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Brazil's investment-led growth in the ecological transition

A CETEx Discussion Paper

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Summary

The global economy is undergoing a profound structural transformation. Climate change, geopolitical fragmentation and rapid technological change are not temporary shocks but enduring forces that are reshaping production, trade and investment. For emerging and developing economies (EMDEs), this transformation is creating new challenges and opportunities for growth and investment.

Brazil's exceptional structural endowments – clean energy, natural capital, agricultural capacity, critical minerals and relative geopolitical neutrality – are no longer passive advantages. They can be actively mobilised as asset-instruments to attract investment, drive structural transformation and generate inclusive growth by industrialising comparative advantages.

Using these assets, Brazil can pursue an investment-led development path. Fiscal adjustment is necessary but not sufficient, and consumption-driven growth alone is unlikely to deliver the productivity gains and structural transformation required for sustained development. By industrialising Brazil's comparative advantages, this strategy places the creation of productive, formal and higher-quality urban employment at its core, with potential implications for the country's persistent challenges of inequality, reliance on informal employment and low productivity in a predominantly urban economy. Because such employment is rooted in real cost advantages and integration into global value chains, social progress may become a by-product of structural transformation rather than redistribution alone. Growth, fiscal sustainability and the climate transition can, therefore, become mutually reinforcing rather than competing objectives. This approach does not imply a relaxation of fiscal or monetary discipline, but rather a recalibration of policy priorities to align with an investment-led growth path.

The strategy relies on a targeted set of policy instruments to crowd in private investment, including foreign direct investment (FDI). These instruments include catalytic public spending through, for instance, the strategic use of green funds to leverage investment in infrastructure and resilience; para-fiscal and development finance instruments, such as public guarantees, blended finance, and de-risking mechanisms such as foreign exchange hedging; and a stable, credible macro-financial framework that lowers risk premia and the cost of capital.

At its core, the strategy combines gradual fiscal consolidation with measures to mobilise private capital. Higher levels of investment are expected to support productivity growth and economic expansion, helping lower risk premia and real interest rates over time. Ultimately, this will improve debt sustainability through a more favourable interest rate-growth differential. These measures are complemented by a selective industrial policy and investment facilitation agenda focused on value-chain integration, regulatory clarity and strategic openness. The objective is to transform Brazil's natural and productive endowments into bankable investment opportunities capable of attracting large-scale domestic and foreign private capital.

The analysis also recognises that regulatory uncertainty, bureaucratic complexity, infrastructure bottlenecks, and implementation challenges remain significant constraints on investment. Therefore, improving regulatory quality, legal predictability and public–private coordination will be essential to mobilising capital at scale. Nonetheless, there are political economy challenges associated with implementing the reforms required for this strategy to succeed. In particular, progress will depend on addressing the long-standing distortions captured by the notion of *custo Brasil* – the inefficiencies and structural barriers that increase the cost of investing, producing, exporting and doing business in Brazil.

Beyond these well-known constraints, the transition raises broader political economy challenges regarding how resources are allocated between decarbonising existing industries and accelerating investment in new low-carbon activities. Both objectives are important, but they often involve different interests, incentives and policy priorities. A successful transition will depend on the ability to balance these goals, preserving economic value and employment while creating the conditions for new sources of competitiveness and growth to emerge.

Current global macroeconomic conditions create a favourable backdrop for an investment-led growth strategy. Global investment in the low-carbon transition exceeded US$4 trillion in 2024 and could reach approximately US$5.6 trillion annually under net zero pathways during 2025–30 (BloombergNEF, 2025). Based on sectoral allocations across net zero transition scenarios, an estimated US$600–800 billion annually may be directed towards energy-intensive and trade-exposed sectors such as steel, chemicals, fertilisers, fuels and industrial materials, sectors in which Brazil has significant comparative advantages. Even a modest capture of these flows could raise annual GDP growth by around 1–1.5 percentage points over the medium term, generating sustained gains in exports, fiscal revenues and formal employment. At the same time, changes in the global risk landscape, with narrowing spreads between EMDE and advanced-economy assets, may create additional opportunities. As uncertainty rises in advanced economies, including countries traditionally seen as providers of safe assets, global investors are reassessing risk and portfolio allocations. This could create a window for countries such as Brazil to benefit from a relative repricing of risk and attract larger volumes of long-term capital. A successful implementation of the strategy could also support the recovery of Brazil's investment-grade status. This status is not an end in itself but would reflect improved growth prospects, stronger institutions and enhanced macroeconomic credibility. In turn, it would broaden access to long-term capital, reduce borrowing costs and reinforce the investment and growth dynamics at the heart of the strategy.

The costs of inaction could be substantial. Without a credible fiscal adjustment anchored in an investment-led ecological transformation, Brazil risks becoming trapped in a cycle of high debt, high interest rates, low growth and recurrent cost-push inflation, while facing rising fiscal pressures from increasingly frequent and severe climate-related shocks. At the same time, it could miss a huge opportunity to attract large-scale domestic and foreign investment associated with the ecological transition.

1. Introduction: Rethinking development strategy for a changing world

This section outlines the analytical framework underpinning the development strategy and examines how climate change, geopolitical fragmentation and technological development are reshaping patterns of production, trade and investment.

There was a time when one could reasonably envisage addressing climate change through a comprehensive policy agenda grounded in strong global coordination: shared scientific understanding, collective financing of the transition and alignment between development, poverty reduction and decarbonisation objectives. That world no longer exists. Policymakers must now operate in a markedly different reality characterised by fragmentation rather than cooperation, climate scepticism among key policymakers and a more limited willingness to collectively finance the transition. Yet even within this more constrained environment, significant opportunities may emerge for Brazil.

