MEETING BRAZIL´S POTENTIAL AS A GREEN ECONOMY

BRAZIL POLICY NOTES

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Key messages

1 **Brazil is highly exposed to climate risk and need to take action to avoid irreversible damage to its economy.** Global climate change and local activities may contribute to reach a tipping point beyond which large areas of the Amazon basin would no longer be able to provide crucial ecosystem services, causing irreversible damage to the structure of the biome.

2 **Brazil is in an exceptional position to achieve emissions reduction at low costs and to benefit from climate action:** its energy sector (one of the most difficult to decarbonize worldwide) already comprises a considerable share of renewables, and most of Brazil's GHG emissions come from land conversion and agriculture, which makes emissions reduction a relatively low-cost option. Based on Brazil's experience and technology on low energy/forest management, Brazil is in a great position to export services and technologies and become a global leader in climate change.

3 **Leveraging its advantages in green energy and shifting from an economic model based on resource exploitation to one based on productivity growth could achieve two objectives:** enable Brazil to grow its economy and lead to a greener, richer, more sustainable and inclusive future.

Brazil can achieve net zero by 2050 by combining:

1 **Productivity-enhancing measures**, including trade policy reforms to integrate in global value chains beyond commodities and re-balance Brazil's growth model, increase efficiency along critical value chains, develop competitiveness in green value chains, leverage its low-carbon energy matrix to build a low emission industrial sector, and increase investment in infrastructure.

2 **Economy-wide interventions**, including two main areas: (i) appropriate pricing, through subsidy reforms and fiscal reforms (including carbon pricing mechanisms) to align economic incentives; and (ii) measures for resilience and a just transition, which includes investment in people's health and education, as well as relevant labor and social protection interventions.

3 **Sectoral interventions**, including (i) curbing deforestation and scaling up climate-informed landscape management; (ii) transitioning to greener and resilient energy, transport, and infrastructure for industries and manufacturing, and (iii) enabling resilient and low-carbon cities.

Why climate action now?

To manage climate impacts

To seize competitive advantages

To meet net-zero commitments

Why climate action now?

1. Brazil faces significant climate change impacts

1 Brazil is an agricultural powerhouse because of its hydrological conditions. Deforestation and global climate change might change this

2 Brazil already suffers because of changing temperature and rainfall patterns, reduced water availability and extended droughts are becoming more frequent, problems are expected to worsen over time. This has implications for hydropower (already impacts of water availability of up to 20%), agriculture (80% rainfed agriculture will suffer without irrigation infrastructure) , and urban water use, and threatens Brazil's unique ecosystems, especially the Amazon and Cerrado biomes.

3 Extreme weather events are already causing losses averaging R$13 billion per year. Disasters also significantly disrupt Brazil's transport and power infrastructure, affecting economic competitiveness. The low-income urban area population, especially residents of informal settlements (such as slums), are particularly vulnerable.

Why climate action now?

1. Brazil faces significant climate change impacts

4

The Amazon approaches a point of no return because of the combination of climate change, ongoing land speculation and deforestation. With further forest loss and degradation, Brazil could soon reach a tipping point beyond which large areas of the Amazon basin, within and outside Brazil, would no longer have enough rainfall to support the native ecosystems or provide essential ecosystem services to Brazil's economy. The projected impact from a potential Amazon tipping point on Brazil's cumulative GDP to 2050 has been conservatively estimated at about R$920 billion (US$184 billion).

5

Climate shocks could push additional 800.000 to 3.000.0000 Brazilians into extreme poverty as soon as 2030. Economic modeling shows how 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.

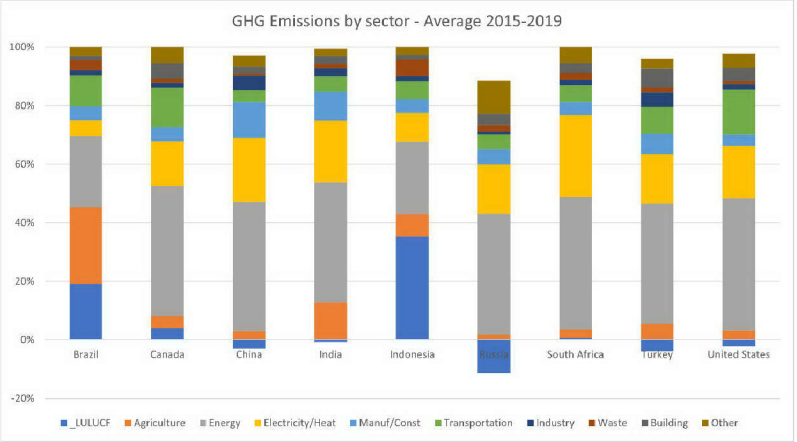
Why climate action now?

