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Executive Summary

Brazil has an opportunity to build a prosperous future by embracing a low-carbon, climate-resilient growth pathway. Building on its green energy mix and natural resource wealth, Brazil could benefit from the global decarbonization trend and reduce its exposure to climate risks by favoring a productivity-driven and diversified growth model, scaling up the use of renewable energy, favoring energy efficiency and resilient development, and curbing deforestation. These actions would help Brazil stop illegal deforestation by 2028, reduce greenhouse gas (GHG) emissions by 50 percent by 2030, and reach net-zero emissions by 2050. At the same time, they would also help address some of Brazil’s key development challenges, such as the slow productivity growth in manufacturing, large income inequality across and within regions, and disparate access to key services like quality education, clean water, and sanitation. There are, however, important challenges to overcome and urgent policy action is needed to unlock this opportunity.

This Country Climate and Development Report (CCDR) explores policies and options for Brazil to meet its development and climate objectives together. It explores the costs and benefits of an illustrative, but realistic pathway through which Brazil could achieve higher resilience and net-zero emissions by 2050. It identifies priorities for the near and medium terms, as well as options for financing the required investments. This CCDR explores structural reforms and productivity-enhancing measures, economy-wide policies for resilient and decarbonized growth, and multisectoral policies and investment packages that are in line with Brazil’s development and climate objectives. These measures, combined with private, public, and dedicated climate financing, could enable Brazil to achieve green, resilient, and inclusive development, with net-zero emissions by 2050.

The Climate and Development Opportunity in Brazil

Climate change risks are compounded by deforestation and land degradation.

Climate change is already affecting temperature and rainfall patterns in Brazil, resulting in reduced water availability and extended droughts, and these problems are expected to worsen with time. This has implications for hydropower, agriculture, and urban water use, and also threatens Brazil’s unique ecosystems, especially the Amazon and Cerrado biomes. Extreme weather events such as droughts, flash floods, and riverine floods in cities are causing losses averaging R$13 billion (US$2.6 billion, or 0.1 percent of 2022 GDP) per year. Disasters also significantly disrupt Brazil’s transport and power infrastructure, affecting economic competitiveness. The urban poor, especially residents of informal settlements, are particularly vulnerable.

Brazil could soon reach a tipping point beyond which large areas of the Amazon basin would no longer have enough rainfall to support the native ecosystems or provide essential ecosystem services such as erosion mitigation, water supply and purification, biodiversity, and carbon storage. The combination of climate change, deforestation, and expansion of low-intensity pasture in the Amazon biome is intensifying threats to Brazil’s key ecosystems. This will have major consequences for agriculture, urban water supply, flood mitigation, and hydropower. The projected impact from a potential Amazon tipping point on Brazil’s cumulative gross domestic product (GDP) through 2050 would be about R$920 billion (US$184.1 billion or 9.7 percent of 2022 GDP).

Even without considering possible tipping points, climate shocks could push another 800,000 to 3 million Brazilians into extreme poverty as soon as 2030. Although Brazil had sharply reduced the share of people living in extreme poverty in the past three decades, the share of extreme poor has risen since the economic downturn of 2015–2016, and is estimated to have reached 5.8 percent in 2021. Climate-related reductions in agricultural income, extreme weather events, food price changes, impacts on
health, and reduced labor productivity due to heat could exacerbate poverty. Depending on the underlying development pathway, the resulting increase in extreme poverty could range from 0.4 to 1.3 percent of the population by 2030.

**Brazil's emissions profile and abundant natural resources represent an exceptional opportunity to benefit from climate action.**

While Brazil is one of the top 10 GHG emitters in the world, its emissions profile differs from that of other countries. Between 2000 and 2020, 76 percent of the country’s emissions came from land use change, including deforestation and agriculture, compared with 18 percent for global emissions. On the other hand, almost half of Brazil’s energy supply, including over 80 percent of its electricity, comes from renewable sources, compared with world averages of about 15 and 27 percent, respectively.