The environment has changed in three fundamental ways. First, geopolitical fragmentation is no longer a temporary disruption but a defining feature of the global economy. This increases the strategic value of countries that combine scale, resource endowments and geopolitical neutrality as firms seek to diversify away from overdependence on any single bloc. Second, the ecological transition and rapid technological change are permanent features reshaping patterns of production, trade and investment. Here, we treat them not as constraints but as structural opportunities capable of transforming resource endowments into new asset classes. Third, Brazil's past development paradigms have reached their limits: protectionist industrialisation, intensive natural resource exploitation and expansionary fiscal policies each delivered partial gains, but none produced a sustained and self-reinforcing process of productivity growth, structural transformation and macroeconomic stability.

We depart from conventional policy sequencing. Rather than treating macroeconomic stabilisation as a unique precondition for growth, we emphasise the need to coordinate macroeconomic and microeconomic policies from the outset. A credible development strategy requires clear sequencing in which public policies and investments prioritise areas of high marginal return, aligning macroeconomic conditions with the expansion of productive opportunities. In this framework, stabilisation, confidence and social improvements are reinforced through the interaction between sound macroeconomic management and sustained real economic transformation.

This approach does not imply any relaxation of fiscal or monetary discipline. Rather, it calls for a recalibration of policy priorities so that macroeconomic frameworks are consistent with an investment-led growth path on which scarce public resources are directed towards high-return, productivity-enhancing activities that support structural transformation.

Brazil's exceptional endowments in clean energy, natural capital, agricultural capacity, critical minerals, a large domestic market and relative geopolitical autonomy are no longer merely passive advantages but asset-instruments capable of supporting investment, technological advancement and structural transformation. A strategy built around these assets could help address Brazil's persistent structural challenges, including high inequality, low productivity, modest and volatile growth, and recurrent macroeconomic imbalances.

1.1. Global trends and analytical assumptions for Brazil's development strategy

Two interrelated global trends are reshaping the development landscape. The first is the geopolitical and economic reconfiguration of the global economy, and the consequent strategic revaluation of natural assets. Geopolitical tensions, strategic competition and supply chain reorganisation are creating new incentives for countries to reassess their development strategies. Assets such as clean energy, water, arable land, biodiversity and critical minerals are gaining strategic importance. Brazil may be well-positioned in the emerging global economy, as one of several countries that combines these endowments with market scale, institutional capacity and diversified international partnerships. Nonetheless, any viable strategy needs to balance opportunity with resilience, combining diversification, strategic autonomy and strengthened international bargaining capacity.

The second trend is the ecological transition as a potential driver of development and investment. The global shift towards decarbonisation is not only an environmental imperative but also a structural transformation of production, investment and trade. Increasingly, the ecological transition is being viewed not merely through the lens of financing gaps but also as a source of private investment opportunities. For emerging economies, a central challenge is to position themselves as credible and attractive destinations for capital seeking opportunities in low-carbon sectors, shifting the focus from mobilising public resources alone to crowding in private capital at scale.

While much of our analysis focuses on decarbonisation and the reorganisation of low-carbon value chains, the ecological transition is understood more broadly to encompass the preservation of natural capital, biodiversity, ecosystem services and resilience against environmental degradation. Building on these trends, our analysis rests on five central assumptions:

- Geopolitical fragmentation is not a temporary shock but a persistent feature of the global economy, implying a growing premium on resilience, diversification and strategic autonomy.
- Technological change and relative price dynamics are likely to continue favouring low-carbon production systems. Lower costs of renewable energy and associated new technologies have become an important source of growth and investment opportunities in the 21st century (Stern, 2025). In this view, the decarbonisation transition is structural rather than cyclical, with implications for long-term investment and decisions on industrial locations.
- Brazil's geopolitical positioning, characterised by relative autonomy, a lack of involvement in major conflicts[1] and diversified international relationships, may constitute a strategic asset in an increasingly fragmented world.
- Fiscal consolidation is necessary but unlikely to be sufficient to generate investor confidence alone, reduce the cost of capital or trigger productive investment at scale. Macroeconomic credibility remains essential, but without a clear investment strategy and sectoral transformation, lower risk premia may not automatically translate into stronger growth.
- We adopt a 'reverse engineering' approach to development: starting from emerging global demand and working backwards to identify the investments and sectors where new dynamic comparative advantages may emerge (Arbache, 2025a). In this approach, structural transformation is not viewed as the passive outcome of improved macroeconomic conditions, but as a response to a changing set of global opportunities.

[1] Recent geopolitical shocks have highlighted the fragility of production and supply systems concentrated in conflict-prone regions, increasing the strategic value of countries that combine abundant natural resources with geopolitical stability. In this context, Brazil's relative insulation from major geopolitical tensions enhances its attractiveness as a destination for long-term investment and as a diversification anchor for global investors.

Together, these assumptions suggest a shift in perspective away from adapting to external conditions and towards assessing how Brazil might position itself within an evolving global economy.

1.2. A new geography of comparative advantage

Our analysis is grounded in a central proposition: much of the current literature treats recent changes as incremental policy or technological adjustments within an otherwise stable system. We argue that the global economy is undergoing a deep structural reorganisation of comparative advantage, driven by climate change, geopolitical fragmentation and evolving policy frameworks (Arbache, 2025a).