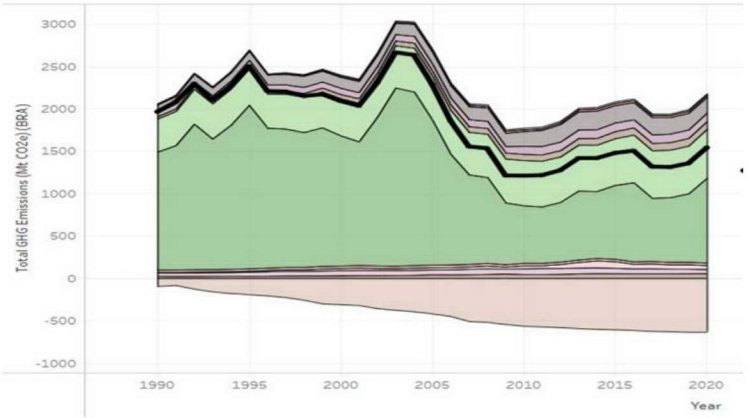
2. Brazil is exceptionally well-positioned to benefit from it

1 Brazil's emissions profile differs from that of most country because of the low share of energy and industry (costlier-to-abate sectors) and the high share of land use/forestry and agriculture (cheaper to abate).

2 Land use change from deforestation and agriculture dominate Brazil's GHG emissions, accounting for more than 50 percent of all emissions, compared with 20 percent globally, with deforestation being responsible for the totality of the net increase in recent years (but also of the net decrease in the early 2000s).

3 Brazil has already one of the most decarbonized energy sectors in the world with adapted and tested technology in place. Renewables account for roughly 48 percent of the Brazilian energy matrix and over 80 percent of its power matrix, compared to world averages of approximately 15 percent and 27 percent, respectively.





Why climate action now?

2. Brazil is exceptionally well-positioned to benefit from it

4 **The carbon intensity of Brazilian industrial production is lower than that of OECD and other BRICS countries,** providing a strong competitive advantage in a decarbonizing world.

5 **Brazil has global comparative advantages in several green value chains and** could become a global leader in exporting services and goods, including in the production of wind turbine, climate smart agriculture, ethanol, green steel production, forest management, electric buses; batteries, and green hydrogen.

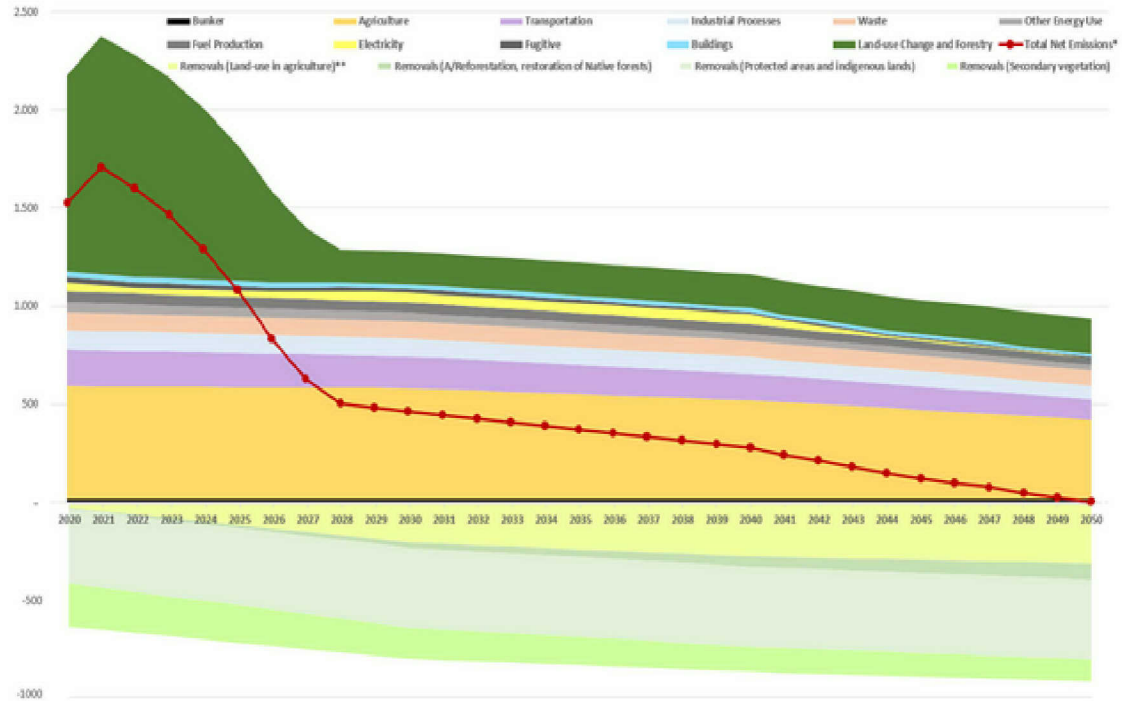
Brazil can achieve net-zero by 2050 by adopting sectoral interventions, structural reforms, and economy-wide policies