Brazil's emission profile presents low-cost options for reducing the country's overall emissions while enhancing its resilience to climate risks and mitigating the risk of reaching a tipping point. Meeting the government’s commitment to stop illegal deforestation by 2028 and reach zero net GHG emissions by 2050 (as per the Forest Code) could create significant carbon dioxide (CO₂) removals while also preserving vital ecosystem services for the agriculture, energy, and urban sectors. Prioritizing efforts to curb deforestation would also enable Brazil to gradually decarbonize other sectors and avoid reaching the Amazon’s tipping point.

Brazil's high share of renewable energy and potential to produce green goods and services give the country a competitive advantage in supplying products required for decarbonization, including green minerals, green hydrogen, and green manufactured goods. Brazil is already competitive in several products required for decarbonization, including products related to the wind turbine value chain and parts for electric motors and generators, and has further opportunities to diversify into solar value chains. Brazil also has exceptional prospects to produce, consume, and/or export green hydrogen, which can help accelerate energy transition while diversifying exports and attracting investment. At the same time, Brazil could benefit from its considerable deposits of climate-relevant minerals. Capturing these opportunities will require working to minimize environmental risks associated with mineral production, as well as to avoid locking the energy system into continued use of fossil fuels (including for hydrogen production).

While renewable options are the most cost-effective for domestic energy needs, Brazil's offshore oil and associated gas reserves will remain competitive in global markets in the coming decades. Relatively low production costs mean that Brazil’s fossil fuel production and associated revenues are expected to increase over the medium term. But future decreases in global demand could pose a risk to the long-term sustainability of relying on pre-salt oil and gas as a source of income. And increased local oil and gas production does not imply an increased use for domestic energy needs, for which renewable sources are more cost-efficient.

How can Brazil reduce its exposure and vulnerability to climate change risks and capture the opportunities offered by more resilient and low-carbon development? This CCDR prioritizes recommendations that can deliver short-term development gains as well as climate-related benefits, either in the form of higher resilience or lower GHG emissions. But it also identifies urgent measures and interventions, which cannot be delayed in the context of growing climate change impacts, rapid forest loss and degradation in the critical biomes, and highly ambitious climate commitments and objectives, such as the end of illegal deforestation by 2028 and zero net emissions by 2050.

This CCDR emphasizes actions in four dimensions that reinforce and build on each other: structural reforms and productivity-enhancing measures, economy-wide policies for resilient and low-carbon growth, sectoral policies and investment packages, and action to ensure the required investments can be financed (Figure ES-1). Structural reforms can boost productivity and efficiency and help Brazil transition to a productivity-led growth path that would reduce pressures on the environment. However, structural change takes time. Structural reforms need to be complemented with economy-wide interventions to align
the incentives of households and the private sector and improve their ability to transition to a cleaner and more resilient development path. Even with these interventions, capturing opportunities at the sectoral level—for instance, linked to land use or the power sector—requires dedicated interventions, and the right sectoral regulations, policies, and investments. And these investments can be made only if public and private capital can be mobilized and directed toward the most pressing needs.

**FIGURE ES-1.** This CCDR’s structure and recommendations: a combination of structural reforms, economy-wide climate policies, targeted sectoral measures, and financing

Structural reforms to boost productivity and efficiency would accelerate Brazil’s journey toward high-income status.

**Brazil could be a richer and greener country if it transitioned to an economic model based on productivity growth.** The productivity agenda has already received significant attention in Brazil with important reforms in areas such as the business climate (such as a new bankruptcy regime), investment promotion (opening new sectors to private investment), capital market efficiency (flexibilization of interest rates and a new law on credit bureaus), sector regulations (e.g., on sanitation, railways, and cabotage), and trade promotion. Productivity gains in manufacturing and traded services would make those sectors more competitive while helping Brazil achieve high-income status. Doing so would also ease pressure on natural resources, with benefits for the climate, biodiversity, and local environment quality.

**Investments in infrastructure and people would accelerate growth and inclusion, helping the population become more resilient to climate risks and better equipped to adapt to climate change.** Good development policies contribute to resilience, through better access to infrastructure services, less precarious housing, lower dependency on agricultural income, and greater financial inclusion, social protection, and access to health care, among others. Reversing Brazil’s underinvestment in infrastructure is critical to close the infrastructure gap and make up for some past neglect of maintenance. The country also needs to strengthen its human capital foundation and prioritize poverty reduction to boost resilience.