A key missing element in existing approaches is the role of distorted relative prices (Arbache, 2026a; 2026b). Subsidies, protectionism, regulation and financial policies shape price signals in ways that disconnect them from underlying scarcities, particularly for energy, carbon, water, land and critical minerals. This leads to persistent capital misallocation. Existing frameworks capture parts of this dynamic but remain incomplete: green industrial policy identifies market failures but often overlooks spatial constraints and relocation dynamics, while analyses of fragmentation document efficiency losses but underestimate deeper shifts in production geography.

Our framework conceptualises the ecological transition as a fundamentally spatial transformation and as the foundation of a new growth paradigm. Recent work shows that the transition is not merely a constraint on growth but the emergence of a new technological and economic regime, driven by rapid cost declines in renewable energy, electrification, and digital infrastructure (Stern, 2025). It also highlights the growing importance of geography in shaping global production patterns through natural resources, renewable energy and infrastructure.

We build on that perspective but place greater emphasis on the spatial reorganisation of production as a central mechanism of efficiency and structural transformation. Rather than treating location as a secondary outcome of technological change, we introduce the concept of dynamic comparative advantage, whereby competitiveness is determined by the interaction between evolving relative prices, infrastructure and policy frameworks.

In this view, the location of production becomes a first-order determinant of both economic performance and the cost of decarbonisation. Emissions reduction will occur not only through technological change within existing production structures but also through the reallocation of energy- and resource-intensive activities towards geographies with structurally lower-cost and lower-carbon production conditions.

Changing relative prices of natural capital are determining where production takes place. Geography re-emerges as a central factor in competitiveness, while policy plays a dual role: it can either reveal and support emerging comparative advantages or distort signals and delay adjustment. A central feature of this transformation is the reorganisation of value chains around powershoring: a process in which firms locate production stages to places with optimal energy costs, carbon exposure and regulatory conditions. This implies that decarbonisation will not occur by greening production everywhere, but by reallocating it towards locations where low-carbon production is structurally most efficient (Arbache, 2022; Arbache and Esteves, 2023).

Our approach connects with New Economic Geography and New Trade Theory in their emphasis on increasing returns, imperfect competition and endogenous industrial location, but extends them in an important way. The key drivers of relocation are no longer primarily transport costs or market access but the changing relative prices of natural capital, which redefine cost structures and the geography of competitiveness. Because these prices are shaped by policy, many observed production patterns are inefficient and artificially sustained. The result is not a marginal evolution of trade, but a structural break in comparative advantage rooted in green and resource-based competitiveness. This implies moving beyond Ricardian, Keynesian and Smithian paradigms towards a more Schumpeterian perspective centred on innovation, investment-driven structural transformation and dynamic competitive advantages aligned with sustainability.

Under this framework, Brazil's traditional endowments are no longer simply sources of static comparative advantage but asset-instruments that can be mobilised to support investment, productivity gains and technological advancement.

1.3. Addressing Brazil's social and inequality challenges

We do not treat Brazil's long-standing social challenges in inequality, reliance on informal employment, regional disparities and gaps in human capital as separate or purely redistributive issues. Rather, they are closely linked to a production structure concentrated in low-productivity activities, with limited technological advancement and insufficient integration into higher value-added global supply chains. Addressing these challenges, therefore, requires not only redistribution but also a transformation in how income is generated.

By shifting the economy towards sectors linked to clean energy, natural capital and sustainable value chains, an investment-led strategy can support more inclusive growth through several channels. Investment in these sectors generates multiplier effects across services, logistics, infrastructure and local supply chains, creating both direct and indirect employment. Higher productivity supports sustained wage growth, weakening the link between low productivity and low incomes. Integration into global value chains through increases in scale, the adoption of standards and technological advancement also contributes to the formalisation of production, with implications for labour conditions and access to social protection.

Box 1.1. Renewable energy projects and local economic development: evidence from Brazil

Scheifele and Popp (2024) analyse the local impacts of utility-scale wind and solar parks in 91 Brazilian municipalities using a difference-in-differences methodology. Their findings challenge the widespread assumption that the success of renewable-energy investments should be measured primarily by the number of jobs they create. Key results include:

- Solar parks generate temporary employment gains during the construction phase of approximately 1–1.5 jobs per MW installed, concentrated among workers with only primary and secondary educations.
- Wind projects generate only limited local employment effects, with little evidence of sustained job creation after commissioning.
- Despite modest employment impacts, renewable-energy projects generate substantial increases in local economic activity. Municipal GDP rises by an average of approximately 23% following the installation of a solar project and by around 12% following the installation of a wind project. The size of these effects relates to the relatively small municipalities in the sample benefiting from relatively large projects for the first time in decades.
- Wind projects generate persistent increases in municipal fiscal revenues, while solar projects produce more temporary revenue gains concentrated around the construction period.

The broader lesson is that the economic contribution of the ecological transition extends beyond direct job creation. Green investments can strengthen local economies through higher output, increased fiscal revenues, improved infrastructure and the creation of new development opportunities even when permanent job creation remains relatively limited.

A common criticism of transition-led development strategies is that many green sectors are highly capital-intensive and, therefore, unlikely to generate large employment gains. Investments in renewable energy, green hydrogen, critical minerals, transmission infrastructure and other low-carbon technologies often require substantial upfront capital expenditure and generate relatively limited direct employment once operational. Recent evidence from Brazil amplifies this concern but also suggests that focusing exclusively on direct employment significantly understates the broader

economic benefits of green investment. A detailed study of utility-scale solar and wind parks in Brazilian municipalities finds relatively modest and often temporary local employment effects, particularly after projects become operational (Scheifele and Popp, 2024). At the same time, these investments generate substantial gains in local GDP and fiscal revenues, especially in smaller municipalities, where they often represent one of the largest investments received in many years. The implication of this is that the contribution of the ecological transition to inclusive growth should be assessed not only through direct job creation but also through its broader effects on productivity, income generation, fiscal capacity and local economic development (see Box 1.1).

