 2019; FAO 2019a).

Long-term adaptation needs and the most appropriate low-carbon options in the agriculture sector usually do not have a single solution that works in all contexts. Adaptation or mitigation practices that take advantage of local or traditional knowledge can also be more readily used by smallholder farmers (Harvey et al. 2014; Vignola

et al. 2015). For instance, a major proportion of the current knowledge regarding water management for good rice growth and high yield was already recognized by farmers in ancient China and Japan (Shirato and Hasebe 2019). Participatory training programs can draw from local knowledge and more easily identify new capacity-building opportunities (Munang et al. 2014).

CSA projects that let poor farmers choose technological innovations and agroecological approaches from a "menu" of options, making use of their knowledge, have higher participation rates and are more likely to change practices in ways that improve the welfare and inclusion of poor and marginalized farmers (Lovo et al. 2015). These menus can propose agricultural options, for instance, for agroforestry, tree planting, orchards, or intercropping, or several schemes of varying cost (Lovo et al. 2015).

A participatory approach is also important when selecting metrics and indicators to track implementation and performance of agricultural mitigation and adaptation options, especially considering the complex and highly contextual nature of their outcomes (IPCC 2019).

Many resources are available to help stakeholders develop gender-sensitive approaches to agriculture (Nelson and Huyer 2016; FAO 2017; FAO and UNDP 2018; FAO and CARE 2019). Such approaches typically start with an understanding of the gender gap in agriculture and gender-differentiated vulnerabilities, needs, barriers, and priorities (Huyer et al. 2015; Mersha and van Laerhoven 2016; IPCC 2019). Gender-sensitive policies include making gender-inclusiveness a criterion for agriculture funding programs; providing government transfers to women; subsidizing credit for women; engaging in gender-responsive communication; and providing training and extension services for women, as well as gender-equality training for women and men (IPCC 2019; Stiem-Bhatia 2019). The use of gender indicators (e.g., related to control of productive assets, access to information, empowerment) and gender-disaggregated data is essential to monitor the implementation of these practices and associated policies and programs (Huyer et al. 2015; IPCC 2019).

REMOVING THE BARRIERS TO CLIMATE-SMART AGRICULTURE: EXAMPLE FOR LAND TENURE AND FINANCE

An important prerequisite for successful CSA projects is securing land tenure and access to productive resources for poor farmers and specific vulnerable groups. Securing women's access to and control over land increases women's agricultural investments and improves their cash income (IPCC 2019; Stiem-Bhatia 2019). Land title security can be achieved through legal reforms and strengthening of land governance processes at both the national and local levels (IPCC 2019; Schwartz et al. 2019). Legal education and capacity building regarding land ownership are equally important (IPCC 2019; Schwartz et al. 2019). Recognizing and enforcing customary and communal tenure systems can also provide the necessary tenure security to make long-term investments in sustainable practices (IPCC 2019; Mowat and Veit 2019).

Social protection mechanisms like cash transfers can help farmers adopt practices that may entail yield and income losses in the short term (FAO 2019b). Community rotating savings and credit associations have long been used for general risk-pooling and can be a source of financing to cope with climate variability (Biggart 2001; IPCC 2019). They can also create local funds that farmers and rural communities can use for other development activities (Harvey et al. 2014). Microfinance institutions follow similar principles. Crop insurance can also increase poor households' willingness to adopt new climate-smart production methods by increasing their risk tolerance. Access to insurance depends on premiums, and the poor may need subsidies to be able to afford commercial crop insurance. Also, as with any insurance, moral hazards may arise if farmers take on excessive risk (IPCC 2019).

LONG-TERM PLANNING OF AGRICULTURAL ADAPTATION OPTIONS

In cases where fundamental changes to agricultural systems are inevitable—for instance, for the vast majority of the planet's 25 million coffee growers—a focus on long-term planning is needed to ensure that short-term actions do not lock farmers into vulnerable farming methods and prevent future adaptation (Bryan et al. 2013; Ovalle-Rivera et al. 2015; Carter et al. 2018). Governments, NGOs, and the private sector need to provide the rural poor with greater support so that they can move beyond short-term coping measures and invest in anticipatory strategies, including livelihood diversification, new crops and animals, and new agricultural technologies (Bryan et al. 2013).

2.6. Forestry Conservation and Agroforestry: Impacts on Rural and Indigenous Communities

The global deforestation rate increased by 43 percent between 2014 and 2018, with an area of tree cover the size of the United Kingdom lost every year (NYDF Assessment Partners 2019). The world has missed the 2020 SDG Target 15.2, which aimed at halting deforestation and its

profound harms for poor populations around the world. The fights against deforestation, climate change, and poverty are deeply intertwined. Forests are the largest terrestrial storers of carbon and provide livelihood and safety nets for one in five people (1.6 billion), including 70 million indigenous people (Newton et al. 2016). Of the world's rural extreme poor, over 90 percent are dependent on forests for at least part of their livelihoods (FAO and UNEP 2020). Poverty has a heavy impact on forest area change. Poorly managed shifting agriculture was responsible for 24 percent of the world's tree cover loss between 2001 and 2015, including 93 percent in Africa (Curtis et al. 2018). Around one-third of the world's population (about 2.4 billion people) uses wood for basic energy needs (FAO 2017). Indigenous and forest-dwelling communities are also deeply affected by deforestation caused by expanding commodity production (rubber, palm oil, soybean, cattle, coffee, cocoa, mining, oil, and gas), especially in Latin America and Asia (Curtis et al. 2018). These communities have legally recognized tenure rights to only about 15–16 percent of forest areas, while they hold and manage a much larger portion (FAO 2018). Those seeking to protect their forests have come under increasing attack (Global Witness 2017).

Forest-related climate actions range from forest conservation with land use zoning and protected areas, to sustainable management, restoration, afforestation, and agroforestry, which consists of planting trees in croplands (IPCC 2019). They are promoted by the Reducing Emissions from Deforestation and Forest Degradation (REDD+) mechanism, which gives carbon a market value, and the Bonn Challenge, which seeks to restore 350 million hectares of deforested land by 2030 (Bonn Challenge n.d.). By 2019, 50 and 62 countries, respectively, had joined these mechanisms. Implementation of these actions has been shown to bring both significant social benefits and, when projects are poorly designed, persistent trade-offs with local needs for farming and other land use. Making progress in tree cover restoration and expansion will involve more systematic attention to community participation, gender equality, and the needs of small-scale farmers, as well as greater integration with antipoverty strategies.

Main progressive impacts

Forest protection, restoration, and expansion enhance numerous ecosystem services for local communities, including water filtering, watershed restoration, soil erosion prevention and coastal area protection, biodiversity conservation, pollination, nutrient retention, and pest control (IPCC 2019). These services are associated with improved livelihoods and health. They provide more timber and nonwood forest products such as fruits, nuts, fish, and medicinal plants and fibers. They improve water security and the productivity of agricultural crops. In arid Niger, the conversion of 5 million hectares of semidesert into productive open woodlands increased crop yields by more than 100 kilograms per hectare, producing enough cereals to feed an additional 2.5 million people a year (IUCN n.d.). These services also strengthen communities' resilience. Forests and mangroves absorb storm surges and limit floods and landslides (FAO 2018; Duchelle et al. 2019; IPCC 2019). Since trees are more resilient to adverse weather conditions than crops, the growth of forest-based food provides a safety net in times of crisis (FAO 2018).

Expansion of sustainable forestry management creates significant numbers of jobs, including opportunities for women and youth (FAO 2018). Forest landscape restoration in 13 countries in 2018 created an estimated 354,000 jobs in sustainable activities such as conservation agriculture, agroforestry, and forest fire management (Dave et al. 2019). The promotion of ecotourism motivates governments and local communities to conserve their environment and wildlife. When well regulated, ecotourism creates jobs and brings benefits for local businesses (Dave et al. 2019; FAO 2019c).

REDD+ and other forest-restoration projects can also secure Indigenous Peoples' and communities' land rights, which are associated with major social and economic gains. Over a 20-year period, such benefits are estimated at up to $54 billion to $119 billion for Bolivia, $523 billion to $1,165 billion for Brazil, and $123 billion to $277 billion for Colombia, including avoiding 42.8–59.7 megatonnes of carbon dioxide emissions, equivalent to taking 9–12.6 million passenger vehicles off the road. The total costs of securing these indigenous lands for 20 years are only 1 percent of the total benefits derived (Ding et al. 2016).

To these benefits can be added effective payment and reward schemes for protecting forests and ecosystems, easing the burden of land use restrictions (Duchelle et al. 2018). Incentives include payments, infrastructure, and livelihood support. Local communities can receive daily wages for forestry conservation activities like planting, fire-line cutting, and weeding, in addition to income earned from sustainable harvesting and marketing of nontimber forest products (Borah et al. 2018). The

pioneer experience of indigenous carbon funds in Brazil, Australia, and Canada shows that the sale of carbon credits to governments and companies looking to offset their emissions finances activities that increase carbon storage or reduce GHG emissions as well as community infrastructure and services, such as schools and clinics (FAO 2019c).

Agroforestry practices are linked to increased agricultural productivity, diversified and improved livelihoods, as well as greater water and food security and potential payments to farmers for ecosystem services (Miller et al. 2019; FAO 2018; IPCC 2019). The use of leguminous trees can enhance nitrogen fixation and resilience to climate change (IPCC 2019). Depending on the species planted, trees can also yield marketable products to add to family income and/or save on fuelwood collection or purchase costs (Tengnas 1994). By regulating ecosystem services, including water, agroforestry increases the overall resilience of the landscape and communities (FAO 2018). Soil improvement and perennial vegetation can reduce desertification and land degradation.

Cities' forests also provide numerous benefits that can have particularly favorable impacts on health, safety, and well-being in historically underserved neighborhoods. These include reduced pollution, lower temperatures with shaded areas, reduced crime and childhood obesity, improved child cognitive development, and adult mental health (FAO 2018; IUCN n.d.).

Regressive impacts

Poorly designed and implemented REDD+ and forest-restoration projects can place a heavy burden on local communities, while the strongest drivers of deforestation are at higher levels (Luttrell et al. 2018).

The goals of REDD+ essentially foreclose certain income-generation forest uses like timber harvesting and conversion to agriculture. While REDD+ initiatives require foreseeing alternatives, some of the more severe impacts reported in REDD+ projects are associated with poorly planned restriction or curtailment of access to resources from land for farming and firewood to vegetables, traditional medicines, and fish from rivers (Miranda et al. 2015; IPCC 2019). Zoning of forest land without just transition strategies results in reduced income, loss of cultural capital, and diminished sense of dignity. Such situations can spark conflicts between local communities and armed forest guards and antipoaching patrols, and can lead to human rights abuses, as illustrated by the case in the Congo described in Box 2.11. Expansion of REDD+ can ultimately accelerate rural-to-urban migration (Bayrak and Marafa 2016).

Women are the most negatively affected by these restrictions given gender discrimination and their role in collecting forest resources. Despite REDD+ gender requirements, insufficient attention to gender equality and women's rights is observed across many contexts (Larson et al. 2018). Some projects even deprive women of income sources or offer them lower-skilled and lower-paid jobs, such as seeding and planting, and thereby increase gender inequality. Reviews of the implementation of REDD+ projects also warn against false assumptions regarding women roles in forest management and highlight the need to more proactively safeguard women's rights (Duchelle et al. 2018).