**A key step will be to accelerate structural reforms and close institutional gaps that hold back productivity-led growth.** Product and factor (including land) market reform and better enforcement of related policies will be important for realizing productivity gains and higher and more inclusive growth. And policy reforms that enhance flexibility and facilitate the reallocation of labor and capital across firms, sectors, and regions can reduce adjustment costs created by climate change impacts or policies to reduce emissions. While institutions tend to be relatively strong at the federal level, there are gaps, especially at the
subnational level (e.g., at the municipal level in planning and technical know-how). Trade policy reform (such as the liberalization of tariffs and nontariff barriers; reduction of regulatory restrictions on environmental services; and adherence to sustainability standards) can also help Brazil integrate with global value chains beyond commodities, delivering economic and environmental gains.

However, not every growth path leads to improved resilience and GHG emissions reduction, and changes in economic structure alone are not sufficient to deliver on Brazil's urgent climate and environmental objectives. Climate policies are necessary to align development and climate objectives. Additional policies are needed to internalize externalities, including the climate change one, but also to tackle the multiple market and coordination failures—such as those related to technologies or network effects—that slow down the transition toward greener and more resilient growth. This CCDR explores the combination of economy-wide interventions—including carbon pricing and measures for resilience and a just transition—with a set of targeted sectoral interventions.

**Economy-wide Policies for Resilient and Low-carbon Growth**

There is already momentum in Brazil toward instituting carbon pricing, with a national emissions trading system (ETS) being advanced through legislative and executive action. In the Brazilian context, an ETS can most obviously be applied to the industrial sector, and implementation would be relatively straightforward for its major emitters. Implementation challenges in other sectors mean that agriculture and land use, land use change, and forestry (LULUCF) are currently not good contenders for direct inclusion. However, an ETS could support emission reductions through forest-based carbon offsets, provided appropriate methodologies and verification ensure their quality and environmental integrity. A jurisdictional REDD+ approach, focused on rewarding subnational governments for curbing deforestation, could also make sense for Brazil, since most deforestation is illegal.

If embedded into a broader reform of Brazil’s tax system, there is also room to consider introducing a carbon tax that meets Brazil’s revenue and climate objectives in a just and efficient manner. Brazil has significant room to improve its tax system, which is considered overly complicated and burdensome. There is an opportunity to consider introducing a carbon tax (and initiate a phaseout of subsidies to emission-intensive activities) in the context of a simplification and improvement of the overall tax system. For instance, a gradually increasing economy-wide upstream carbon charge on fossil fuels could raise about R$150 billion (1.3 percent of GDP) annually by 2030, which could be used to replace less efficient, more distorting, or costlier-to-collect taxes (for instance in a budget-neutral way) or to invest in the country’s development.

Investments in education and job skills training—with targeted support for vulnerable people and workers—will also be important to boost resilience and facilitate the transition to a greener economy. While an increased ability to reallocate resources will facilitate adaptation and GHG emission reduction, people who depend on high-emissions or climate-vulnerable activities will need support to shift to new livelihoods. Investing in education and retraining can reduce the social and macroeconomic costs of climate change and facilitate the reduction of GHG emissions. A just transition in energy, manufacturing, and agriculture will require active labor market programs and professional training to close skills gaps and help workers find new jobs. Socially sensitive interventions are also needed that recognize communities’ cultural ties to certain places and economic activities, and minimize disruptions.

A more robust adaptive social protection (ASP) system could support families and communities and help protect them from being impoverished by climate shocks—especially when those shocks affect large swaths of the population at once. Brazil’s existing ASP system has constraints that limit its scalability and hinder timely and appropriate responses to those in need. It needs additional resources, and the social registry needs to be modernized with climate vulnerability information.
**Sectoral Policies and Investments to Align Development and Climate Action**

Brazil needs to prioritize targeted sector-level interventions. Brazil can achieve its development objectives, increase its resilience, and reach its 2050 net-zero emissions target by dedicating resources and political support to implementing sectoral policy and investment measures in the short and medium terms in three key intervention areas: deforestation and agriculture; the energy sector, including the power sector; and cities and transport systems. These are selected based on their impact on GHG emissions, climate risk exposure, and inclusive growth. In particular, the net zero emission target can be achieved thanks to a zero (gross) emission power system, with the rest of the economy being net zero with residual emissions in transport, agriculture, waste, and industries compensated by carbon removals from forests (Figure ES-2). By fixing important market and governance failures—for instance, related to the use of land or the infrastructure gap—these interventions also support the structural transformations that are needed for rapid and inclusive growth.