There is growing quantitative and sectoral evidence supporting these mechanisms. Case studies of sectors such as green steel, sustainable aviation fuels and green hydrogen show strong upstream and downstream linkages spanning mining, agriculture, engineering, logistics and advanced manufacturing, confirming that there are significant multiplier effects at work. Regional simulations for northeastern Brazil illustrate the scale of potential impacts: while the increase in direct qualified employment is estimated to be 40,000–170,000 jobs by 2035, total employment effects, including indirect and induced employment, could reach 300,000–350,000 jobs, alongside substantial export and fiscal gains (Arbache, 2026b). These sectors are also embedded in large global investment pools (US$600–800 billion annually) and can generate significant domestic value-added when integrated into industrial ecosystems such as those for hydrogen-linked steel, fertilisers and chemicals. This supports productivity gains and increases wage potential. More broadly, transforming natural assets into industrial platforms in areas such as biofuels, minerals processing and low-carbon manufacturing contributes to capability accumulation, formalisation and more stable employment outcomes.

In this framework, poverty and inequality reduction are not solely outcomes of *ex post* redistribution but are linked to structural transformation. The expansion of higher-productivity activities broadens the tax base and strengthens fiscal capacity, creating the conditions for more sustainable social policies while supporting upward mobility through access to better jobs. Therefore, social inclusion can be embedded within the development process itself, both as a potential outcome of structural change and as a factor reinforcing its long-term sustainability, insofar as more inclusive economies tend to support more stable growth and investment dynamics.

At the same time, we do not assume that structural transformation alone will automatically reduce inequality. Indeed, both international and Brazilian experience show that economic growth, export expansion and technological advancement can coexist with persistent or even rising inequality, depending on how gains are distributed across households, sectors, regions and skill groups. The interaction between the ecological transition, technological change (including the development of artificial intelligence), labour-market dynamics and income distribution is particularly complex and unclear.

These broader distributional questions lie beyond the scope of our analysis, which primarily focuses on investment, growth, macroeconomic stability and structural transformation. Nevertheless, we suggest that the distributional outcomes of the proposed strategy will depend not only on investment and industrial policy but also on complementary measures in education, skills formation, innovation, social protection, labour-market policy, small and medium-sized enterprises, competition policy and progressive taxation. As technological change and artificial intelligence reshape labour demand, these complementary policies are likely to play an increasingly important role in shaping access to opportunities and the distribution of productivity gains.

Education, taxation, social protection, labour-market institutions and wealth distribution all play a central role in shaping inequality outcomes (Atkinson, 2015; Bourguignon, 2015; Medeiros, 2023; Attanasio et al., 2025). Therefore, we treat inclusive growth as an important objective and a likely complement to a successful transition strategy, while recognising that additional policies beyond those analysed here may be required to ensure that the benefits of structural transformation are broadly shared across society.

1.4. A strategic alternative: investment-led transformation

The investment-led strategy positions itself between two influential but ultimately incomplete approaches to development policy. The first prioritises strong fundamentals for inducing private investment: in particular, fiscal balance is treated as the primary condition for growth, under the assumption that the restoration of fiscal credibility will automatically improve business confidence and revive what Keynes described as 'animal spirits'. While this approach rightly emphasises stability, it underestimates the need for coordinated investment strategies and structural transformation. The second approach prioritises the expansion of consumption demand through fiscal stimulus, often underestimating macroeconomic constraints and supply-side limitations. While this approach highlights inclusion, it risks generating instability in the absence of productivity gains. Both approaches tend to treat growth as an indirect outcome of confidence effects or demand stimulus rather than a deliberate transformation of the production structure.

The approach examined here differs from both and is broadly consistent with the emerging 'London Consensus',[2] which rethinks the role of fiscal policy in the 21st century by positioning it as an active instrument for growth, structural transformation and resilience rather than merely a tool for deficit control. In this perspective, the state acts not only as a macroeconomic stabiliser but as a coordinator, risk-sharer and long-term investor.

The strategy places investment, productivity and structural transformation at its centre, while emphasising the need for close coordination between macroeconomic and microeconomic policies. Macroeconomic stability is not treated as a unique precondition for growth, but as a set of conditions for using policy instruments that need to be aligned and sequenced to support the expansion of productive investment. Fiscal, monetary and financial frameworks should provide predictability, manage volatility and align incentives with long-term investment. At the same time, financing conditions constitute a critical constraint: shifts in debt dynamics and policy credibility can affect risk premia and the cost of capital, particularly in the short term. This underscores the importance of credible policy frameworks, careful sequencing and clear communication. Therefore, stability remains essential but is pursued alongside the investment strategy rather than imposed *ex ante* at the expense of growth. The strategy rests on three principles:

- The allocation of public resources should prioritise areas with the highest expected economic and social returns. This is guided by the industrialisation of comparative advantages (Arbache and Drummond, 2025), directing investment towards sectors where Brazil's structural endowments can be transformed into dynamic competitive advantages, crowding in private investment and generating broad-based productivity and employment gains.

- Strategic openness and global integration are vital. Attracting foreign direct investment (FDI) is important not only as a source of financing but as a channel for technology transfer and integration into global value chains. In a fragmented global economy, this implies diversifying partnerships and strengthening Brazil's position as a reliable investment destination.