Small-scale, poor farmers tend to benefit much less from forest preservation activities because they have less access to land, knowledge, financing, and licenses. The empirical evidence strongly suggests that agroforestry and other conservation technologies are much more commonly adopted by wealthy landowners than tenants and poor farmers (Mercer and Pattanayak 2003; Bryan et al. 2013). Agroforestry is a relatively high-cost option because it requires new knowledge and sizeable upfront

Box 2.11 | Human Rights Abuse in REDD+ Projects in the Republic of the Congo

In early 2020, following a formal complaint by Survival International in 2018, an investigation by the UN Development Programme (UNDP) confirmed human rights violations against the Baka people in Messok Dja National Park in northern Republic of the Congo, including regular beatings, torture, rape, illegal imprisonment, summary evictions, destruction of property, and confiscation of property by forest guards. The guards accused the Baka of poaching while they hunt to feed their families and collect medicinal plants. The restriction of access to the forest has contributed to further marginalization and impoverishment of indigenous people.

The UNDP conclusions highlight factors that can lead conservation projects to such abuses. These include poor community engagement and information, the absence of formal consent to the national park, insufficient evaluation of the park's implications for hunter-gatherer Indigenous Peoples, and a failure to identify alternative resources. The absence of a clear legal framework, adequate training of the guards, and a monitoring process also explained the extent of the abuse.

Sources: REDD-Monitor (2020); Survival International (2020); Vidal (2020).

investment. Other barriers for poor farmers include low availability of labor, scant access to rural credit and to markets, and cumbersome and onerous administrative and licensing procedures that make it difficult for farmers to obtain processing licenses and organize themselves into cooperatives (e.g., communal tree nurseries) that would allow them to operate at the landscape level and reduce costs (Mercer and Pattanayak 2003; Bryan et al. 2013).

The cost and criteria of certification for sustainable production are also significant barriers for smallholders. For instance, in Indonesia, the world's largest producer of palm oil, fewer than 1 percent of independent smallholder farms were certified as sustainable as of 2017. One important reason is the annual cost of certification, including surveillance audits and membership fees, which can equal as much as 12 percent of farmers' annual incomes (Suhada et al. 2018).

Likewise, poorer households have less access to alternatives to deforestation and their social benefits. For example, adoption rates of cleaner, more fuel-efficient cookstoves or of alternatives like cooking gas, which lessens fuelwood collection, are positively correlated to household income, with low adoption rates among the poor (Brooks et al. 2016; BRTdata 2019).

Countries benefiting from REDD+ financing are very uneven in their adoption and enforcement of required safeguards to respect the rights, participation, and knowledge of local communities. In many of the cases generating negative impacts, there are reports of limited local participation, poor engagement of women and disadvantaged groups, inadequate information and communication tools, and even failure to obtain local communities' free, prior, and informed consent (IUCN 2010; Duchelle et al. 2018; REDD-Monitor 2020).

Increased market value of standing forests, which REDD+ is expected to bring about, can also drive a growing contest for control over the land of Indigenous Peoples and local communities. The prospect of large profits from large-scale, plantation-type production may cause smallholder farmers to be marginalized and even dispossessed of their lands, especially if they lack secure tenure.

An aggravating factor is that some governments are inclined to recentralize their forest management systems, forest tenure rights, and decision-making power because REDD+ represents an important revenue stream and requires them to establish national carbon-oriented forest management plans, reliable baseline data, and monitoring, reporting, and verification mechanisms (Bayrak and Marafa 2016). Such unintended incentives could reverse the recent decentralization trend and disempower some local forest communities.

Main corrective and accompanying measures

Good practices emphasize the importance of inclusive planning and governance respecting communities' rights and of tailoring forest preservation solutions to community preferences, existing resources, and needs. More broadly, forest preservation activities need to be integrated into poverty reduction strategies that provide local communities with secure tenure rights, alternative livelihoods, and greater access to credit and markets while promoting gender equity and social inclusion. There is strong evidence that reductions in poverty and in deforestation are often correlated (IPCC 2019; Miyamoto 2020).

SECURING TENURE RIGHTS AND RESPECTING COMMUNITIES' PREFERENCES

The most beneficial forestry projects vigorously engage local communities and build on transparent and inclusive forest governance arrangements that involve them in every step of REDD+ planning and implementation. Such projects secure the land rights of local communities, inform about them the positive and negative impacts of REDD+, ask for their consent to implement REDD+, and provide them with adequate institutional and capacity-building support to ensure that they share equitably in the benefits of sustainable forest use (Bayrak and Marafa 2016; NCE 2018; FAO 2018; Duchelle et al. 2019; IPCC 2019).

Empowering forest-dwelling communities and indigenous people increases the effectiveness of forest protection strategies. Evidence shows that the 1.5 billion local and indigenous people who have secured rights over forest resources are more likely to take a longer-term approach to forest management. Traditional knowledge also enhances the effectiveness of practices (FAO 2018). As shown in the example from Peru (Box 2.12), deforestation rates are lower in tenure-secure indigenous forestlands than in similar lands that are not managed by Indigenous Peoples. The estimated cost of carbon mitigation by securing forest rights on indigenous lands in Bolivia, Brazil, and Colombia is 5–42 times less than other carbon-mitigation strategies such as carbon capture and storage of fossil fuels (Veit et al. 2019).

Studies of REDD+ projects stress the importance of responding to the concerns and preferences of forest-dependent communities regarding the type of compensation and who will manage the funds (Grieg-Gran and Rolington 2012). For example, in Tanzania, households in the Kilosa REDD+ pilot project preferred other forms of compensation, such as increased employment and better social services, over direct cash payment. In Uganda, people involved in the Ongo Community Forest REDD+ project considered the government to be the least-desirable manager of the compensation scheme (Grieg-Gran and Rolington 2012).

OVERCOMING ACCESS BARRIERS FOR SMALLHOLDERS AND POOR FARMERS

In many contexts, more robust planning could help reduce and even overcome the access barriers that hamper the adoption of sustainable activities and alternatives to forest resources by low-income, small-scale farmers.

Studies stress the need for inclusive planning to better tailor forest preservation options and any needed certification to the resources of local communities. In the case of agroforestry, for instance, biodiverse practices with more passive and inexpensive methods, such as natural regeneration and simple agroforests, are easier for poor communities to adopt. Another targeted solution is the new Independent Smallholder Standard of the Roundtable on Sustainable Palm Oil (RSPO), which is adapted to the situation of independent smallholders (RSPO 2017). Developed through a collaborative and multistakeholder process, this certification standard is made more accessible to smallholders with updated criteria and available support from the RSPO Smallholder Support Fund.

Financial support and incentives, as well as rural credit and extension services, are essential to overcoming some of the major constraints faced by poor farmers, as experience in China illustrates (Box 2.13). Likewise, subsidies for low-income households and awareness campaigns often facilitate adoption of clean cookstoves in poor communities. Successful experiences include the promotion of liquified petroleum gas by the Indian government, with US$2.9 billion in subsidies in 2018–19 (IISD 2018).

Box 2.12 | Greater Indigenous Rights and Forest Protection Go Hand in Hand in Peru

The Peruvian tropical forest, the second largest in Latin America, is home to more than 1,000 indigenous communities. Reducing deforestation while empowering Indigenous Peoples is a top priority for Peru's nationally determined contribution. Through a REDD+ agreement with Norway and Germany, Peru established high standards to improve titling procedures, build local capacities in forest preservation, and fund sustainable land use practices. An Amazon indigenous REDD+ initiative has defined protocols using carbon financing to support indigenous development plans and agroforestry techniques with a focus on securing collective land rights. This initiative is implemented in partnership by national and local governments. In 2019, it enabled the Amarakaeri community to protect nearly 1 million acres in the Peruvian state of Madre de Dios. At COP24, Peruvian indigenous leaders of the Coordinated Indigenous Organizations of the Amazon Basin called for an increase in the global funding of REDD+ initiatives to enable them to compete with corporations seeking to buy or lease large tracts of forest land for commercial exploitation.

Sources: Blackman et al. (2017); Veit et al. (2019).

Box 2.13 | Agroforestry for Conservation and Livelihoods in China

The recent shift of Chinese forest policy from mandatory to incentive-based instruments is already showing greater social benefits. China's Sloping Land Conversion Program is a pioneering example of a scheme to reward farmers financially for agroforestry. Targeted at poor rural localities, this program seeks to support rural economic restructuring and improve livelihoods by providing subsidies in the form of free seedlings and off-farm working opportunities for farmers in ecologically fragile environments. The program uses public funds to compensate upland farmers for losses of their farming livelihoods through contract-based implementation of forest plantation on steeply sloped lands. The policy aims to stimulate voluntary participation in a way that provides benefits through afforestation on cropland.

To date, the government has invested nearly US$23 billion in the program, converting over 8 million hectares of cropland into forestland. Some 27 million households in 25 provinces have participated. The increased land area devoted to tree planting has significantly reduced time needed for agriculture, freeing labor for nonfarm employment that brings higher income. The outmigration of young people to cities has been one key source of income diversification.

Sources: He and Sikor (2017); Miccolis et al. (2019).

PART 3. LESSONS LEARNED: HOW DO CLIMATE ACTIONS AFFECT EQUITY?

Drawing on the findings in the six sectors studied, Part 3 proposes three tools that can help policy planners identify, assess, and manage the potential impacts of climate actions on social equity:

- A typology of the multidimensional and distributional impacts of climate actions
- A list of the main benefits and burdens that disproportionately affect lower-income and disadvantaged groups
- A typology of the main barriers that prevent these groups from benefiting from climate interventions and common corrective measures

3.1. Typology of the Multidimensional Impacts of Climate Action on Different Social Groups

Policymakers need to pay much more attention to the multiple impacts of climate interventions and their distribution across social groups. The transformations needed to build carbon-neutral and resilient societies can affect almost all aspects of people's lives, including access to basic services; political, social, and cultural participation; economic empowerment; and the environment. Working-class, lower-income, and disadvantaged groups are often disproportionately affected by the way climate actions change the allocation and distribution of development opportunities. Climate policies that provide them with equitable access to development opportunities can be socially progressive. If not well-designed and executed with equity in mind, they can perpetuate or even exacerbate poverty and inequality.

Table 3.1 presents a typology of the distributional impacts on different social groups that can be caused by climate action. It contributes to the discussion on climate actions' social impacts in three ways:

- It is evidence-based, drawing on the literature and reflecting the wide range of impacts that climate actions are reported to have on different social groups and identifies indicators commonly used to assess them.
- It is aligned with the 17 SDGs.
- It builds on the "leave no one behind" pledge by underscoring the need for disaggregated data and data on the poorest 40 percent of the population (bottom 40 percent of the income distribution).

This typology is provided to help planners look beyond impacts on income and jobs and consider a broader range of effects that can reduce the well-being of lower-income and disadvantaged groups, directly or indirectly. It includes, for instance, impacts on social networks and cultural heritage and diversity, which are frequently neglected despite their importance for well-being. (Part 5 elaborates on the use of this typology to carry out an equity impact assessment.)