One possible path to net-zero (see graph) can be achieved by pursuing:

1 **Net zero deforestation:** zero illegal deforestation by 2028 and net zero by 2050.

2 **Negative emissions from various forms of enhanced land use:** commercial plantations (native and exotic) and restoration, climate smart agriculture and agroforestry, integrated land management systems, pasture restoration, protected areas (reaching -600 MtCO2e per year negative emissions).

3 Agricultural productivity gains **in already open land and at the same time effective restriction of forest lands.**



Brazil can achieve net-zero by 2050 by adopting sectoral interventions, structural reforms, and economy-wide policies

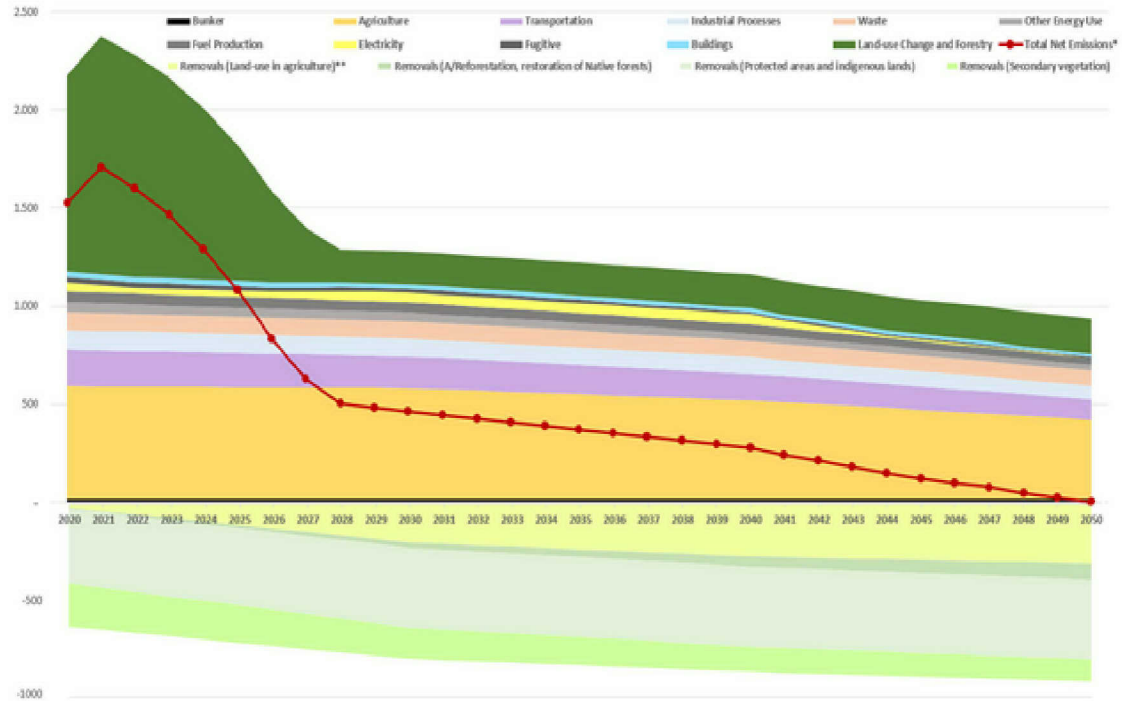
One possible path to net-zero (see graph) can be achieved by pursuing (continued):

4 Shifting the power system towards a significant increase in renewable electricity (up to 99 percent).

5 Higher electrification rates and hydrogen deployment in the transport sector , and modal shift from road transportation towards rail and waterways, and higher participation of public transport in urban areas.

6 Transition to low carbon fuels in high energy-use sectors.

7 Reduction of emissions in waste, energy use in industry and agriculture, fuel production, and buildings.



What are the World Bank recommendations?