**FIGURE ES-2.** Brazil GHG emissions and removals by sector, 2020–2050

![Graph showing Brazil GHG emissions and removals by sector, 2020–2050](image)

Source: World Bank analysis done for CCDR

Curbing deforestation and increasing agricultural productivity can generate major economic and climate gains and help avoid reaching a tipping point in the Amazon.

Brazil’s commitment to end illegal deforestation by 2028 (per the current Forest Code) can be achieved without compromising development. Crop production and cattle ranching, land grabbing, illegal logging, road infrastructure, weak land and forest governance, and macroeconomic factors (like commodity prices and exchange rates) have all been identified as drivers of deforestation. Land-grabbing—including for the expansion of cattle ranching and land speculation—is a significant driver of deforestation in the Amazon and in the Cerrado. Illegal deforestation is most prevalent in undesignated lands. Additional incentives to convert land for agriculture come from subsidies, rural credit policies, and the structure of the rural land tax (Imposto sobre a Propriedade Territorial Rural, ITR).

A combination of measures to prevent land-grabbing and strengthen land governance would enable Brazil to more effectively tackle illegal deforestation. For example, the municipality priority list—which penalizes municipalities with high deforestation rates—increased its effectiveness through...
complementary policies on protected areas and private sector initiatives (e.g., a soy moratorium). Key steps for the government to strengthen land governance include adequately resourcing satellite monitoring of forests (e.g., PRODES and DETER) and law enforcement agencies, removing political interference, and eliminating uncertainties about the implementation of laws. Mapping of untitiled public lands would provide the government with crucial spatial data on the location of public lands and facilitate their designation as protected areas (including sustainable use lands and Indigenous territories). This information could also form the basis for adjudicating requests to regularize a private land claim. At the same time, it is important to modernize land registration, analysis, and validation practices. This would accelerate validation of the Rural Environmental Registry (CAR), which would, in turn, enable the use of instruments in the current Forest Code, such as the mechanism for trading forest certificates.

Augmenting the climate resilience and productivity of the agriculture sector will be important to ensure food security and the continued export of commodities. Priorities include improving cattle production through intensification and restoring degraded pastures. Reforming the main subsidized rural credit program, Plano Safra, would help promote low-carbon and climate-resilient practices that increase productivity. Farmers will need support with registration in the CAR to follow the current Forest Code and be able to apply for rural credit. Another key measure is to invest in improving irrigation infrastructure, with higher water productivity in the water-stressed regions of the country. Farmers’ vulnerability to drought could be further reduced through a climate-indexed insurance scheme, complementing the strengthened social protection system discussed earlier. Technical assistance and effective extension services can also help leverage private investment. Efforts to expand biofuels consumption can align with a net-zero trajectory if Brazil implements its RenovaBio agenda (see Box ES-1).

Support for other sustainable land- and forest-based economic activities could contribute to inclusive growth in rural areas. Expanding protected areas (including sustainable-use lands and Indigenous territories) can improve forest governance and create opportunities for receiving payments for ecosystem services, ecotourism, sustainable harvesting of non-timber forest products, sustainable forest management, and agroforestry systems. The setting aside of Legal Forest Reserves (LFRs), as required by the Forest Code for the Amazon and Cerrado biomes, also offers an income generation opportunity for rural landowners through sustainable management of the forest asset.

Box ES-1. Opportunities and risks in biofuel expansion

Brazil has a longstanding biofuel (ethanol and biodiesel) industry with policy support, including mandatory blending of 27 percent ethanol in gasoline and 11 percent biodiesel in diesel. Brazil’s nationally determined contribution (NDC) aims to increase the share of sustainable biofuels in the energy mix to about 18 percent by 2030. The biodiesel industry has been growing rapidly, in tandem with soy production, which provides more than two-thirds of Brazil’s biodiesel. The direct and indirect impacts of biofuel production on land conversion depend on the feedstock and policy framework.