Table 3.1 | **Typology of Differentiated Impacts of Climate Actions**

CATEGORY	IMPACTS	INDICATIVE INDICATORS	SDG TARGETS
Basic needs	**Food and water security**	Rate of access to nutritious and sufficient food and safe water Levels of food insecurity and water stress Rates of use of safely managed drinking water services and sanitation services	2.1, 2.2, 6.1, 6.4
	Health	Number of deaths, missing persons, and persons directly affected by disasters per 100,000 population Exposure to environmental health risk, including air pollution Rate of access to health services	1.5, 3, 11.5, 5.2, 5.3, 5.6
	Energy access	Rate of electricity access Proportion of the population with primary reliance on clean fuels and technology Average energy prices	7.1, 7.2, 7.3

Table 3.1 | **Typology of Differentiated Impacts of Climate Actions (Cont'd)**

CATEGORY	IMPACTS	INDICATIVE INDICATORS	SDG TARGETS
Basic needs	Safe housing	Proportion of households living in inadequate or unsafe housing Affordability of resilient and safe housing (price/annual median income of the poorest 40% of population)	11.1
	Mobility	Rates of convenient access to clean transportation options Affordability of clean vehicle ownership (price/annual median income of the poorest 40% of the population)	11.2
Political, social, and cultural participation	Access to information and knowledge	Availability of information on climate change and climate action Rate of access to relevant skills and capacity building to uptake and/or advance climate actions	3, 5.b, 12.8, 16.6, 16.10
	Social network	Rate of participation in social events and frequency of contact with social networks Availability of support network and social infrastructure	10.2, 11.b
	Cultural heritage and diversity	Proximity of people to cultural landmarks and institutions that they value Ability to protect and develop cultural diversity and traditional knowledge	4.7, 11.4, 10.2
	Engagement in decision-making	Rate of participation in decision-making and the governance of climate projects Perception of the inclusiveness of decision-making Proportion of population reporting having felt discriminated against in the framework of climate projects	5.5, 16.7, 10.2, 10.3
Economic empowerment	Access to decent jobs	Number of jobs created and lost as a result of climate actions Proportion of the population working in green jobs that are decent and comply with labor rights Quality and safety of the working environment	8.5, 8.6
	Income	Average income of targeted groups Growth rates of household expenditure or income per capita among the poorest 40% of the population and the total population Proportion of population covered by social protection systems	1.3, 10.1
	Access to natural resources	Proportion of adult population with equal access to natural resources Proportion of adult population with secure tenure rights to land	1.4, 10.2
	Private wealth	Value of wealth of the poorest 40% of the population as share of total personal wealth	5.4, 8.5
	Cost of living	Price of basic goods and services (including basic food products, electricity, fuel, material amenities, public transport) compared to the income of the poorest 40% of the population Share of household expenditures on food, water, energy, and mobility in total household expenditure or income	2.1, 7.1, 10.2, 11.2
	Access to technology	Price of technologies needed for adaptation and mitigation actions compared to the income of the poorest 40% of the population	9.5, 9.b
Life in healthy environment	Access to natural environment	Proximity of natural areas and green parks Rates of access to and enjoyment of natural areas and green parks	11.7
	Exposure to pollution	Exposure to pollution of water, air, land, and soil	2.4, 6.3, 11.6, 12.4, 14, 15

Source: WRI authors, drawing from Gold Standard (2014); ICAT (2018); C40 Cities and Ramboll (2018); and Markkanen and Anger-Kraavi (2019).

3.2. Main Benefits and Burdens of Climate Interventions for Lower-Income and Disadvantaged Groups

Climate interventions often have disproportionate impacts—positive or negative—on low-income and disadvantaged groups. They can be especially observed in five key aspects of human development: health; access to energy, water, and transport services; jobs and livelihoods; affordable cost of living; and political, social, and cultural participation (Figure 3.1).

Main Benefits for Low-Income and Disadvantaged Groups: Reducing Inequality

Conceived to ensure social equity, climate actions can provide the least well-off with the greatest improvements in well-being in these five aspects of human development. Most mitigation and adaptation measures have the potential to address causes of deprivation and injustice while tackling environmental degradation and vulnerabilities to climate change.

Since low-income and disadvantaged groups are often exposed to the biggest health risks, they can gain the greatest health benefits associated with climate mitigation and adaptation measures. These include interventions protecting against climate disasters and water scarcity; resilient and sustainable agricultural practices that strengthen food security; sustainable transport, clean energy, and cooking systems that reduce outdoor and indoor air pollution; mass transit investments that help lower the number of vehicular accidents; and sustainable production systems that mitigate health risks to workers and consumers.

Underserved populations can also enjoy the greatest improvements in access to infrastructure and services enabled by shifts toward sustainable energy, water, and transport systems. Off-grid energy solutions, clean cooking systems, improved home energy efficiency, and the expansion of public water systems, mass transit, and other sustainable mobility options are low-carbon and resilient solutions that primarily benefit lower-income people who live in suburban and rural areas, have poorly insulated houses, and spend a large share of their budget on energy, mobility, and private services (REN21 2019). Women and children can be the greatest beneficiaries of clean cooking options, modern and efficient energy, and water services. These improvements can correct historic injustices and are associated with major improvements in health, income, and economic, social, and cultural inclusion.

Climate actions can also provide the least well-off with more decent job opportunities and improved livelihoods. Among the biggest beneficiaries are farmers, rural communities, and fishers affected by land and forest degradation, biodiversity loss, and ocean acidification, groups whose livelihoods depend on climate actions. Pro-poor climate-smart agriculture, renewable energy, energy efficiency, recycling, and repair activities are green sectors that create decent jobs accessible by disadvantaged groups who lack a high level of education and resources. The promotion of circular economies with shorter supply chains tends to boost the incomes of small-scale farmers and producers. Sectoral transformations and the development of new activities also offer opportunities to improve workers' rights, social protection, and gender equality, especially in the energy, waste, and garment sectors.

The transition to carbon-neutral and resilient economies also has a huge—but largely untapped—potential to reduce the cost of living for lower-income households, who spend larger shares of their budget on rent or mortgage, basic needs, and services. Key drivers of this transition can make housing, goods, and services more affordable, including through efficiency gains in the use of natural resources, energy, food, and materials; the development of a circular economy offering durable, repairable, reusable, and recyclable products; and the promotion of shorter supply chains and compact cities. Citizen-led projects and cooperatives are often particularly effective in harnessing the ecological transition to lower the cost of living. Examples include renewable energy cooperatives providing members with cheaper electricity; locally sourced cooperative supermarkets supplying affordable, healthy food and goods; community networks sharing food, clothes, and toys to reduce waste and spending; and partnerships among restaurants and NGOs distributing surplus food to homeless people.

Advanced with strong attention to social inclusion, the ecological transition can also enhance disadvantaged groups' participation in political, social, and cultural life.

Figure 3.1 | **Disproportionate Impacts of Climate Action on Lower-Income and Disadvantaged Groups**

	BENEFITS	BURDENS AND BARRIERS
Health	▪ **Lower risk of death, injury, and disease** related to disasters, pollution, food, water and energy insecurity, and transport crashes ▪ **Better access to health services** with the expansion of renewables and public transport	▪ **Higher risk of being left behind in adaptation efforts** ▪ **Disproportionate displacement to unsafe resettlement sites** in many adaptation and green infrastructure projects ▪ **Greater health risks in poorly regulated green industries**
Access to energy, water, and transport services	▪ **New access to clean energy, piped water, and new transport options in underserved areas** ▪ **More reliable and resilient energy, water, and transport services** ▪ **Lower energy poverty and better housing** resulting from energy efficiency gains ▪ **Decreased travel time** for long commuters with mass transit and in compact cities	▪ **Inequitable access to sustainable and efficient energy, water, and transport systems** (unavailable or unaffordable) ▪ **Greater energy precarity** because of more expensive energy services ▪ **Reduced access to city centers** with bans on fossil fuel–powered vehicles
Jobs and livelihoods	▪ **New job opportunities for working-class and rural people** in renewables, energy efficiency, recycling, and climate-smart agriculture sectors ▪ **Improved livelihoods for farming, fishing, and forest communities** with natural resources that are protected and sustainably managed ▪ **Greater productivity and income for farmers** ▪ **More decent jobs for waste pickers and garment and energy workers** ▪ **Greater gender equality** in some sectors	▪ **Higher risk of job loss for people with low education who are insufficiently represented and protected**, especially poor, informal, farm, and female workers ▪ **Loss of livelihood** because of displacement, restricted access to protected forests and lands, new regulation, and/or new distribution of roles in green agriculture and productive projects
Affordable cost of living	▪ **Cheaper housing and utility bills** thanks to improved and more efficient energy, water, and construction ▪ **Cheaper food and goods** due to resource-efficient production systems, shorter supply chains, and a circular economy ▪ **Reduced transportation expenses** with more mass transit and shared mobility	▪ **Rising energy prices and transport fares** with carbon taxes, removal of fossil fuel subsidy, a shift to renewables, or technology costs ▪ **More expensive sustainable and organic products** due notably to higher labor, input, and technology costs ▪ **Increased land value, real estate prices, and rent** with new green mobility, parks, greenbelts, and energy retrofit
Political, social, and cultural participation	▪ **New opportunities to engage in decision-making** ▪ **Better access to information and knowledge** ▪ **Preservation of the social fabric and cultural identity** of communities whose habitat and livelihoods are protected ▪ **Greater solidarity and social inclusion**, including in sharing, local, and circular economies ▪ **Valued or revived traditional knowledge** for adaptation, land restoration, or a circular economy ▪ **Greater access to social and cultural activities** with greater mobility and better energy ▪ **Reduced risk of social tensions and conflicts**	▪ **Further exclusion from decision-making** in projects that overlook power asymmetries and inequalities ▪ **New information and knowledge barriers** to civic activities ▪ **Loss of traditional practices, expertise, sense of dignity and meaning** with the end of carbon-, resource-intensive, or climate-vulnerable activities ▪ **Unraveling of the social fabric** because of green gentrification, closing local industries, and out-migration ▪ **Higher risk of losing social networks and cultural heritage** because of disproportionate displacement in adaptation and green infrastructure projects

Source: WRI authors based on literature review.

Greater access to basic needs and services, including electricity, the internet, and transport, can dramatically expand people's capabilities and their political, social, and cultural inclusion. The protection of communities' habitat and livelihoods can be decisive to preserve the social fabric, cultural identities, and cohesion of affected populations, including with lower risks of conflict. In addition, climate project planning that addresses social justice issues can empower disadvantaged groups by giving them greater access to information, capacity building, and decision-making, with profound implications for their sense of dignity and well-being. The identification of low-carbon and adaptive solutions can value and even revive traditional knowledge and practices, especially in the agriculture, forestry, and circular economy sectors. Community-led initiatives and citizen cooperatives can also effectively promote inclusive decision-making and social inclusion in all sectors of the ecological transition.

Main Burden for Low-Income and Disadvantaged Groups: Worsening Inequality

In contrast, poorly designed climate measures, with inadequate consideration of equity, can place a disproportionate and unfair burden on low-income and otherwise disadvantaged groups, pushing the least well-off further into poverty. The literature review shows that knowledge of the most likely regressive impacts of climate actions needs to be enhanced.

Unfair climate interventions can exacerbate health inequalities. The literature highlights a tendency to prioritize the wealthiest, most populated, and economically valuable regions in adaptation projects, leaving underserved and highly vulnerable populations behind. In the context of adaptive land use regulations and sustainable infrastructure projects, a disproportionate displacement of poor residents toward remote, riskier resettlement sites is often reported. If insufficiently regulated, some green sectors—including repairing, recycling, and waste management—can increase health and safety risks for vulnerable workers.