SECTORAL MEASURES:

I Curbing deforestation

II Climate-smart agriculture

III Greener and more resilient energy

IV Greener and more resilient transport

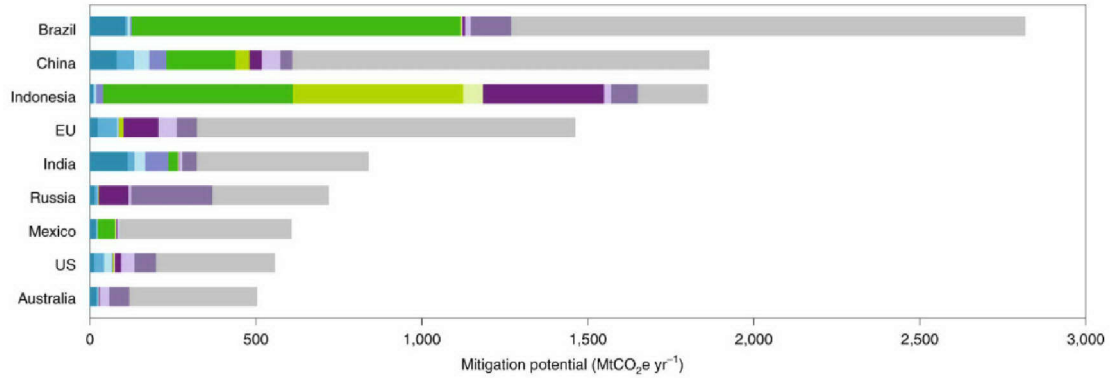
V Low-carbon cities

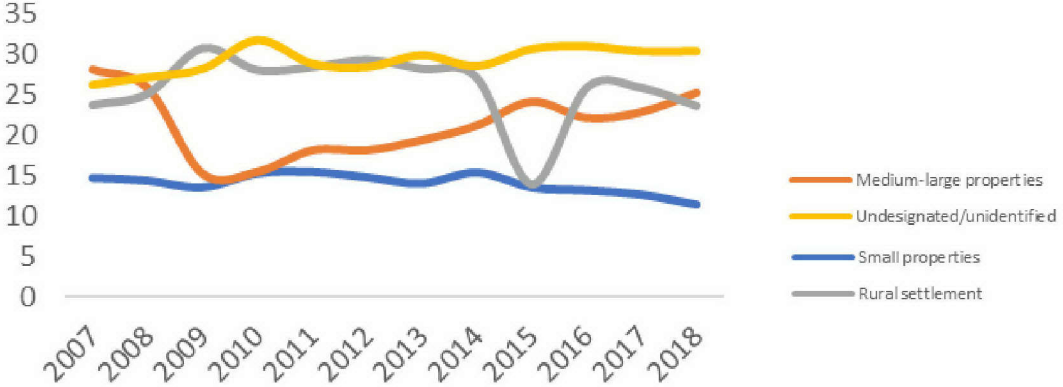
Sectoral interventions

Curbing deforestation and developing Brazil's forest economy:

Curbing deforestation is Brazil's single, most effective tool to reduce GHG emissions and reach net zero by 2050. Brazil has the capacity and the policy instruments to curb illegal deforestation, as shown between 2004 and 2012, with a drop of deforestation by more than 80 percent even during a time of high commodity prices, which reduced GHG emissions by more than 65 percent.

Actions include strengthening forest law enforcement and governance, address land grabbing and extensive cattle ranching, and facilitate just transition for rural households. At the same time Brazil's forest economy can significantly benefit from the emerging carbon market and take advantage of degraded lands.





Sectoral interventions

Specific policy actions include:

1

Enhance enforcement of environmental legislation by adequately strengthening satellite monitoring of forests (PRODES, DETER) and environmental enforcement agencies through resourcing, training, and interagency collaboration.

2

Mandate the interoperability and integration of the multiple land cadasters and registries and modernize and accelerate the land registration, analysis, and validation processes.

3

Invest in more accessible and simpler dispute resolution systems (arbitration, mediation, and other administrative procedures) and enforce credible penalties for illegal occupation and deforestation of land and related land-grabbing activities.

Sectoral interventions

Curbing deforestation and develop Brazil's forest economy:

1. **Complete the mapping and designation of all undesignated public rural lands,** including the designation, mapping, demarcation and registration of all federal and state protected areas, indigenous peoples' lands, agrarian reform settlements.

2. **Prioritize interventions in municipalities with the highest deforestation rates** to attack illegal deforestation more efficiently and avoid the expansion of the deforestation frontier.