- Industrial policy is a selective and catalytic instrument to support investment in sectors with emerging comparative advantages. The focus is on addressing coordination failures and early-stage risks, while progressively reducing distortions that hinder the efficient allocation of capital.

Taken together, these principles describe an investment-led development strategy anchored in the industrialisation of comparative advantages, supported by coordinated macro-financial frameworks, strategic openness and a modern industrial policy.

[2] The London Consensus is a recent body of work that redefines fiscal policy as a strategic instrument for growth, resilience and structural transformation, highlighting the complementarities between fiscal, monetary and industrial policies in crowding in private investment, supporting innovation and addressing structural challenges (Besley et al., 2025; Reis and Velasco, 2025). Related contributions include Aghion et al. (2021); Rey (2025); Aghion and Van Reenen (2025).

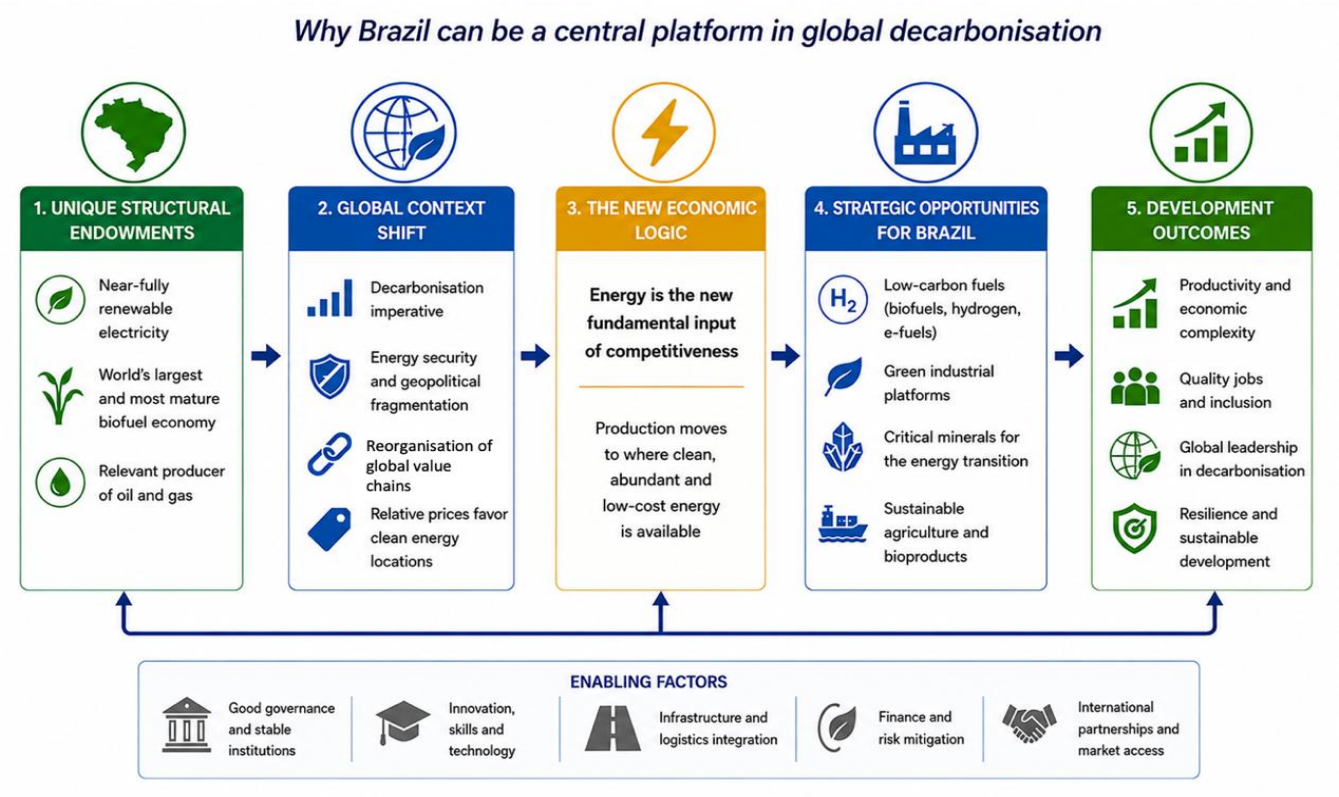
1.5. Towards a coherent development strategy

Brazil's transition can be understood through a coherent framework built on three mutually reinforcing pillars: accelerating growth and productivity while incorporating sustainability objectives; driving productive transformation through greater value addition, technological advancement and integration between natural resources, industry and advanced services; and strengthening strategic global integration, positioning the country as a provider of solutions to global challenges such as food security, the energy transition, decarbonisation and supply-chain resilience.

These pillars are deeply interconnected. Sustained growth expands the domestic market, strengthens social cohesion and enhances political stability. Strategic global integration accelerates growth by enlarging markets, attracting investment and facilitating technology diffusion. Productive transformation increases productivity, reduces external vulnerabilities and generates higher-quality employment.

Together, these elements suggest a pathway through which economic development and the ecological transition can reinforce one another. While developed in the Brazilian context, our analysis may also offer insights for other emerging markets and developing economies (EMDEs) navigating a world increasingly shaped by ecological constraints and geoeconomic fragmentation.

Figure 1.1. Brazil's investment-led growth strategy: endowments, opportunity, and development outcomes



Source: Authors.