Likewise, inequitable access to sustainable and efficient energy, water, and transport solutions can widen social inequalities. As with other policy interventions, climate policies can reproduce well-known patterns of spatial injustice without explicit interventions to prioritize public goals over profit-seeking strategies, address power asymmetries, and identify adequate funding for underserved areas. Climate solutions remain unaffordable for many, while unequal access to sustainable goods and services increases the risk that taxes and restrictions on carbon-intensive sectors will disproportionately burden the least well-off.

Job losses are the negative impacts of climate action that receive the greatest political attention, with a heavy focus on the energy sector. Estimates and proactive policies are lacking for other industries and sectors, such as agriculture, fisheries, and aquaculture, where the risk of job losses due to climate change impacts and unfair transitions is great. The most vulnerable to income loss are workers who already have lower wages, levels of education, political representation, and social protection. Poorly designed climate projects can also deprive low-income and disadvantaged groups from sources of livelihood when they result in displacement away from jobs and resources; restrict access to land, forests, and rivers; or limit ability to engage in productive activities.

Greener does not necessarily mean cheaper for people. In several countries, government support for renewable energy and increased system costs has led to sharp increases in the price of electricity, deepening energy poverty for many. Similarly, sustainable transport options (e.g., BRT, electric buses, EVs) may be cheaper to run, but they can still involve higher fares and retail prices. Without appropriate regulation and incentives, recycled products, organic food, and sustainable clothing can remain unaffordable for many, increasing injustice in access to safe and healthy consumption. Increases in land value, real estate prices, and rent, and subsequent green gentrification, are also associated with the expansion of mass transit, bike-sharing systems, parks, greenbelts, and building retrofits.

Without major attention paid to inclusion, climate actions can disempower disadvantaged groups and affect their social and cultural life. These groups often have less access to the information and knowledge required to participate in climate decision-making. Women, the poor, and otherwise marginalized people remain largely underrepresented. Resilient and low-carbon transitions that are not managed with and for vulnerable groups can deprive them of their traditional knowledge, cultural practices, and heritage. Residents of underserved neighborhoods, slum dwellers, the rural poor, Indigenous Peoples, and marginalized communities experience the greatest loss in social and cultural capital because they suffer disproportionately from displacement and destruction resulting from mitigation and adaptation

measures involving land use and infrastructural change. The unraveling of the social fabric, networks, and infrastructure built over time is associated with weaker access to opportunities and reduced well-being. These losses are often overlooked in impact assessments, despite having far-reaching implications for people.

3.3. Barriers for Disadvantaged Groups and Support Measures

There is considerable room to better address the barriers that prevent low-income and otherwise disadvantaged groups from engaging in climate actions and benefiting from the opportunities created. The simple typology proposed in Table 3.2 encompasses the legal, social, cultural, knowledge, institutional, economic and financial, infrastructure, and geographic barriers that climate interventions can maintain, increase, or introduce. The table lists types of barriers reported in the literature; the most affected groups (groups at risk of being left behind as identified by the United Nations; see Table 1.1); and examples of support measures adopted by countries to remove the given barriers.

The effectiveness of the support measures depends on how well they address specific needs of disadvantaged groups, how well timed they are in relation to possible harms brought by climate actions, and how they interact with other policies. These criteria are further discussed in Part 5.

Figure 3.2 | **Typology of Access Barriers and Corresponding Support Measures**

TYPE	FREQUENT BARRIERS	EXAMPLES OF SUPPORT MEASURES
Legal	▪ Inexistent or insecure property rights and land tenure (e.g., for poor farmers, women, slum dwellers, and displaced persons) ▪ Lack of legal identify ▪ Absence of legal protection and social dialogue framework, especially for informal workers	▪ Recognition of property rights to fairly compensate displacement related to adaptive and infrastructure projects ▪ Secure land tenure as basis for advancing CSA and REDD+ projects ▪ Enhanced social protection and social dialogue
Social and cultural	▪ Power asymmetries ▪ Discrimination, marginalization based on social status, gender, and/or other characteristics ▪ Lack of safety, especially for women, people with disability, racial and ethnic minorities, and children ▪ Social and cultural conventions, peer pressure ▪ Ignored traditional knowledge ▪ Lack of examples of pioneers among peers	▪ Specific actions to ensure access of marginalized people to decision-making ▪ Awareness campaigns against discrimination ▪ Security cameras, hotlines, women-only cars in mass transit ▪ Improved street lighting in transit stations and on bike paths ▪ Valuing of traditional knowledge in climate planning ▪ Partnerships with champions
Knowledge	▪ Literacy, language requirements ▪ Education and skills requirements ▪ Information gap ▪ Technological complexity	▪ Translation into local languages and in-person trainings ▪ Targeted capacity building ▪ Adaptation of guidelines to end users' needs
Institutional	▪ Decision-making that does not effectively engage disadvantaged groups ▪ No or limited social dialogue ▪ Absence of clear mandates and responsibilities for leading and implementing agencies ▪ Poor transparency and responsiveness ▪ Lack of clear enforcement rules (e.g., for land use regulations and land conservation) ▪ Cumbersome institutional, administrative, or tax procedures	▪ Transparent, inclusive, and responsive decision-making ▪ Specific engagement frameworks for marginalized groups with enhanced capacity building ▪ Plan for social dialogue that includes disadvantaged individuals and groups ▪ Clear enforcement rules for regulations ▪ Simple administrative processes (e.g., with one-stop-shop models) ▪ Easily accessible fiscal incentives (e.g., discount at the time of purchase)

Figure 3.2 | **Typology of Access Barriers and Corresponding Support Measures (Cont'd)**

TYPE	FREQUENT BARRIERS	EXAMPLES OF SUPPORT MEASURES
Economic and financial	▪ Cost (e.g., technology and equipment, land registration, corruption, transport fares, energy price) ▪ No or restricted access to assets, financial services, and resources ▪ Dependency on homeowners' will to enhance energy efficiency ▪ Uncertain return on investments	▪ Anticorruption measures ▪ Targeted fiscal and financial incentives ▪ Flexible payment options for renewable energy or energy efficiency services ▪ Partnerships with microfinance institutions ▪ Solutions to overcome split incentives for housing energy efficiency retrofits
Infrastructure	▪ Inaccessible places and transport for people with disabilities, pregnant women, and elders ▪ Lack of public services and transport options ▪ Lack of financial services ▪ Lack of equipment	▪ Accessibility policies in mass transit and adaptation projects ▪ Progressive pricing of infrastructure services ▪ Partnerships with local NGOs, social entrepreneurs, and private actors to provide affordable services
Geographic	▪ Poor, remote, and/or unsafe suburban and rural areas underserved ▪ Informal settlement left behind or displaced ▪ Migrant and refugee camps left behind or displaced	▪ Integration of equity goals into national and subnational development plan and in urban planning ▪ Adequate funding models to finance low-carbon and adaptive interventions in underserved neighborhoods and remote areas with low density ▪ Prioritization of informal settlements and refugee camps

PART 4. COMMON PITFALLS LEADING TO REGRESSIVE IMPACTS

The review of socially regressive impacts associated with climate actions across the six systems studied provides valuable lessons on key pitfalls to avoid. While many factors leading to social inequity are context- and project-specific, several recur in the literature. The following seven pitfalls stand out: a "win-win" discourse that overlooks differentiated impacts and distributive issues, biases related to the pursuit of climate goals that tend to prioritize advantaged groups, nonparticipatory and exclusionary planning, inadequate impact assessment, a data gap on those left behind, inadequate funding models, and weak policy coherence.

Many of these factors underscore the importance of in-depth understanding of the social and political-economic context in which climate interventions are elaborated. Like any other policies, these interventions are embedded in the very institutions—the power, economic, and social frameworks—that perpetuate historic inequalities. Climate actions also interact with a myriad of political, social, and economic factors to produce negative or positive social outcomes. This interdependency can explain why climate actions designed to empower poor communities can fall short. Avoiding these pitfalls requires that climate experts and decision-makers acknowledge the risks of unintended impacts in the first place. They would also benefit from further analyses of climate policies that fail to ensure social equity.

4.1. "Win-Win" Discourse Overlooking Distributive Issues

Regressive impacts of climate actions can result from broader political neglect of equity concerns. A review of the literature reveals that climate discourse often focuses on the economic benefits of climate interventions and can speak in broad terms of their potential social gains, without necessarily delving into how benefits and costs will be distributed across social groups (Checker 2011; Long 2016; Bouzarovski et al. 2018). Developed to address misconceptions and interest-driven narratives on inevitable trade-offs among jobs, well-being, and climate action, the 'win-win' and 'green growth' narratives can overlook harms for some social groups and the perpetuation of inequality. In assuming that the benefits will be universal or in focusing on positive net benefit,

public officials and planners sidestep politically difficult choices about the redistribution of risks and benefits (Wilkinson 2012; Pelling et al. 2015; Anguelovski et al. 2016; Abram et al. 2020). The use of a generic "win-win" or "resiliency" discourse can hide what is at stake to ensure fair benefit- and cost-sharing (Fainstein 2015; Matyas and Pelling 2015).

If they don't make social equity and inclusion political priorities, climate policies and projects are more likely to overlook the barriers related to existing deprivation and inequalities that will prevent the disadvantaged from accessing climate solutions and enjoying their benefits. The literature also reports higher risks of these projects being captured by motivations that can exacerbate inequality, such as real estate development, economic competitiveness, rent-seeking strategies, prioritization of tourism growth, clearance of informal settlements, and land-grabbing strategies.

4.2. Biases in Climate Change Policymaking That Prioritize Advantaged Groups

The goal to prioritize the least well-off can be perceived as conflicting with the urgency to scale mitigation and adaptation impacts. Three frequent inherent biases in planning climate policies and projects seeking greater efficiency and effectiveness foster inequities:

- *A focus on high-emitters*. Policies expanding low-carbon technologies and practices reasonably prioritize high-emitters, which are rarely low-income households, the rural poor, and small-scale producers.
- *Targeting of populated areas*. It is cheaper per person to invest in climate-resilient and low-carbon infrastructure in areas with high population density than in sparsely populated rural or suburban neighborhoods.
- *Need for advanced technologies*. Some mitigation and adaptation actions employ the latest technologies that are the least emitting and most resilient but whose up-front costs pose barriers for the poorest and disadvantaged groups.

Effectiveness needs to be weighed in these cases against equity concerns. It is crucial to ensure that those concerns are addressed through financial support mechanisms designed to benefit low-income communities living in underserved and vulnerable areas.

4.3. Lack of Engagement of Disadvantaged Groups and Procedural Injustice

Although climate interventions often have massive impacts on people's livelihoods and access to opportunities, very few are designed through participatory approaches and support community-led planning. Planning processes that do not adequately consider power asymmetries, discrimination, and historic injustice end up catering to the preferences of wealthier groups and profit-seeking investors (Füssel 2007; Measham et al. 2011). The result is often displacement of low-income residents, loss of livelihoods, income, social and cultural capital, and maladaptive outcomes. Three common approaches to public engagement in climate policymaking drive the exclusion of disadvantaged groups:

- *Top-down and technocratic approach*. A tendency to ignore and even disregard local knowledge and needs—along with a preference for "expert" opinions, for instance, on risk tolerance, what it means to be vulnerable, and what "beneficiary" populations need.
- *Power-blind approach*. Engagement frameworks that are insensitive to the unequal power of the different stakeholders usually fail to empower disadvantaged groups and to give them a safe place where their concerns can be properly considered.
- *One-size-fits-all approach*. When direct consultations are attempted, they can fail to consider the specific constraints faced by disadvantaged groups, such as language difference and digital poverty, when choosing information and consultation tools, such as posters, questionnaires, and online surveys.