3. **Prioritize investments in education and health care services in remote Amazon villages,** including Indigenous Peoples and traditional communities, small farmers to reduce poverty in the frontier.

4. **Create the enabling environment for a conservation friendly forest economy development in the Amazon.** Brazil has the highest forestry yield globally thanks to favorable climatic conditions and decades of research and could expand to the Amazon. A combination of appropriate financing mechanisms, paired with carbon finance, investments in logistics and fiscal incentives would allow the private sector to invest in a new forest economy in the Amazon, Cerrado and Mata Atlantica.

5. **Support bioeconomy development for communities in the Amazon forests, including Nontimber forest products, fisheries and agroforestry.** Developing market access, improve logistics, development of local capacity and research and facilitation of private community partnerships in the Amazon will provide a sustainable income to communities as an alternative to illegal exploration of natural resources.

Sectoral interventions

Scaling up climate-smart and resilient agriculture and sustainable landscape management

The Brazilian agriculture sector needs to shift toward a more climate-smart agriculture to achieve simultaneously (i) increased productivity (particularly amongst the poorest farmers), (ii) enhanced resilience of the sector and farmers towards climate shocks and, (iii) reduced emissions (by enhancing carbon storage in soils and fostering the use of low-carbon practices).

Implementation of a range of policy measures and support for scaling up climate-informed landscape management and fostering climate-smart agriculture will need to be tailored across and within biomes and reward climate smart and resilient management of natural assets.

1. **Reforming and retargeting existing financing programs and incentives** to further promote the adoption of low-carbon and resilient agriculture practices by scaling up the ABC+ program, and increasing loans limits for farmers with an approved Environmental Regularization Program (PRA); Dedicated support to the poorest family farmers should be enhanced, including support to family farmers' CAR registration to allow them to access rural credit.

2. **Changing the parameters of the land tax (ITR)** to reward the adoption of good practices and the efficient use of areas that can be farmed or ranched.

3. **Support extension services, and dissemination of best practices on climate smart agriculture.**

4. **Foster research on climate smart agriculture and landscape management** (in particular on integrated agro-sylvo-pastoral systems, agroforestry and on options to reduce methane emissions from cattle).

Sectoral interventions

Scaling up climate-smart and resilient agriculture and sustainable landscape management

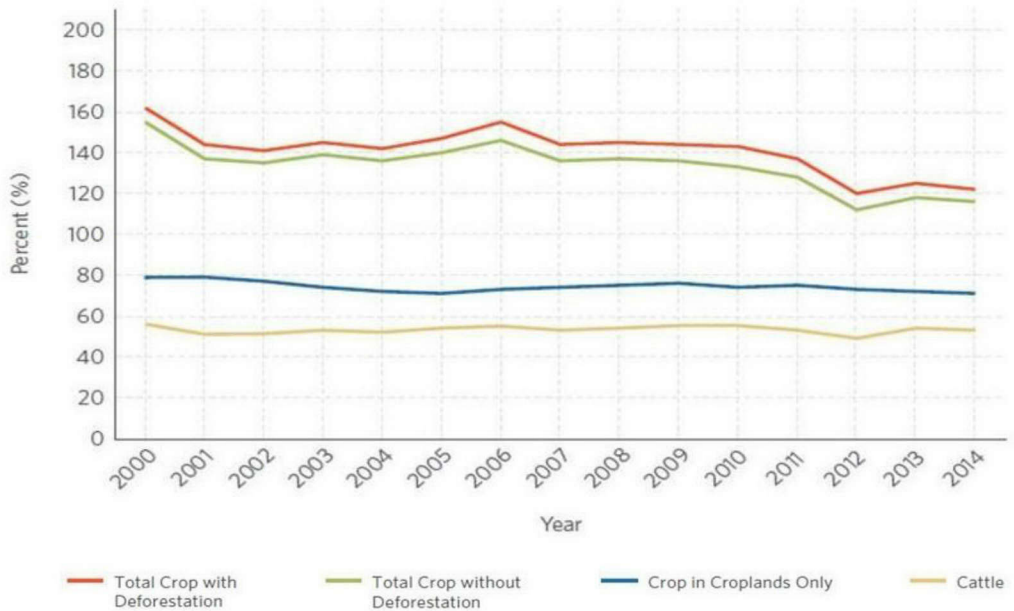
5. **Increase the use of climate-risks management tools such as insurance instruments** and coverage for agricultural production to catalyze climate resilience and productivity gains.