As Brazil takes steps towards an electromobility strategy, biofuels can be a transitional fuel, but care is needed to avoid potential unintended consequences. EVs are a more energy-efficient and cost-effective option for Brazil to reduce GHG emissions and air pollution from road transport. Biofuels can help reduce emissions during the transition phase, as long as the strict RenovaBio criteria are met: no deforestation, compliance with the Forest Code’s legal reserve requirements, and compliance with agricultural zoning. While increasing evidence points to limited competition between crops for fuel production and crops for food production, it is also necessary to monitor for indirect land use effects and impacts on food prices.
Brazil can decarbonize its domestic energy sector without increasing costs, even if climate change reduces hydropower generation.

Brazil's power system can be fully decarbonized without increasing costs relative to business as usual (BAU). Brazil could shift from its current domestic energy plans to a zero (gross) emission plan with 99 percent renewables and 1 percent nuclear power (ZPS scenario in Figure ES-3, left panel). This shift would not increase total costs, estimated at R$376 billion (US$75.2 billion, or 1.3% of GDP over the same period), as higher upfront investment costs for power generation, transmission, and storage are fully compensated by savings in fuel and operations.

The zero-emission scenario can achieve decarbonization and climate resilience more cost-effectively than Brazil’s current approach. Climate change creates large uncertainties about future water availability, which may reduce hydropower generation and the power system’s overall ability to meet demand. However, the decarbonized power system can be made resilient to pessimistic scenarios regarding water availability (Resilient ZPS in Figure ES-3). Doing so would require increased renewable energy capacity and storage to ensure security of supply. But the resulting system would be slightly cheaper than current plans under reduced water availability (R$421 billion instead of R$432 billion) (BAU scenario in the right panel of Figure ES-3). This result shows that decarbonization and resilience objectives can be combined.

Brazil can use its green power supply to efficiently decarbonize transport and industry. Brazil has exceptional prospects to use renewable energy to produce electricity and green hydrogen for use in transport and industry and/or for export. A scenario with increased electrification and the use of green hydrogen for fuel-switching and export in transport and industry does not increase economy-wide energy costs, at a total of R$682 billion. Savings in transport and industry and revenues from hydrogen production compensate for the increased costs of power system expansion. However, R$267 billion in non-electricity energy expenditures are transferred to the power sector. This transfer would require significant investments in the power system expansion, especially in a scenario with reduced water availability; large investments in the transport sector (see estimates below); and the successful deployment of innovative technologies that create a global demand for green hydrogen or its derivatives.

Brazil’s current thermal expansion plans bring significant financial and economic costs to the power system and economy overall, and they would increase emissions. A zero-emission power system (ZPS) can be more resilient than BAU, with the 8 GW of new gas replaced by increased renewable energy capacity and storage to ensure security of supply. Costs to decarbonize transport and industry through electrification and green hydrogen would be about 3.4 percent lower with the cancellation of the 8 GW of new gas.

**FIGURE ES-3.** Present costs of power generation for multiple scenarios: Business as Usual (BAU) and Zero-emission Power Sector (ZPS) with current (left) or reduced water availability (right)

<table>
<thead>
<tr>
<th></th>
<th>Operational costs</th>
<th>Investment costs - generation</th>
<th>Investment costs - transmission</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Decarbonizing the power system does not increase total costs... (R$ billion)</strong></td>
<td>0</td>
<td>100</td>
<td>200</td>
</tr>
<tr>
<td>BAU</td>
<td>232</td>
<td>121</td>
<td>21</td>
</tr>
<tr>
<td>ZPS</td>
<td>184</td>
<td>166</td>
<td>26</td>
</tr>
<tr>
<td><strong>... even in a scenario with reduced water availability (R$ billion)</strong></td>
<td>0</td>
<td>100</td>
<td>200</td>
</tr>
<tr>
<td>BAU</td>
<td>289</td>
<td>121</td>
<td>21</td>
</tr>
<tr>
<td>Resilient ZPS</td>
<td>203</td>
<td>189</td>
<td>29</td>
</tr>
</tbody>
</table>

Note: A 6 percent discount rate is used.
Brazil needs substantial new investments in its cities and its transport systems.