4.4. Limited Assessment of Equity Impacts

The harms that climate actions can bring are usually poorly anticipated. Comprehensive vulnerability analyses and robust distributional impact assessments of climate plans and projects are scarce, despite being essential to addressing social equity issues. Four shortcomings are common:

- Assumption of automatic co-benefits, commonly associated with climate measures, without estimating their local relevance.
- Absence of distributional impact analysis looking at the differentiated effects on various population categories, especially on poor and disadvantaged groups.

- Narrow focus on jobs and income, overlooking all the other economic, social, and cultural impacts that climate interventions can have on people's lives.
- Ignorance of social and political factors of vulnerability, such as discrimination and marginalization, including for adaptation projects (Pelling and Manuel-Navarrete 2011; Pelling et al. 2015).

4.5. Data Gap on Those Left Behind

The consideration of outcomes for the disadvantaged groups is hampered by a lack of disaggregated data. This gap makes differentiated impact assessment difficult, limits the ability of policy planners to design interventions that prioritize those who most need them in a way that fits their circumstances, and impedes the monitoring of impacts on the most vulnerable groups (Bizikova 2017; Kalow and O'Donnell 2017). National aggregates mask uneven trends across different population groups and the extent of disparities. Marginalized groups are invisible to varying degrees in official statistics. Surveys that are based on the household systematically exclude some groups, such as street dwellers and floating populations without a fixed address. They also mask intrahousehold dynamics and distribution of development benefits. Weak disaggregation of indicators can also be explained by lack of political will to reveal disparities, and by existing discrimination against specific groups.

The UN classification for indicator quality makes clear that many countries, especially middle- and low-income countries, lack the capacity to collect disaggregated data for many indicators.[9] Challenges include limited financial resources to build the capacity of statistical institutions, insufficient data-sharing among different actors (national government, regional public services, local authorities, NGOs, and research institutions), and lack of policies to recognize and address data produced by nonstate actors outside national statistical systems. The collection and integration of data from multiple sources requires technology investments and capacity building in most countries. UN sustainable development progress reports acknowledge that the "data revolution" called for by the 2030 Agenda (HLP 2013) is challenging and call for enhanced international support for such efforts (UN 2019).

4.6. Inadequate Funding Models

Uneven distribution of the benefits from climate policies and projects can be further explained by the challenge of channeling adequate resources to lower-income and marginalized groups, which typically live in underserved, poorly equipped neighborhoods and in remote rural areas. Climate actions targeting these populations can involve higher upfront costs, incentives, and subsidies.

In addition, public authorities increasingly rely on private financing to develop and scale up climate interventions, while "left behind" communities face severe disadvantages in attracting private financing. Private finance exceeded funding from public sources in each year during the period 2012–16, with public funding being fairly static (Padraig et al. 2018). The challenge for public authorities is to channel such growing financial flows to initiatives that target underserved communities (IFC 2016). The very channels, instruments, and decision criteria used most frequently by private capital are underdeveloped or not as robust and reliable for these communities. Private investors typically seek to support climate projects with attractive returns. For instance, private real estate developers often enter underserved neighborhoods seeking a quick return on investment in renovations and upgrades, which drive gentrification. These flaws can also be observed in the context of public-private partnerships.

4.7. Weak Policy Coherence

The absence of an enabling policy environment is another major obstacle to equitable climate outcomes, since climate actions alone cannot tackle structural poverty and inequality. In many cases, the costs and benefits of climate interventions are unevenly distributed because of gaps in other public policies to support the capacities of the least well-off and disadvantaged groups. The corrective and support measures that institutions in charge of climate policies and projects can adopt can successfully support disadvantaged groups but won't be able to fully address major gaps in development policies, such as primary quality education, transport, financial services, and healthcare centers in rural areas. High-level political direction and whole-of-government efforts are needed to make the broader policy changes to enhance social equity and address deeply entrenched inequalities.

PART 5. BUILDING BLOCKS FOR EQUITABLE AND JUST TRANSITIONS

Analysis of climate actions that significantly benefit disadvantaged groups provides valuable information on means to increase the likelihood of delivering progressive impacts. Climate change policy and project planning should internalize lessons learned in decades of development policy. Achieving equity and leveraging the opportunities that climate transitions offer to reduce poverty and inequality require new approaches to priority-setting, public engagement, impact assessment, policy design, funding models, and monitoring. Figure 5.1 outlines concrete, relevant steps for the climate change planning process.

5.1. Prioritize: Move Beyond a Social Co-benefit Approach to Proactive Planning for Equity

1. **ADOPT EXPLICIT OVERARCHING GOALS RELATED TO POVERTY AND INEQUALITY REDUCTION, AND JUST TRANSITION.**

Progressive climate actions underscore the importance of proactively pursuing social equity in designing climate actions and setting an explicit social equity goal from the start. Achieving a fair distribution of the costs and benefits is challenging and rarely happens without deliberate planning. The pursuit of social equity thus cannot be an afterthought. It will significantly impact designers' early choices regarding the scope of the climate policy or project, its objectives, funding model, and engagement framework for affected communities, businesses, and private investors.

The priority of equity also needs to be reflected in public discourse on climate policy. Moving social equity to center stage in climate narratives is essential to send strong signals to all the actors and frame the planning process (Agyeman 2008).

Social equity goals should also be better embedded in national and subnational climate change plans, including in NDCs and LTS, to provide strong guidance for policy, program, and project design. For instance, Mexico underscored in its midcentury strategy for low-carbon development that the well-being of the people is a central goal and that impacts on the poorest should be considered in planning climate mitigation, adaptation, and capacity-building measures (Government of Mexico 2016). Bolivia's NDC links the objective of ending extreme poverty with priority climate actions in forestry (Government of Bolivia 2015).[10] The integration of gender goals could be supported by the definition of common principles and objectives under the upcoming UNFCCC Gender Action Plan.

2. **DEFINE ADEQUATE PLANNING PROCESSES AND ENGAGEMENT FRAMEWORKS TO DELIVER JUST OUTCOMES (TRANSPARENCY, INCLUSIVENESS).**

These concerns also need to be fully reflected in countries' guidance for formulating climate policies and projects, including preparation of NDCs and LTS. Only a few countries call for attention to equity in such guidelines. Examples include Mexico's climate change strategy of 2013, which requires consideration of gender, ethnicity, disability, health, and inequality, including in access to public services, when designing all climate policies (Government of Mexico 2013). Biennial update reports could also provide helpful information on these equity effects and governments' response measures.

5.2. Empower: Enable Ongoing Dialogue and People-Centered Climate Planning

The delivery of equitable social outcomes through climate action rests largely on enabling an open, ongoing, and transparent dialogue on the changes needed in society (Just Transition Commission 2020; Abram et al. 2020) and giving space to and empowering people, especially the most disadvantaged, so they can actively participate in decision-making. Quality of public engagement and social dialogue strongly influences the relevance of climate transition strategies, policies, and projects—including NDCs and LTS—as well as public buy-in and ultimate impacts. Lessons learned from international experience highlight key ingredients for successful social dialogue and public participation as well as the growing potential of community-led planning.

To result in tangible social benefits, public engagement efforts need to be carried out from the start and throughout the planning cycle, from identification to policy or project design to monitoring. Since needs and preferences vary greatly across social groups, representation of and participation by people at risk of being harmed and left behind at the design and inception phases is essential to increasing their chance of benefiting from climate policies and projects. Information collected through public dialogue should include communities' vulnerabilities; perception and acceptance of climate risks; traditional adaptive and mitigation practices; priority needs, preferences, and constraints; and concerns about and ability and willingness to engage in proposed climate actions (WRI et al. 2011).

Figure 5.1 | **Planning Measures to Advance Equitable Climate Action**

Identification

PRIORITIZE

Move beyond a social co-benefit approach to proactive planning for equity

- Adopt explicit overarching goals related to poverty and inequality reduction, and just transition.
- Define inclusive planning processes and engagement frameworks to deliver just outcomes (transparency, inclusiveness).

EMPOWER

Enable ongoing dialogue and people-centered climate planning

- Identify groups at risk of exclusion and facing access barriers to decision-making.
- Embrace participatory and deliberative approaches to climate planning.
- Work with local community leaders, networks, and NGOs to empower disadvantaged people.
- Leave space for and support decentralized, community-led planning.

Design

ASSESS

Perform a thorough social equity impact assessment

- Identify vulnerabilities to climate actions (context, forward-looking analyses).
- Engage with local communities to identify perceived risks.
- Assess distributional impacts of a climate plan or project beyond income, while considering constraints experienced by vulnerable and disadvantaged groups.
- Evaluate the effectiveness of existing policies in offsetting harms.

IMPROVE

Select, revise, and complement climate measures using a social equity lens

- Select actions based on their progressivity; drop actions with regressive impacts that cannot be offset.
- Revise climate actions to neutralize negative impacts and foster benefits.
- Complement climate actions with corrective and accompanying measures in coordination with all other relevant actors (e.g., public agencies, project developers).

FINANCE

Target resources at underserved groups

- Introduce progressivity and social goals in climate finance.
- Incentivize private finance to invest in deprived areas.
- Tap the potential of innovative finance to deliver on climate and social equity.

Monitoring evaluation

ADJUST

Monitor equity impacts to enhance progressive outcomes

- Define indicators of social impacts with representatives of affected groups.
- Regularly monitor equity impacts, including through surveys of affected groups.
- Adjust climate interventions accordingly.

1. **IDENTIFY GROUPS AT RISK OF EXCLUSION AND FACING ACCESS BARRIERS TO DECISION-MAKING.**

Effective participation involves addressing context-specific access barriers to decision-making, including lack of legal identity and rights; illiteracy; insufficient information; intimidation; and lack of access to transport, childcare, and technology. Planning for an inclusive social dialogue on just transitions also involves specific actions to reach out to low-wage, low-skill workers, including from the informal sector. Obstacles can include differences in vocabulary, values, and cultural references used by elite and disadvantaged groups (Anguelovski et al. 2016). Targeted awareness-raising, outreach, and enforcement of legislation is often needed to reach marginalized people.