6. **Enhancing involvement of the private sector** in delivering market solutions for sustainable food systems, by scaling-up green certifications and low-carbon sustainable traceability protocols, as well as carbon market initiatives.

7. **Support forest-based economic activities ,** by strengthening the implementation of the forest code by scaling up the Cadastro Ambiental Rural (CAR) and enabling investments in agroforestry and allow trading of APP rights.

8. **Ensuring a just transition** to avoid adverse impact on formal and informal labor in rural areas.

Potential for productivity gains from different land use strategies



Sectoral interventions

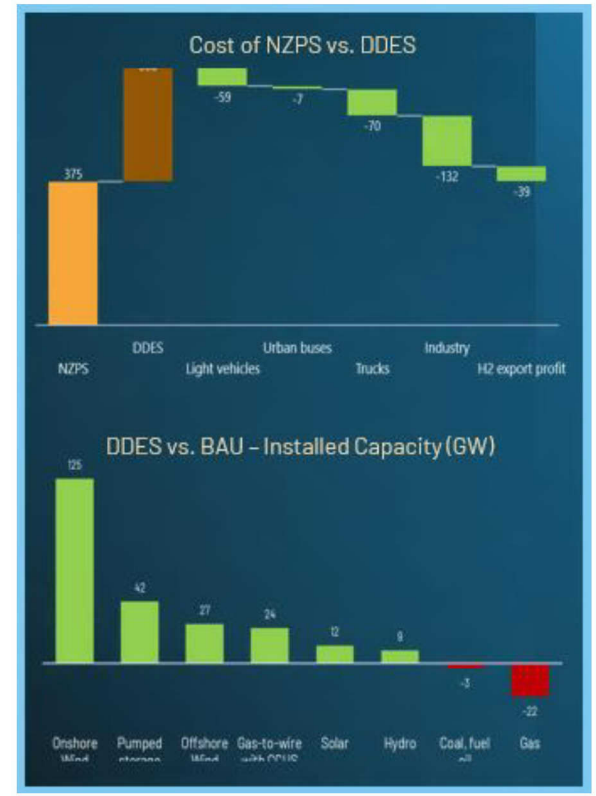
Greener and more resilient energy infrastructure

Brazil power system can be decarbonized without additional costs, as lower operating costs would compensate investment needs. A net-zero Power System (NZPS) would cost only marginally more than business as usual.

Beyond electricity generation, Brazil could invest to efficiently decarbonize transport and industry. The Deep Decarbonization of the Energy System (DDES) assumes increased level of electrification and the use of green hydrogen for fuel switch and export at comparable economy-wide costs but require considerable upfront investments.

Reduce support for inefficient and costly fossil-fuel power generation, including replacing plans of installing 8GW of new thermal with increased renewable energy capacity and storage, avoiding significative financial and economic costs.

Use Brazil's comparative advantage in the green supply chains: green hydrogen, e-buses, battery components. This would also accelerate its energy transition, diversify exports, and attract investment.



Sectoral interventions

Greener and more resilient transport infrastructure

Brazil could adopt the Avoid-Shift-Improve framework to decarbonize its transport system and make it more inclusive:

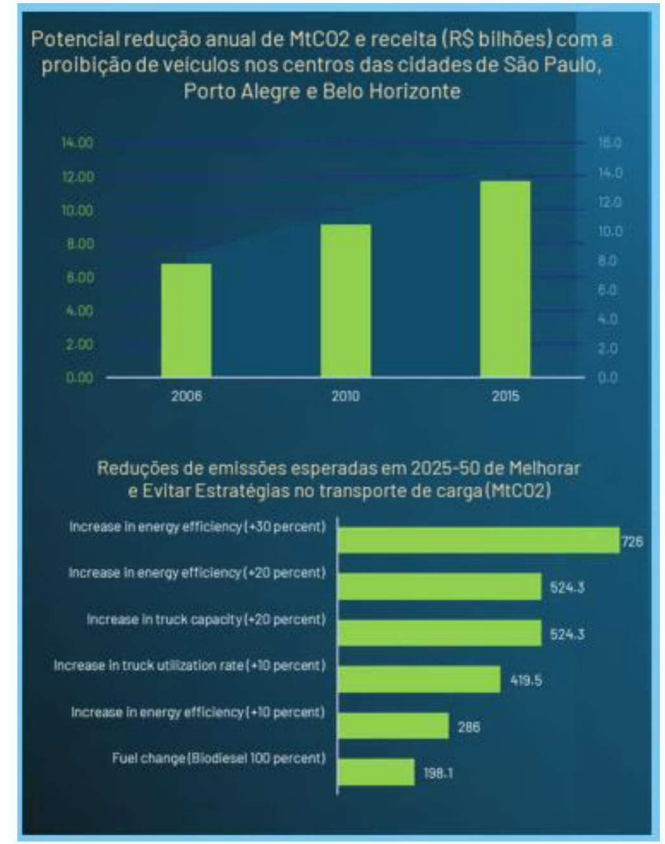
Travel demand can be reduced through more compact and mixed-use urban development, which can also improve people's access to services and economic opportunities. Low Emission Zones in large cities can reduce emissions and generate income that can be used to improve public transport services.