Brazil's high level of urbanization makes actions to ensure cities are resilient, low-carbon, and inclusive a top priority. There are significant gaps in access to sanitation and to high-quality housing, and rapid and unplanned urbanization has left many people living in unsafe areas, such as floodplains and steep hillsides. Brazilian municipalities are already starting to take action to address climate change, but need policy support, increased private sector engagement, and access to finance. Policy support to enhance coordinated urban development planning and management will be instrumental. Increased private sector engagement and access to finance for investing in nature-based and grey infrastructure measures could help augment urban resilience. Transport, the building sector, and waste management offer large GHG reduction opportunities.

Proactive investments to make the road network more resilient to natural hazards would increase upfront cost but pay back over time. In the next decades, the country will need to invest an estimated R$2,170 billion (or US$434 billion) in road infrastructure to address the existing infrastructure gap. To make these new infrastructure assets climate-resilient, additional investment needs are estimated at R$110 billion (or US$22 billion), but they would avoid losses estimated at R$235 billion (US$47 billion). In contrast, economic analysis suggests that retrofitting roads outside the normal replacement schedule has a benefit-cost ratio below 1, except for the most critical assets (such as the main corridors for soy exports, for which retrofitting for resilience makes economic sense).

The Avoid-Shift-Improve approach can help Brazil decarbonize its transport system and make it more inclusive, but this transition requires large investments. Travel demand can be reduced through more compact and mixed-use urban development, which can also improve people’s access to services and economic opportunities. Achieving a modal shift in freight will require large investments in railways and waterways, while a modal shift in passenger transport will require improving public transit service and passenger rail. Because a modal shift cannot fully eliminate the need for motor vehicles, it will be important to electrify trucks and locomotives or shift to hydrogen fuels. Investments will also be needed to electrify buses and light vehicles, to cover the costs of vehicles as well as charging infrastructure. The additional investment needed to achieve net-zero emissions for freight is R$532 billion (~US$106 billion) and R$546 billion (US$109 billion) for passenger transport.

Economic Costs, Investment Needs and Financing Options

Meeting Brazil's development objectives will require an increase in investment in infrastructure, and this challenge is only marginally affected by climate change. The reduction in infrastructure spending is particularly worrying, as it has dropped dramatically from approximately 4.8 percent of GDP in the 1980s to just over 2 percent in the 2010s and just 1.7 percent in 2021—a volume insufficient to replace depreciated capital, let alone expand the infrastructure stock. The World Bank has estimated that Brazil needs to invest 3.7 percent of GDP per year to achieve its infrastructure-related Sustainable Development Goals by 2030. Additional investments required for the resilient and net-zero pathway should be considered in this broader context.

The additional investments needed for climate action represent about 1 percent of Brazil’s annual GDP. Total investment needs in 2022–2030 amount to 0.8 percent of projected GDP, and over the 2022–2050 period, around 1.2 percent. They also represent around 22 percent of the baseline investment needs to close the infrastructure gap and achieve Brazil’s development goals, in the absence of the climate objective. Moreover, they would yield significant savings, equivalent to 0.3 percent of GDP over 2022–2030 and 0.7 percent of GDP over 2022–2050, through avoided energy spending in transport or industry and reduced costs from congestion and air pollution. Overall, the total economic costs of the resilience and net-zero pathway proposed in this CCDR are about 0.5 percent of GDP, without accounting for benefits from avoided climate change impacts (which depend on action in the rest of the world).
These public spending needs will be increased by compensation and social expenditure needed for a just transition. While these expenditures are transfers, not aggregate economic costs, they will nevertheless increase pressure on public finance. Compensation and social expenditures related to coal are expected to remain relatively small (R$2.6 billion over 2022–2050, or US$510 million). However, if the 8 GW of planned new gas capacity is built, achieving net-zero GHG emissions by 2050 would require early retirement of plants and compensation to their owners that could reach R$217 billion, or US$43 billion. Other needs to support the transition, such as retraining or reskilling for affected workers in agriculture or industry, were not estimated.