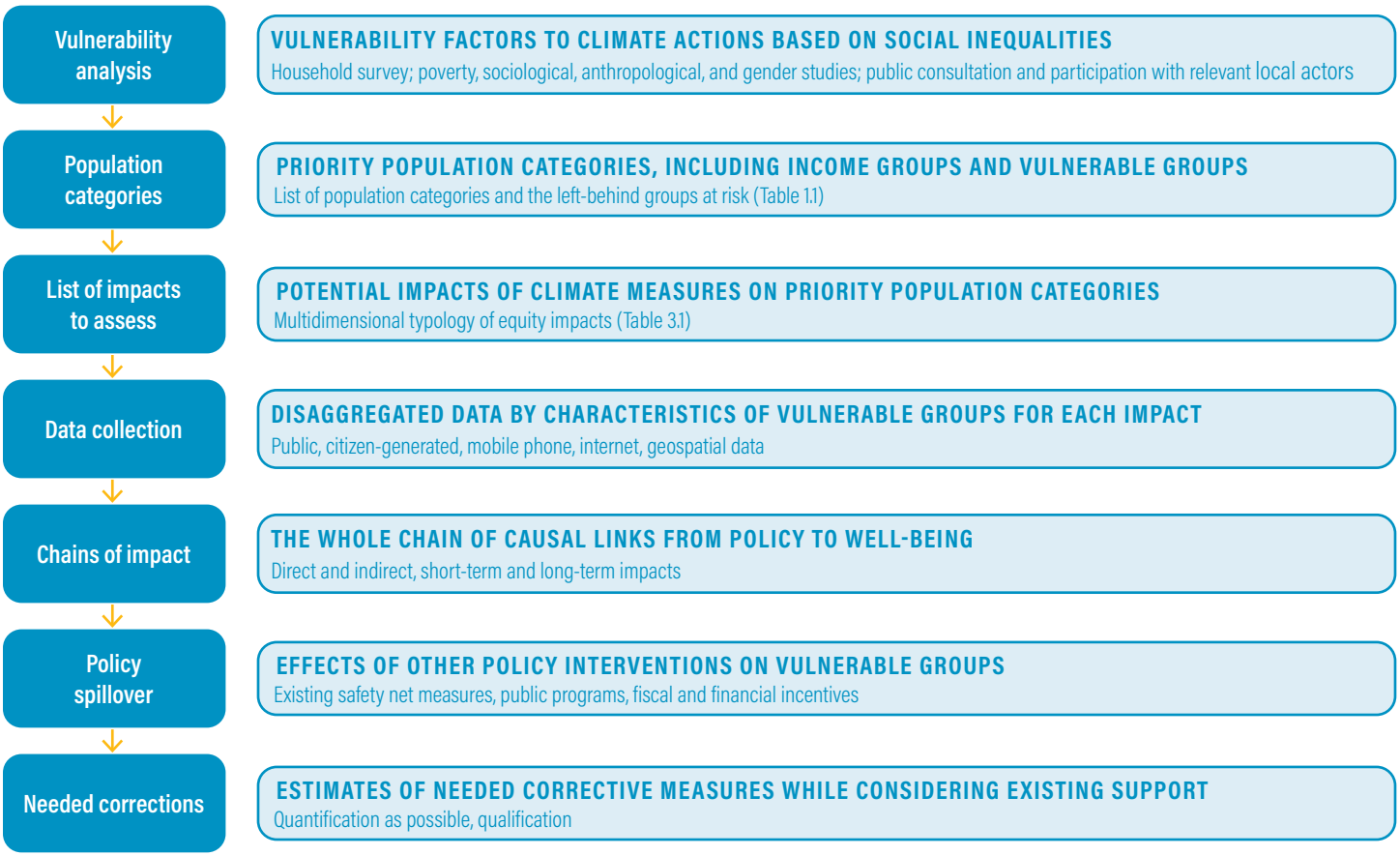
2. **EMBRACE PARTICIPATORY AND DELIBERATIVE APPROACHES TO CLIMATE PLANNING.**

At the government level, some of the most promising experiences institutionalize participatory approaches to climate planning. For instance, in Spain, social dialogue is guaranteed by just transition agreements among the government, businesses, and workers, which can ensure transparency and social commitments in planning the phaseout of carbon-intensive industries. Citizens' deliberative processes, including citizens' juries, panels, and assemblies, have been mandated at the national level, in Ireland, France, the United Kingdom, and Scotland, as well as at the city level, in Quito (Ecuador), Gdansk and Wrocław (Poland), and Camden and Oxford (UK), to produce recommendations for the public and elected officials regarding new climate measures and support needed to ensure equity. Growing numbers of city governments also use participatory budgeting that allows the public to select climate interventions.

3. **WORK WITH LOCAL COMMUNITY LEADERS, NETWORKS, AND NGOS TO EMPOWER DISADVANTAGED PEOPLE.**

At the project level, effective approaches are designed and implemented in partnerships with local trusted messengers and community leaders, local NGOs, social scientists, and social housing and faith-based organizations. Some cities, like Detroit (United States)

Figure 5.2 | **Key Steps for a Thorough Equity Impact Assessment**



Source: Authors.

also make community engagement in private-driven projects compulsory, which can encourage inclusive climate interventions.

4. **LEAVE SPACE FOR AND SUPPORT DECENTRALIZED, COMMUNITY-LED PLANNING.**

There is growing evidence that community-led planning can foster more inclusive climate action. Lessons learned across a great variety of local experiences suggest that citizen-driven projects can perform on climate goals while enhancing social inclusion and reinvigorating communities. The transformations underpinning climate transitions—such as the expansion of distributed energy systems, shifts to short and circular supply chains, and the promotion of nature-based solutions—can restore economic power to local communities and enable them to step up local climate action.

Citizen cooperatives' governance, financial models, and services greatly vary, but they often promote nonprofit goals that can help enhance social equity, including regaining local ownership of common resources in opposition to their privatization and/or commodification; promoting sustainability and affordability through collective management; and enhancing social inclusion (Wierling et al. 2018). The literature on the "commons" suggests that together these projects can drive the transformations needed at the national and global levels to scale up climate transition (Ostrom 2010). This would require creating an enabling environment for these initiatives to flourish, including by removing the legal, administrative, and financial barriers they face in many countries.

5.3. Assess: Perform a Thorough Social Equity Impact Assessment

In impact assessments across the literature that fully consider equity issues, seven key steps emerge, as shown in Figure 5.2.

5.4. Improve: Select, Revise, and Complement Climate Measures Using a Social Equity Lens

Policymakers need to weigh the identified equity impacts to improve the design of climate actions so that they foster benefits for disadvantaged groups, minimize or compensate negative impacts, and assist those harmed wherever possible. As mentioned above, the engagement of affected populations is also essential in this phase to determine acceptable risks and side effects and identify ways to enhance benefits for local communities.

The improvement of climate measures to enhance social equity typically involves three steps:

- **SELECTING.** Climate measures whose significant inequitable harms cannot be offset may be reconsidered or dropped; those with the greatest benefits for the least well-off can be prioritized.
- **REVISING.** Climate measures that bring harms or low benefits to disadvantaged groups can be reviewed, considering their scope, time frame, and targeting.
- **COMPLEMENTING.** A package of corrective and accompanying measures is needed to offset negative impacts and enhance benefits for disadvantaged groups.

Four success factors emerge from experience putting in place such corrective and accompanying measures:

- **COMBINATION.** Several policy, regulatory, financial, fiscal, governance, and communication instruments are often needed to effectively address the access barriers that disadvantaged groups face. Examples include social programs and safety nets, price regulations, income tax credits and subsidies, hiring quotas, capacity building, and awareness campaigns addressing discrimination.
- **COORDINATION.** Planners of climate measures usually need to go beyond the boundaries of their portfolio to collaborate with other sectors, levels of governance, private actors (utility, developers), civil society organizations, and other local institutions. This coordination is essential to addressing policy gaps in other sectors (e.g., availability of clean cookstoves to support forest preservation) and structural obstacles (e.g., gender discrimination) in a holistic manner.
- **TARGETING.** The effectiveness of these measures depends on how well they reach and benefit the most affected groups. This can involve eligibility criteria, adequate funding models, and targeted awareness and information strategies that consider challenges faced by disadvantaged groups.
- **TIMELINESS.** Corrective actions need to be identified early on and not once the negative impacts are noticed during implementation. Articulating them from the outset is needed to give these measures time to produce effects and can ensure clear communication to the public.

5.5. Finance: Target Resources at Underserved Groups

1. **INTRODUCE PROGRESSIVITY AND SOCIAL GOALS IN CLIMATE FINANCE.**

Conscious planning to allocate resources to underserved communities and populations could be better mainstreamed in climate finance, including NDC investment plans, annual public budgets, and multilateral climate funds.

Country experience shows that classical instruments of finance climate can be leveraged and tailored to ensure social equity. Strong vertical coordination between national and local governments on shared goals supporting inclusive climate action can guide green climate programs, funds, and fiscal incentives toward underserved communities (C40 2016). Fees, charges, and taxes paid by wealthy households and businesses can be earmarked for climate interventions benefiting lower-income and disadvantaged groups. Similarly, equity criteria set for green bonds and formal agreements established between local communities and municipalities and/or developers can provide guarantees that climate projects benefit deprived populations (Eldridge et al. 2019).

2. **INCENTIVIZE PRIVATE FINANCE TO INVEST IN DEPRIVED AREAS.**

Additional measures are also needed to guide private investments toward disadvantaged groups. National and local governments seeking investments in targeted sectors and communities are actively pursuing the private sector with financial incentives—from blended finance to extended tax breaks to showcasing the potential for higher marginal returns for investments in chronically underserved areas and communities (UNCDP 2018). Safeguarding the public interest involves guidance from national, local, and city governments; adequate public participation; tight monitoring and management of public expenditures; and sometimes the inclusion of nonprofit groups (Colenbrander et al. 2018).

3. **TAP THE POTENTIAL OF INNOVATIVE FINANCE TO DELIVER ON CLIMATE AND SOCIAL EQUITY.**

Private capital could be further mobilized. Investors should be sought who do not expect a quick profit, and an increasing number of innovative funding instruments are being developed to help leverage this patient capital. These include low-carbon energy retrofit funds; green, environmental, or social impact bonds; and land-based financing (Agyeman and Claudel 2017). New instruments are also needed to unlock institutional investment in long-term sustainable infrastructure projects, ones with a strong social equity dimension. While these instruments have mainly been tested in high-income countries, they show significant potential for wider use.

5.6. Adjust: Monitor Equity Impacts to Enhance Progressive Outcomes

The impacts of climate measures on those at risk of being left behind needs to be monitored throughout the implementation cycle. Given the complexity of these effects and policy responses, learning and accountability are fundamental to achieving equitable climate actions. Close monitoring offers an opportunity to fill information gaps relevant to tracking outcomes for the poorest and disadvantaged groups. The documentation of the relationships between specific climate policies and projects, other policy measures, and inequality and poverty reduction can enable greater policy effectiveness, data collaboration, and integration across government.

1. **DEFINE INDICATORS OF SOCIAL IMPACTS WITH REPRESENTATIVES OF AFFECTED GROUPS.**

There is agreement that local stakeholders need to participate in indicator development, including in their revision to reflect new circumstances, new scientific knowledge, and data availability. The literature recommends combining a "top-down," expert-led approach, which typically considers international or national standards, with a "bottom-up," citizen-led approach that draws on local expertise and traditional knowledge and involves the public.

2. **REGULARLY MONITOR EQUITY IMPACTS, INCLUDING THROUGH SURVEYS OF AFFECTED GROUPS, AND ADJUST CLIMATE INTERVENTIONS ACCORDINGLY.**

Regular evaluations of the social impacts of climate policies, including LTS and multiyear plans for transforming entire industries and regional economies, are needed to plan potential adjustments. For instance, Germany's Climate Action Plan 2050, which will select climate actions based on the criteria of social justice, affordability, economic efficiency, and citizen participation, requires impact assessment of climate targets at regular intervals to take their economic and social impacts into account and adjust as needed (Government of Germany 2016).

Given the uncertainty of climate change policy impacts, and the costs and benefits of low-carbon technologies for poor communities, the collection of public feedback and

data is essential to tracking the impacts of climate policies and projects. Digital technology, open data, and social media offer new opportunities to target awareness-raising and information campaigns, collect information, and monitor effects on communities. In-person surveys and partnerships with local actors are still needed, however, to reach low-income individuals who lack internet access.