Our analysis does not assume that Brazil's structural advantages alone will automatically attract large-scale private investment and FDI. Brazil continues to face institutional, regulatory and governance constraints that have historically limited long-term investment. Regulatory uncertainty, complex administrative procedures, licensing delays, judicial unpredictability, tax complexity, fragmented governance structures, infrastructure bottlenecks and frequent changes in sectoral rules raise transaction costs, increase perceived risk, and weaken investor confidence. These challenges, often captured by the notion of *custo Brasil*, can significantly reduce the country's attractiveness to

investors despite its significant endowments in clean energy, agriculture, natural capital and low-carbon industrial potential.

The effectiveness of any investment-led transition strategy will, therefore, depend not only on macroeconomic conditions, but also on gradual improvements in regulatory and institutional quality, legal predictability, infrastructure planning, project execution capacity, administrative simplification and coordination across various levels of government and regulatory agencies. Macroeconomic credibility, institutional credibility, implementation capacity and regulatory credibility are deeply interconnected. Together, they shape the conditions for mobilising long-term productive investment.

2. From structural endowments to dynamic competitive advantages

This section examines how Brazil's structural endowments could be transformed into dynamic competitive advantages in the context of the ecological transition and the reorganisation of global value chains. We discuss why geography, relative prices, clean energy, natural capital and industrial location are becoming more important determinants of competitiveness, while also highlighting the risks of passive specialisation and the conditions required to avoid a new form of green resource curse.

Brazil's development challenges can no longer be framed as a simple combination of macroeconomic stabilisation, incremental productivity reforms or conventional industrial policy alone. A more fundamental question has emerged from the conjunction of climate change, geoeconomic fragmentation and the reorganisation of global value chains: to what extent can Brazil transform its structural endowments into dynamic competitive advantages and become a central platform in global decarbonisation, while generating domestic productivity growth, economic complexity and sustained development?

This question arises from a structural condition that distinguishes Brazil from most other large economies. Brazil is simultaneously a major fossil fuel producer, the operator of a near-fully renewable electricity system and the world's largest and most mature biofuel economy. That tripartite energy architecture is not incidental; it gives the country a set of opportunities that is unusual in the global economy and potentially important for the emerging industrial geography of the 21st century. Natural resources need not be treated solely as static endowments that condemn countries to commodity dependence; under the new global conditions discussed above, they may become the basis of industrial transformation if strategically governed, processed and embedded in productive systems. Geography is also becoming a more active determinant of competitiveness as energy, water, land, climate stability and critical minerals are repriced in a world shaped by decarbonisation and geopolitical risk. Decarbonisation should be understood as not only an environmental obligation but also as a platform for structural transformation and access to international markets through value chains (Arbache, 2025a). Brazil's challenge is, therefore, no longer simply to exploit comparative advantage but to industrialise it. The country needs to convert geography into competitiveness, competitiveness into investment, investment into productive ecosystems and those ecosystems into productivity growth, industrial upgrading and more resilient development.

2.1. Why geography and relative prices are back

For much of the late 20th century, development policy was often based on the assumption that technological diffusion, falling transport costs and trade openness would progressively reduce the importance of location. That assumption is now under pressure. Climate change is disrupting production and logistics, geopolitical fragmentation is pushing firms towards more resilient supply configurations, and energy security has re-emerged as a central determinant of industrial location. At the same time, regulatory instruments such as carbon border adjustment mechanisms, disclosure requirements and local-content rules are introducing new forms of locational asymmetry. These are not cyclical disturbances, but structural forces reshaping the geography of production.

The deeper driver of this shift lies in the interaction between relative prices and the physical properties of energy (Arbache, 2025a). Fossil fuels allowed industrial geography to be organised around transport networks because they are energy-dense, storable and tradable. Renewable electricity follows a different logic: while abundant in some locations, it is expensive to transport once system costs,

transmission constraints, storage needs and losses are taken into account. Hydrogen and its derivatives add further conversion and transport costs. As a result, the economic logic of location is being reversed: rather than moving energy to industry, it is increasingly efficient to move industry to energy.

As clean electricity, water, land, carbon intensity and regulatory risk gain weight in production functions, the relative prices that guide investment are being reconfigured. The energy transition is, therefore, not only a technological substitution but also a spatial repricing of production factors, shifting competitive advantage towards locations where clean energy and natural capital are structurally cheaper and more abundant.

2.2. The return of value chains and the shift from optimisation to resilience

Global value chains are not disappearing but are increasingly being reorganised around a broader objective function that includes resilience, energy security, strategic redundancy and regulatory predictability rather than cost minimisation alone. Firms increasingly seek a combination of stable and clean energy, reliable logistics, diversified supplier networks, climate resilience and political predictability. These criteria favour countries that can offer a coherent platform for low-carbon production in conditions of strategic uncertainty. Brazil is not simply a potential recipient of diverted investment from Asia or Europe; it may also emerge as a location for a new class of industrial platforms on which energy-intensive stages of production are aligned with abundant renewable energy and natural capital (Arbache, 2025c).

Energy does not affect all stages of production symmetrically. Primary metals, electrolysis, hydrogen-based reduction, basic chemicals, fertilisers and biofuel processing are far more sensitive to electricity costs and reliability than are downstream fabrication and assembly operations. Therefore, the economically efficient response is not to relocate entire industries but to relocate only the segments of the supply chain for which the proximity between renewable energy and production materially lowers costs, emissions and implementation time, before reconnecting them to downstream production through trade, logistics and contractual coordination (Arbache, 2026a).