Achieving a modal shift in freight will require large investments in railways and waterways, while modal shift in passenger transport will require improving public transit service and passenger rail.

Proactive investments to make the road network more resilient to natural hazards would increase upfront cost but pay back over time (with 2x return over each $1 invested).

Improve the energy efficiency of freight transport, including by increased electrification, of trucks and locomotives or shifting 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.

However, 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).



Sectoral interventions

Low-carbon, more resilient cities

With 87 percent of the population living in urban areas and increased disaster hazards, actions to make cities low-carbon, more resilient and inclusive is a top priority: climate action in cities requires stronger urban planning, management, access to finance and public-private coordination.

Build capacity at municipal level for more coordinated urban development planning and management and secure financing to invest in multiple areas (e.g. urban, water, transport, waste), including through increased private sector engagement and investing in nature-based and grey infrastructure measures to augment urban resilience.

Support land-use and urban planning that increase density through compact urban form and transit-oriented development could have a strong impact in reducing GHG emissions but also in increasing productivity.

Develop an ex-ante strategy for the financial management of disasters and support to the most exposed cities.

Reduce GHG emissions from cities by promoting: Green building certification programs, Solid Waste Management system that include methane capture and destruction, Travel demand management measures that may switch users to additional use of public transport, and Introduction of clean fuel alternatives in the public transport fleet.

Invest in urban resilience, to address the combined challenges of social exclusion, lagging access to infrastructure and services, and vulnerability to extreme climatic events, through a combination of "hard" and "soft" interventions. Large-scale climate-adaptive infrastructure solutions combined with non-structural measures such as strengthening early warning and disaster preparedness and response systems.

What are the World Bank recommendations?

ECONOMY-WIDE MEASURES

I Carbon pricing instruments

II Productivity enhancing measures

III Climate adaptive social protection systems

IV Financing climate action

Economy-wide measures

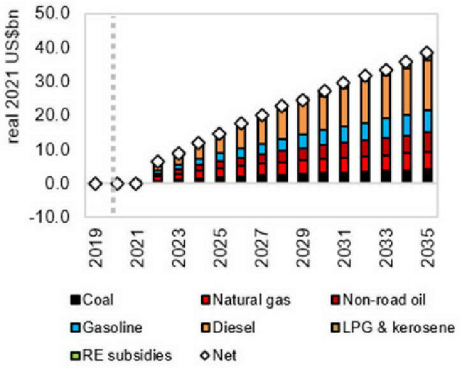
01 Pricing mechanism to align economic incentives

Brazil's tax system could become more productivity-enhancing and greener. Proposals for tax reforms in Brazil have been debated for several years and could provide an opportunity to pursue the implementation of a revenue-neutral carbon tax, while revising and eventually phasing out subsidies to emission-intensive activities.

A carbon pricing mechanism could be created through multiple mechanisms, including an emission trading system (ETS), a carbon tax, or a mix of instruments.

An economy-wide carbon charge on fossil fuels could raise about R$150 billion (1.3% of GDP) in revenue from fossil fuels by 2030, which could in turn be used to promote productivity, inclusion, and adaptation. Because a carbon pricing policy can have detrimental impacts on equity, a share of the income would need to be used to protect the **section of the population** most affected by price shocks.

An ETS could accelerate decarbonization and leverage global carbon markets. The Brazilian Congress is discussing a bill on national ETS focusing on the industry sector. A preliminary step for the establishment of an ETS would be the creation of a measuring, reporting, and verification (MRV) system for large GHG emitters. Agriculture and LULUCF are not good contenders for an ETS, but forest offsets could provide opportunities for emission reductions.



Economy-wide measures

02 Productivity enhancing measures can help reduce the pressure on deforestation. Key policy measures include:

Boosting productivity through deeper regional and global trade integration: Trade policy reform that create opportunities to integrate in regional and global value chains beyond primary commodities.