PART 6. CONCLUSION AND RECOMMENDATIONS

Countries' ability to shift to carbon-neutral and resilient development will depend largely on the fairness of their adaptation and mitigation solutions. Unfair measures make the uptake of low-carbon and resilient solutions impossible for many, and they undermine the resilience of communities and of the whole society. In a context of stark social inequality and scarce public resources, climate action cannot be advanced successfully if it places a disproportionate burden on lower-income and disadvantaged groups, perpetuates injustice in the access to services and opportunities, and thereby fails to address vulnerabilities. Governments increasingly recognize that overlooking equity concerns can invite public pushback and doom climate policies to early reversal.

The literature review on the social impacts of priority climate actions in six strategic systems—industry, energy, transport, cities, agriculture, and forestry—highlights massive, but largely untapped, opportunities to enhance social justice while tackling climate change. The major transformations driven by climate actions often alter the distribution of capabilities and development opportunities across the society, especially in health; access to energy, water, and transport; jobs and livelihoods; affordable cost of living; and political, social, and cultural participation. These changes disproportionately impact those who are currently the least well-off. Disadvantaged groups can benefit most from greater protection, public services, decent jobs, and cleaner and more efficient resources, products, and housing. However, they are also at higher risk of being harmed and left behind. Given existing deprivation and inequalities, they are the most vulnerable to the cost and adverse impacts of climate actions, and the new barriers (e.g., price and knowledge) to livelihoods, goods, and services that such actions can introduce.

This paper provides planners and other actors engaged in climate action design with tools that can help them better anticipate, assess, and address potential harms and enhance equity of climate measures, including a typology of the multidimensional and distributional impacts of climate actions, a list of the main benefits and burdens that disproportionately affect lower-income and disadvantaged groups across the sectors studied, a typology of the main barriers that prevent these groups from benefiting from climate interventions, and common corrective measures.

A major conclusion of this analysis is that countries could do a much better job of harnessing the system changes involved in climate action, preventing and redressing inequalities by giving those left behind by unsustainable development patterns greater access to rights and opportunities. Most of the pitfalls that most commonly lead to regressive impacts could be avoided. The following six recommendations promote greater consideration of equity in climate policy planning.

1. COUNTRIES NEED TO ADOPT A MORE COMPREHENSIVE APPROACH TO "JUST TRANSITION."

Just transition strategies are currently mainly developed in shrinking or restructuring power industries. The literature review highlights major gaps in other segments of the economy. Countries need to design similar plans in all affected economic sectors and promote equitable access to decent jobs in new green activities in more proactive ways. As seen at COP25, governments also increasingly recognize the importance of just transitions to addressing the major consequences of adaptation strategies for jobs, livelihoods, and communities in all sectors, especially in industries, land use, agriculture, and cities. Greater support is needed for vulnerable workers and communities, including informal workers, indigenous people, and poor rural farmers.

2. CLIMATE POLICIES AND PLANS SHOULD BE ALIGNED WITH THE LEAVE NO ONE BEHIND PLEDGE.

Endorsed with the 2030 Agenda, the leave no one behind pledge provides a strong complement to the just transition imperative to put social equity at the core of mitigation and adaptation measures. The analysis of climate discourse and planning, however, shows that this commitment remains largely overlooked and/or misunderstood. The pledge calls for people-centered narratives on climate action that reconcile environmental sustainability, human rights, and social justice and inclusion. It involves major shifts in business-as-usual climate policy planning, including explicit statement of poverty and inequality reduction as goals of climate

action, systematic identification of those at risk of being left behind, efforts to combat all forms of discrimination, empowerment of disadvantaged groups in decision-making, and prioritization of their interests in designing and selecting climate measures. This guidance can help avoid most of the major pitfalls that our review has identified as drivers of regressive impacts.

3. **THE ENVIRONMENTAL AND CLIMATE COMMUNITY NEEDS TO CHANGE ITS MINDSET ABOUT INEQUALITY.**

The literature review also strongly suggests that aligning climate action with the goal of inequality reduction and the leave no one behind pledge raises concerns for many in the climate and environmental community. Greater understanding of what this alignment entails is needed. Some fear that the goal of inequality reduction could raise expectations beyond what climate interventions can achieve. Pursuing this goal, however, does not mean assuming that climate action alone can reduce social inequality. Structural factors of inequality must be considered in designing climate actions so that access to these actions' benefits is made equitable, but this should be part of a whole-of-government strategy tackling inequality.

More analyses of country experiences and peer learning will help build knowledge on ways to overcome perceived trade-offs between efficiency and equity. The systematic prioritization of disadvantaged groups in climate actions may seem challenging. Scaling up progress in cutting emissions and protecting entire societies can involve targeting green solutions at high emitters, deploying adaptive projects in areas where populations and economic assets are concentrated, and promoting the most effective technologies, all of which can be complex and expensive. These biases can put climate solutions out of reach for the least well-off. Country experiences show that an equity approach can help scale up low-carbon and adaptive solutions with strong guidance from public actors, multistakeholder partnerships, and diversified financial resources, among other factors. Valuing inputs from local communities and broadening access to benefits can result in more relevant and effective solutions, enhanced resilience, and greater mobilization during implementation.

A nonpartisan approach to linking climate and social measures is also needed to gain support for greater integration. There are some concerns that making inequality reduction an explicit goal of climate action could bring controversies over social policies into climate debates, politicize proposals for climate measures, and undermine efforts to get buy-in for raising climate ambition. Such arguments were raised during debates over the Green New Deal in the United States and the Green Deal in the European Union. The gradual rightward shift of political debates in large economies partly explains the lack of consensus on the goal of inequality reduction. The recognition that equity is a universal value and aspiration and that it can be achieved politically is a precondition for progress in advancing fairer climate actions.

4. **ACHIEVING JUST AND INCLUSIVE TRANSITIONS REQUIRES DELIBERATE PLANNING FOR EQUITY, FROM THE START.**

The assumption that climate actions will automatically generate universal benefits is probably the biggest factor leading to negative social impacts. It explains all the other gaps in climate action design. From this assumption usually derives a lack of distributional impact analysis, engagement of local populations, and identification of concrete measures and funding to enable groups at risk of being harmed and left behind to reap the benefits of climate solutions. Building on the literature and on country experiences, this paper has captured elements of a framework that climate policymakers should use to ensure they factor social equity, routinely and systematically, into climate policy planning, from the very start. This framework emphasizes six building blocks, including (1) clear prioritization of benefits for disadvantaged groups,

(2) participation by all stakeholders from the outset, (3) social equity impact assessments, (4) use of a social equity lens in the design of climate measures, (5) adequate finance, and (6) monitoring of social impacts during implementation and adjustment of climate policies in response. These elements have already been highlighted by numerous studies in various disciplines, but they are still too often overlooked in climate policy planning.

5. **SCALING UP CLIMATE ACTION WITH EQUITY SUPPOSES GREATER DEMOCRACY AND CITIZENS' EMPOWERMENT IN CLIMATE POLICYMAKING.**

Country experiences show the paramount importance of public participation to design just solutions and reach the least well-off. At present, they also reveal the predominance of top-down, technocratic, or engineering approaches to climate policymaking and business-as-usual consultations. Among the most significant shifts needed to drive a fair transition is the adoption of engagement frameworks that put people at the center of decision-making that will change their lives. The urgency and magnitude of the transformations needed across the economy call for whole-of-society mobilization and democratic innovation. The use of participative, deliberative, and direct democracy processes in the design and/or adoption of climate actions is on the rise. Experiences range from participative budgeting that lets people select climate projects to citizen assemblies on climate change (which are spreading across Europe) and bottom-up planning, where populations identify and develop their solutions. All these approaches deserve further research to identify factors that produce timely, inclusive, fair, and effective climate actions.

The literature review highlights the increasing number of citizen cooperatives emerging in all sectors to sustainably manage common resources, goods, and natural areas and their great potential to produce socially just actions. Examples show that such cooperatives can lower access barriers to practices that preserve water sources and forests, produce renewable energy, enhance energy efficiency, and promote climate-smart agriculture and a circular economy. While their forms vary greatly and cases of discrimination have been reported, most of them foster participatory decision-making, sharing, and distributive justice. The administrative and financial environment in which these citizen cooperatives develop could be improved in most countries.

6. **MORE RESEARCH, DATA, AND PEER LEARNING WILL HELP CLIMATE POLICY PLANNERS DELIVER EQUITY.**

This literature review underscores significant data and information gaps on the equity impacts of climate actions, their factors, and the effectiveness of corrective measures. More research is needed to support the development of just strategies in all economic sectors, in the context of both low-carbon and adaptive policies, especially in low- and middle-income countries. Experience-sharing among countries facing similar transition challenges and peer learning on how to design progressive climate policies could help avoid many pitfalls identified in this paper. Already some coalitions are emerging—such as among countries with large coal-mining industries. Other communities of practice are needed.

The next few years will be decisive for avoiding the worst impacts of climate change and building a sustainable future for all. Ambition and equity in climate action are two sides of the same coin that condition the humanity's ability to preserve human rights and social justice. Both should guide countries' efforts to revise their climate plans and scale up implementation.

APPENDIX A. SUMMARY TABLE: MAIN EQUITY IMPACTS OF PRIORITY CLIMATE ACTIONS, ACCESS BARRIERS, AND CORRECTIVE MEASURES IN SIX KEY SYSTEMS

GOALS	CLIMATE ACTIONS	POSITIVE IMPACTS
Industry		
Phasing out most polluting industry	Target phaseout of extractive industry	Sustainable job opportunities Better health
Shifting toward a circular economy	Reducing waste Recycling and reuse of material	Sustainable job opportunities Better health Cheaper food and goods Cheaper housing
Energy		
Ending fossil fuel consumption	Removal of fossil fuel subsidies Carbon pricing	Dismantlement of expansive black market Improved public services and infrastructure Increased disposable income Better health
Expanding renewable energy and clean cooking solutions	Large-scale renewable energy (RE) projects Expansion of off-grid RE Expansion of clean cooking	Better health Greater opportunities for education and productive activities Higher disposable income
100% net zero building by 2050	Building stock retrofit High-efficiency building standards	Lower energy bills Better health Better home comfort (i.e., heating and cooling becoming more affordable)
Transport		
Phasing out ICE vehicles	Ban on ICE vehicles Removal of parking spots Zero-emission zones	Better health and quality of life

NEGATIVE IMPACTS	BARRIERS TO BENEFITS	CORRECTIVE MEASURES
Job and revenue losses Loss of identify, cultural capital, and well-being Reduced services, infrastructure	Lack of social security Poor social dialogue Skills requirement Limited mobility Mismatch between location of fossil fuel workforce and location of green jobs	Forward-looking social impact assessment Social dialogue and inclusive just transition plans Close monitoring of the impact of protective and corrective measures
Job losses Rising prices of some recycled goods Exposure to chemicals and hazardous material	Legal job contract Poor labor regulation and safety standards Lack of domestic production competing with secondhand imported goods	Integration of informal workers into formal waste management systems Safety measures Subsidies for recycled products Financial schemes to increase access to technology
Reduced mobility and welfare due to rising fuel prices	Lack of compensation No affordable alternative to high-emitting energy and mobility options	Transparency and information on likely impacts and revenue streams Redistributive approach to fossil fuel reforms and carbon revenues Support for low earners to access clean energy and mobility
Lower earners and disadvantaged groups left behind, greater social and gender inequality	Lack of local skills and technologies High cost of RE and clean cooking solutions Information gap Social norms and discrimination	Inclusive energy-related decision-making and gender-sensitive approach Financial schemes to support adoption of RE and clean cooking solutions Energy auctioning schemes for affordable clean electricity Awareness and education programs
No reduction in or greater energy poverty	High cost of retrofit work Split incentives issue Information gap Poor regulation	Cost-benefit-sharing approach to address split incentives Financial support to reduce cost of technology One-stop source to inform customers
Limited mobility for suburban and rural residents Reduced access to good and services Job losses	High cost of sustainable mobility Lack of public transport	Financial support for clean vehicles Deployment of public transport and other sustainable mobility options