The concept of powershoring emerges at this intersection of resilience, geography and industrial economics. Powershoring refers to the relocation or expansion of energy-intensive production to regions with abundant, clean and competitively priced renewable energy, thereby reducing both the cost and the carbon intensity of industrial activity (Arbache, 2022; Arbache and Esteves, 2023). This process is driven by the underlying economics and physics of clean energy rather than political alliances or geographical proximity and, therefore, points to a more durable reorganisation of value chains grounded in structural cost differentials.

2.3. Limitations of existing approaches

A large share of the current literature on green industrial policy, geoeconomic fragmentation and clean energy supply chains captures important aspects of the transition but may underestimate its spatial and price-mediated character (e.g. Rodrik, 2014; Aiyar et al., 2023; Energy Transitions Commission, 2025).

One approach focuses on market failures, particularly learning externalities, coordination failures and carbon underpricing. While this perspective is important, it tends to assume that, with the right policies, a wide range of countries could develop similar portfolios of green industries. It underplays the fact that some activities will remain structurally uncompetitive in many locations due to underlying constraints in energy, water, land, logistics and carbon intensity. A second approach focuses on fragmentation and its efficiency costs, but often evaluates developments against an implicit benchmark of integrated globalisation, overlooking the fact that decarbonisation may make some current production locations unviable. A third approach comes closer to recognising relocation

dynamics, but typically treats them as a secondary effect rather than as a central feature of the transition (Arbache, 2026d).

Across these approaches, a key missing element is the role of relative prices in interventionist conditions. Firms respond not to textbook prices but to effective prices shaped by tariffs, subsidies, local-content rules, procurement regimes, financing conditions and certification requirements. These interventions can obscure the rising value of natural capital and low-carbon locations, sustaining high-cost production sites beyond what the underlying economics would seem to justify. However, they do not eliminate cost differentials; they redistribute them across taxpayers, consumers and downstream sectors, often with regressive or inflationary effects.

This distinction is critical for development strategy. Some policies help reveal and scale activities aligned with structural endowments; others attempt to override relative prices on a sustained basis. The former can deepen comparative advantage; the latter may lock economies into inefficient structures. For countries such as Brazil, the implication is that industrial policy should focus on removing coordination, infrastructure, financing, skills and governance constraints around activities that already have structural advantages rather than force economic activities that require permanent insulation from underlying price signals.

2.4. Brazil's endowment profile: scale, competitiveness and untapped potential

Brazil enters this historical moment with an unusually strong endowment profile, the economic significance of which is partially underappreciated.[3] In 2024, roughly 90% of Brazil's electricity generation came from renewable sources, including approximately 56% from hydropower and 23% from wind and solar (Empresa de Pesquisa Energética [EPE], 2024; International Energy Agency [IEA], 2023). While most advanced economies still require large investment in their green power systems, Brazil already operates with a largely decarbonised electricity base. This temporal and cost advantage could support industrial development. Bringing those advanced economies to something close to Brazil's current electricity profile could take 18–30 years and require between roughly US$8 trillion and US$10 trillion in combined investment (Arbache, 2025a).

Brazil's cost advantage is significant, particularly in onshore wind (see Table 2.1). This advantage is large enough to shape decisions about industrial location in electricity-intensive sectors. Brazil's broader endowment base includes sizeable fossil fuel production, a largely renewable electricity mix, the world's most mature large-scale biofuels ecosystem, a diversified base of critical minerals and vast reserves of land, water and biodiversity (World Bank, 2024). The country's offshore wind potential alone exceeds 700 GW (EPE, 2020; GWEC, 2020), and wind capacity factors - the share of potential output actually generated over time - in the northeast frequently exceed 50% (Pereira et al., 2017; EPE, 2022).

The case of critical minerals illustrates why a perspective based on static resources is no longer sufficient. Brazil has important reserves of bauxite, graphite, manganese, niobium, nickel, rare earths, and lithium, but its share of global mineral exports has fluctuated between only 2% and 3.7% over the last two decades (Leão et al., 2025). Scenario analysis suggests the gross value of Brazil's output in selected critical minerals could rise from approximately US$5.4 billion in 2024 to as much as US$15.6 billion by 2030 if part of this output is processed domestically (Arbache and Leão, 2026). The gap between extraction and industrialisation is large, measurable and developmentally decisive. Brazil's opportunity lies not in passively supplying a world short of clean energy, biomass and minerals, but in

[3] Few countries combine, at scale, abundant clean energy, agricultural strength, biodiversity, critical minerals, industrial capabilities, a large domestic market, deep financial institutions and a relatively neutral geopolitical position. Our argument is, therefore, not that Brazil possesses unique assets individually, but that the combination, scale and interaction of these assets create an unusually broad platform for capitalising on opportunities arising from the global ecological transition and the reconfiguration of international value chains.

capturing greater value-added from these resources through domestic processing and industrial integration.

Table 2.1. Comparative levelised cost of electricity for renewable energy and implications for powershoring

Country	Onshore Wind (US$/MWh)	Utility-scale Solar (US$/MWh)	Relative Cost vs Brazil (Wind / Solar)	Implications for powershoring
Brazil	33.6	46	—	Strong cost advantage – prime destination for energy-intensive activities
Belgium	67.2	90.2	~2.0x / ~2.0x	High-cost location – limited attractiveness
Italy	67.9	60.5	~2.0x / ~1.3x	Moderate disadvantage
Japan	140.2	172.1	~4.2x / ~3.7x	Very high cost – strong relocation incentive
Korea	113.3	96.6	~3.4x / ~2.1x	High cost – strong relocation incentive

Source: IEA and OECD–NEA (2020).