Improving the business climate. Reducing the "Custo Brasil" through business environment reforms and adopting a reform of the tax system.

Promoting innovation and technological adoption by revamping the current underperforming innovation policies.

Modernizing infrastructure: To close the infrastructure gap, Brazil will need to significantly increase its investments in infrastructure, but the additional needs linked to climate change do not change drastically this challenge

Placing learning back on the right track: Reducing drop-out rates, reversing learning losses and increasing the quality of education.

These measures are discussed in more detail in the policy notes on growth **(here)**, infrastructure **(here)** and education **(here)**.

Economy-wide measures

03 Adaptive social protection policies to ensure a just transition

Climate policies can also have undesirable effects that need to be managed through appropriate complementary interventions. For instance, a carbon pricing policy could have detrimental impacts on equity, unless a share of the revenues is used to protect the bottom of the population most affected by price shocks.

Investment in human capital and social protection and active labor policies can act as an enabler for resilience and decarbonization. The transition from "non-green jobs" can lead to long-term impacts on certain groups of workers. Active labor market programs and unemployment insurance can be important for increasing employability of those displaced by the green transition by adapting their skillset to "green jobs".

Strengthen Brazil's social protection system to help vulnerable populations adapt to climate transformations and climate shocks. An Adaptive Social Protection (ASP) system combines different sectoral approaches of Social Protection, Disaster Risk Management, and Climate Change Adaptation to build the resilience of the poor and vulnerable by enhancing their capacity to prepare for, cope with, and adapt to covariate shocks. Brazil's SP system is well established but there is room to expand its capacity to respond to shocks and to modernize the social registry with information on vulnerability to climate change.

Social protection can support the mitigation of climate change through programs focusing on reducing deforestation or restoration of ecosystems. Social protection can help the mitigation of deforestation through Payment for Environmental Services (PES) or through Public Works Programs. PES programs such as the discontinued national Bolsa Verde program or the ongoing Bolsa Floresta program in the state of Amazonas can serve as important SP interventions for forest communities.

Putting it Together

Investment needs & Financing Options

Among CCDR countries to date, economic costs in Brazil are among the lowest, reflecting Brazil's potential to reconcile development and the climate agenda and become a leader in the global decarbonization effort.

Preliminary Investment Needs Assessment

Reaching net zero in 2050 would require a total investment of US$552–612 billion in the power, transport, forestry, and agriculture sectors (investments in WSS, industry and manufacturing are TBD).

- **US$542 billion =** baseline investment needs for generation and transmission, and roads and public transport infrastructure
- **US$64–70 billion =** additional investment needs for net zero.

Available Financing Options

- Repurpose carbon-intensive subsidies to support the low-carbon transition
- Direct financing towards climate smart actions/investments by using climate criteria for approval of public investment and in public procurement procedures
- Green investments by the Brazilian financial sector involving more extended payback periods, and long-term, patient financing (including for SMEs)
- Scale up private sector engagement in the climate change agenda
- Financing that may become available through emission trading

What has the World Bank been doing?

What the World Bank is doing

Analytical Studies

1. **Country Climate and Development Report (CCDR) Capital:** The CCDR explores policies and options for Brazil to meet its development and climate goals simultaneously. It explores the costs and benefits of an illustrative but realistic pathway to net zero by 2050. LINK
2. **Infrastructure Assessment:** the study aims at developing policy advice designed to stimulate infrastructure development in Brazil while supporting the county's Covid-19 recovery process and promoting long-term, sustainable and equitable growth.. LINK
3. **Amazon Economic Memorandum:** The study examines how to reconcile inclusive economic development in the Brazilian Amazon with the conservation of its natural forests.
4. **Agricultural Sector Policy Review:** To identify public policy and program options for a greener, more resilient, inclusive and competitive sector in Brazil.

Projects

1. **Sustainable Amazonas DPF, Sustainable Mato Grosso DPF:** Support for public policies in the states to support fiscal and environmental sustainability, promoting the integration of development and conservation of forest resources.
2. **Sustainable Goiás DPF:** Support for state public policies to promote fiscal and environmental sustainability, promoting low-carbon agriculture
3. **Ceará DPF*:** Support for state public policies to support fiscal sustainability and promote green growth based on the promotion of clean energy, including green hydrogen.
4. **Climate Financing:** Support to small and medium-sized companies, through Banco do Brasil, to support climate mitigation plans and access to the carbon market, with emission reduction targets.
5. **Bahia Produtiva:** Projects to support family farm producer organizations for climate-smart investments.

Thank you!

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