GOALS	CLIMATE ACTIONS	POSITIVE IMPACTS
Expansion of green motorized transport	Improved and extended green public transport network	Direct employment opportunities Better access to city jobs, goods, and services Better health Reduced travel time
	Support for electric vehicles (EVs)	Better health Reduced mobility cost
Expansion of shared mobility services	Extension of shared mobility system (car-sharing, bike-sharing, ride-sourcing)	Resolves the "first and last mile" issue Reduced mobility cost and improved connectivity
Nonmotorized transport	Bike lanes Pedestrian-friendly street design	Better health Reduced mobility cost
Cities		
Compact and resilient cities	Adaptive land use regulations and planning	Safer housing Improved health and quality of life Greater spatial and social mobility Enhanced resilience
Sustainable and resilient infrastructures	Expansion of green mobility options Expansion of public piped water systems Building retrofit District refurbishment	Better health Greater access to mobility Improved water and energy security and disposable income Safer housing
More green spaces	Conservation of natural areas Expansion of parks and urban forests	Healthier environment Better quality of life Greater resilience to climate change impacts

NEGATIVE IMPACTS	BARRIERS TO BENEFITS	CORRECTIVE MEASURES
Job losses in informal mobility Safety and accessibility issues Green gentrification with land value and rent increase	Lack of equity goals and financing targeting poorer districts High fares on green public transport Social norms and discrimination Planning overlooking accessibility and safety issues	Political and financial support to ensure sociospatial justice Preferential fares Inclusive design Safety measures
Increased inequality in mobility	High cost of EVs Limited charging infrastructure	Financial support for EV acquisition from public and private actors Expansion of charging infrastructure
Exclusion of low earners, digital poor, and other disadvantaged groups Poorer and/or remote areas underserved	Prevalence of economic and financial concerns over public goals Insufficient safety measures Requirement of digital technologies Information gap Cultural and social barriers	Political and financial support to ensure sociospatial justice Preferential fares Available connection without digital tools Safety measures
Uneven distribution of walking and biking options, increasing inequality in access to safe, cheap mobility Green gentrification with increased land values and rents	Prevalence of economic and financial concerns over public goals Price of biking Social norms and discrimination	Political and financial support to ensure sociospatial justice Price incentives Safety measures
Disproportionate displacement of poor and disadvantaged groups without fair compensation and equal access to services Relocation in areas exposed to climate risks Loss of income, safety, and social networks	Poor representation decision-making Lack of property rights and legal protection	People-powered planning Independent climate risk assessment Fair land use regulation, relocation policy, and compensation for all
Concentration in wealthier areas, greater spatial inequality Disproportionate displacement of poor and disadvantaged groups without fair compensation Green gentrification with increased land values and rents	Prevalence of economic interests over public goals Poor consultation Social norms and discrimination Price of green amenities Information gap	Priority to underserved, water- and energy-poor areas People-powered planning Equity criteria for green finance instruments Control over real estate prices
Displacement without fair compensation Limited frequenting of green spaces Green gentrification with increase land values and rents	Poor consultation Social norms and discrimination	People-powered planning addressing residents' preferences Fairness in relocation policy and compensation for all Control over real estate prices

GOALS	CLIMATE ACTIONS	POSITIVE IMPACTS
Agriculture		
Soil improvement and restoration	Soil carbon and nutrient management Reduced tillage Replenishment of soil carbon	Enhanced productivity, income, and food security Greater resilience Improved resource conservation
	Soil conservation practices	Enhanced productivity, income, and food security Greater resilience
Resource efficiency	Improved nitrogen fertilizer management	Enhanced productivity, income, and food security Greater resilience Improved resource conservation
	New irrigation schemes Improved management of water resources	Enhanced productivity, income, and food security Greater resilience Improved resource conservation
Adaptation of crops and species	Crop diversification Shifts in cropping calendars	Enhanced productivity, income, and food security Greater resilience Greater gender equality
	Adapted species	Anaerobic digestion yields biogas for cooking, other uses
Forestry		
Sustainable forest management	Alternatives to fuelwood collection for cooking	Better health, especially for women and children Forest and biodiversity conservation, greater ecosystem services and livelihoods Enhanced resilience to climate disasters
Sustainable forest management	Expanded REDD+ initiatives	Diversification of farmers' income with rewards schemes Job creation More secure land rights Microclimatic regulation Improved soil Protection of coastal areas Water and flood regulation
Agroforestry	Mixed planting of trees and crops	Diversification of livelihoods and income Greater productivity and water and food security Improved ecosystem services and enhanced resilience to climate disasters

NEGATIVE IMPACTS	BARRIERS TO BENEFITS	CORRECTIVE MEASURES
Greater social and gender inequality among farmers	No land ownership and insecure land tenure Poor access to credit Inability to wait for long-term benefits Knowledge gap Labor market conditions Social norms and discrimination	Inclusive decision-making and gender-sensitive approaches Financial schemes to support poorer farmers Land access and tenure security Information and capacity building
Reduced land for production Maintenance costs Greater inequality among farmers	No land ownership and insecure land tenure Poor access to credit Inability to wait for long-term benefits Knowledge gap	
Greater social and gender inequality among farmers	Cost of technologies and equipment Knowledge gap	Inclusive decision-making and gender-sensitive approaches Financial schemes to support poorer farmers Information and capacity building
Greater social and gender inequality among farmers Disruption of grazing patterns	Cost of technologies and equipment Knowledge gap Social norms and discrimination	
Greater social and gender inequality among farmers	Cost of technologies and equipment Knowledge gap Social norms and discrimination	
More labor for farmers	Cost of equipment Knowledge gap Social norms and discrimination	
Greater inequality with low adoption rates among the poor Loss of livelihoods	Cost of alternatives and low access to credit Information and knowledge gaps Social norms	Information and capacity building Subsidies for low earners
Loss of resources, livelihoods, income and cultural capital Rising conflicts and human rights abuses Greater social and gender inequality Increased dependence on external funding Rural-to-urban migration Contested control over land	No or insecure land-tenure rights Poor information and engagement of local communities, especially disadvantaged groups No prior informed consent Poor institutional capacity	Secured tenure rights Inclusive governance Respect for communities' needs and preferences Equitable benefit-sharing arrangements in REDD+ initiatives Close monitoring with the population
Social and gender inequality among farmers Reduced availability of land for farming	No or insecure land-tenure rights Cost and low access to credit Knowledge and technology gaps Cumbersome and onerous administrative and licensing procedures	Support for upfront investments Information and capacity building Farmer organization into cooperatives (e.g., through common nurseries for saplings) Accessible licensing procedures

ENDNOTES

1. Consideration of the global nature of climate change, historical emissions differences among countries, and wide divergence in levels of development have underpinned the principle of common but differentiated responsibilities and respective capabilities (CBDR-RC) in the light of different national circumstances. Recalling this principle, the Paris Agreement requires all Parties to put forward their best efforts through nationally determined contributions (NDCs) to meet universal goals, while requiring developed countries to provide finance to assist others.
2. IAEG-SDGs used the term *dimensions* to refer to the characteristics by which data are disaggregated (such as income and sex) and *categories* to refer to the different characteristics under certain disaggregation dimensions (such as male and female under the sex dimension).
3. For example, steel production grew by 40 percent over the decade before 2018, with nearly 95 percent of this growth in China alone, while global cement production tripled during that decade (Material Economics 2018).
4. The promotion of renewable energy sources impacts electricity tariffs in many ways. Increased retail costs can reflect supporting policies for renewables (feed-in tariffs, renewable portfolio obligations, net energy metering) and financial incentives for consumers. The increase in renewables production units and the variability of renewable energies can increase energy system operating costs. Renewable energies can benefit from preferential tariffs and priority access to the grid, which means that other energy sources coming from coal-fired, gas, or nuclear power plants must immediately reduce production accordingly and need to amortize fixed costs over lower operating times.
5. *Split incentives* refers to any situation where the benefits of a transaction do not accrue to the actor who pays for the transaction.
6. The origin of the concept of commons is found in the Magna Carta and the Charter of the Forest, written in the 13th century. Following mass hunger triggered by the nobility's privatization of forests and rivers, the commons reaffirms the need for shared resources. The concept was revived in the 17th-century England when commoners rebelled against elites who had fenced vast tracts of land for private use, leading to the English Civil War.
7. National and regional governments can strengthen the financial capacities of cities in many ways, including through higher fiscal transfer; investing in capacity building; introducing standards methodologies for appraising, establishing, and disclosing public-private partnerships; and authorizing the use of land value capture. This challenge cannot be addressed within the scope of this paper.
8. Many climate funds can only engage with central governments or require sovereign guarantees. The new institutional features that the Green Climate Fund and the Adaptation Fund have introduced to channel climate finance to the local level, including direct access modalities and fit-for-purpose organizational accreditation and project approval processes, may help cities tap into these resources.
9. According to the UN classification, three levels distinguish indicator quality: Level I stands for indicators for which both data and a data collection methodology are available; Level II means methodology is available but no data; and Level III means that neither data nor collection methodology exist.
10. Bolivia's NDC sets the target of "reducing extreme poverty to zero in the population dependent on forests by 2030," under the mitigation priority of decreasing deforestation.

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ABOUT WRI

World Resources Institute is a global research organization that turns big ideas into action at the nexus of environment, economic opportunity, and human well-being.

Our Challenge

Natural resources are at the foundation of economic opportunity and human well-being. But today, we are depleting Earth's resources at rates that are not sustainable, endangering economies and people's lives. People depend on clean water, fertile land, healthy forests, and a stable climate. Livable cities and clean energy are essential for a sustainable planet. We must address these urgent, global challenges this decade.

Our Vision

We envision an equitable and prosperous planet driven by the wise management of natural resources. We aspire to create a world where the actions of government, business, and communities combine to eliminate poverty and sustain the natural environment for all people.

Our Approach

COUNT IT

We start with data. We conduct independent research and draw on the latest technology to develop new insights and recommendations. Our rigorous analysis identifies risks, unveils opportunities, and informs smart strategies. We focus our efforts on influential and emerging economies where the future of sustainability will be determined.

CHANGE IT

We use our research to influence government policies, business strategies, and civil society action. We test projects with communities, companies, and government agencies to build a strong evidence base. Then, we work with partners to deliver change on the ground that alleviates poverty and strengthens society. We hold ourselves accountable to ensure our outcomes will be bold and enduring.

SCALE IT

We don't think small. Once tested, we work with partners to adopt and expand our efforts regionally and globally. We engage with decision-makers to carry out our ideas and elevate our impact. We measure success through government and business actions that improve people's lives and sustain a healthy environment.