Brazil has limited fiscal space and faces increasingly challenging demographic trends. The country has made progress towards rebalancing its budget, liquidating much of the pandemic’s emergency spending package. But debt levels remain high (73.5 percent of GDP as of December 2022) and budget rigidity is high (over 90 percent of expenditure is mandatory). These challenges will be magnified by demographic change and rapid aging of the population, which will increase pressures on the pension system and public services.

Financing investments in decarbonization and climate resilience will require private sector engagement supported by dedicated climate finance and public spending.

The private sector is expected to cover a large share of investment needs for climate action, including a majority of capital investments to expand the power system. Businesses have led innovation in Brazil in agribusiness and forestry, renewable energy, public transit electrification, green buildings and retrofits, and waste-to-energy plants. To continue playing this role, the private sector requires an appropriate enabling environment, and public support to accelerate innovation and incubate early investments in areas such as electrification of the economy and green hydrogen. In agriculture, the private sector would be best placed to invest in activities that result in removals of emissions (e.g., agroforestry, restoration of pastureland), implement climate-smart agriculture, boost agricultural productivity, and support biomass and second-generation biofuels. There are ongoing studies examining the financial viability of supporting the restoration of degraded pastures through agroforestry. The consolidation of a solid concession and public-private partnership (PPP) framework, with clearly identified priority projects, can provide a better environment for private investment.

Brazil can continue to access a mix of available climate finance. The Amazon Fund, for instance, has raised R$3.4 billion in donations as of 2020. Other forms of climate finance from global and bilateral climate funds have also been mobilized for Brazil. Dedicated climate finance (grants, concessional loans, and performance-based payments such as REDD+ and payments for environmental services) can continue to support Brazil’s climate efforts, many of which have regional and global benefits. There are also opportunities to mobilize external financing via REDD+ for Indigenous peoples and local communities for areas where they have rights to the forest resources. Additionally, 16 Federation Units (out of a total of 26 states and the Federal District) have created “state funds” aimed at financing environmental actions, including mitigation and adaptation measures. The amounts available for financing vary greatly among states, from a few thousand reais to R$492 million in 2018 in Rio de Janeiro state.

Brazil has the potential to benefit from recent developments in carbon markets and expansion of innovative financing instruments. New resources may become available through emissions trading under the Paris Agreement, but these resources will take time to materialize. In parallel, the voluntary carbon markets will continue to offer opportunities to commercialize forest carbon credits and REDD+. Finally, green bonds and sustainability-linked bonds could provide significant amounts of finance.

To free up public resources for climate action, Brazil could repurpose some existing spending and subsidies. In the agriculture sector, this can be done by linking access to subsidized credit with the adoption of climate-smart agriculture and supporting farmers’ enrollment in the CAR. Other subsidies that could be repurposed include those available to the beef industry (about R$12.3 billion between 2008 and 2017). Subsidies for coal-fired power generation, which totaled almost R$1 billion in 2020, could be
redirected to support the energy transition. Brazil can also support climate-related actions and investments by the private sector by applying climate criteria to the approval of public investments and in public procurement procedures.

There are real challenges to overcome, but if Brazil can tackle them, it can become a leader in green, climate-resilient, and inclusive growth.

Brazil has a time-bound opportunity to lead the way in the transition to a climate-resilient and net-zero GHG future, with significant benefits in terms of productivity and environmental preservation. With its large renewable energy potential and a majority of its emissions coming from land use, Brazil is well positioned to benefit from global decarbonization trends. There are clear synergies to capture between growth and the climate agenda: structural policies that promote higher efficiency and better use of resources will boost growth, but also reduce deforestation and energy use.

Even so, the transition will require overcoming difficult political economy challenges and can create social impacts that need to be minimized and managed. Structural change alone cannot generate the urgent changes needed to achieve Brazil’s objectives: it will need to be complemented by specific economy-wide and sectoral interventions that face their own barriers. Although this CCDR finds that the cost of those interventions is manageable, they nevertheless face difficult implementation, institutional, and political challenges and would require significant departures from current trends and plans. It is well worth the effort. If Brazil succeeds, it will not only meet its net-zero commitment, but also accelerate its journey toward high-income status and protect its people from the worst impacts of climate change and environmental degradation.