2.5. Natural capital as asset-instrument and the industrialisation of comparative advantage

A useful way to conceptualise Brazil's opportunity is to treat natural capital as an asset-instrument rather than as a passive stock of wealth (Arbache and Drummond, 2025).[4] Clean energy, water, land, biodiversity and minerals are not simply things the country has; they are productive instruments that can be mobilised, combined and embedded in industrial systems. Clean electricity becomes a platform for aluminium, green steel, fertilisers, chemicals, sustainable fuels, data infrastructure and advanced manufacturing. Biomass becomes a platform for fuels, chemicals and circular material flows. Biodiversity becomes a platform for science-intensive sectors and environmental services markets. Minerals become platforms for refining, electro-processing and materials-intensive manufacturing. The central developmental task is, therefore, to convert resource endowments into productive capabilities and industrial ecosystems.

A related dimension concerns the growing capacity to attribute economic value to natural capital itself. Historically, many ecosystem services provided by forests, biodiversity, water systems and carbon sinks remained largely outside market valuation and, accordingly, outside investment decisions. This is beginning to change. Deforestation, biodiversity loss, water stress and ecosystem degradation can have significant macroeconomic costs, affecting agricultural productivity, energy generation, trade

[4] The growing strategic value of natural capital should not be interpreted as evidence of abundance but rather as a consequence of increasing global scarcity. Although Brazil is rich in these assets, we acknowledge that they are also vulnerable to nature degradation and climate impacts. Their preservation is, therefore, not only an environmental objective but also a condition for maintaining the dynamic comparative advantages we discuss.

competitiveness and financial stability (Klein Martins et al., 2026). Preserving natural capital is not only an environmental objective, but also a condition for sustaining long-term economic value. Advances in carbon markets, biodiversity credits, natural capital accounting, disclosure standards and emerging international initiatives such as the Tropical Forests Forever Facility (TFFF) are creating mechanisms through which conservation and ecosystem preservation can generate recurring financial flows. For countries such as Brazil, this creates the possibility of transforming natural capital into not only a source of commodities and industrial inputs but also into a productive asset class capable of attracting investment, supporting conservation, generating income streams and strengthening the economic rationale for preserving forests and biodiversity. While these mechanisms remain at an early stage and face important implementation challenges, they illustrate a broader structural shift in which nature increasingly acquires economic value beyond its traditional extractive uses.

From this perspective, industrialising comparative advantage does not imply autarky or a return to import substitution with a green vocabulary. It means occupying the segments of value chains in which the underlying advantages are strongest, barriers to entry are rising, and spillovers to engineering, services, logistics, skills, urban employment and technological capability can be maximised. In this context, industrial policy is not primarily about choosing sectors based on aspiration; it is about organising complementary investments and institutions around structurally promising activities (Arbache, 2022; Arbache and Esteves, 2023; Arbache and Drummond, 2025).

The importance of energy can be illustrated with simple sectoral examples. In green hydrogen, electricity represents roughly 60% to 80% of total production costs (IEA, 2019; International Renewable Energy Agency [IRENA], 2020). In aluminium, energy often accounts for around 30% to 40% of total costs (IEA, 2020; International Aluminium Institute, 2021). In steel, energy inputs frequently account for around 20% to 30% of costs, with higher shares in low-carbon routes such as hydrogen-based direct reduced iron (IEA, 2020; Energy Transitions Commission, 2018). In ammonia and basic chemicals, energy can exceed 50% of operating costs depending on feedstock and process (IEA, 2021). Once sectors of this kind become exposed to decarbonisation requirements, relatively small differences in electricity prices translate into very large differences in final costs, margins and bankability. This is one of the main reasons why the geography of clean energy is now re-entering industrial economics so forcefully (Arbache, 2026a).

Cost structures propagate through chains rather than competing plant by plant. If upstream green inputs are produced in structurally expensive locations and sustained by permanent subsidies, the cost burden is eventually transmitted to downstream activities. Conversely, if upstream energy-intensive stages are relocated to regions with abundant low-cost clean power, the entire chain may become more competitive (Arbache, 2026a). For this reason, the clean electricity system can be viewed as a central enabling condition for the industrialisation of comparative advantage. Realising this potential requires complementary investments in transmission, logistics, industrial land, water access, financing, skills, certification, trade facilitation and coordination mechanisms capable of turning an energy advantage into broader productive ecosystems (Arbache and Drummond, 2025).

2.6. The green resource curse and the risk of passive specialisation

The fact that Brazil's natural capital is becoming more valuable does not guarantee development. On the contrary, it creates a new version of an old structural danger: a green resource curse. Countries may become major suppliers of low-carbon commodities, unprocessed critical minerals, renewable electricity, carbon-efficient agricultural products or green hydrogen while still failing to build the domestic capabilities, linkages and technological density that sustained development requires. A country may export green goods and yet remain locked into a pattern of shallow specialisation; the label changes, but the structural trap remains (Arbache and Drummond, 2025).

This risk is particularly visible in current debates on green hydrogen, critical minerals and data-intensive infrastructure. Exporting molecules without industrial integration, shipping minerals without refining or attracting isolated projects with weak domestic linkages may generate investment and headlines, but not necessarily broader economic transformation. The relevant metric is not export

volume by itself, but domestic capability accumulation and the development of productive capacity. The green resource curse is best understood as the failure to convert a favourable global revaluation of natural capital into dynamic competitive advantages and more complex forms of development.

There is also a broader geopolitical implication worth emphasising. As the relative prices of renewable energy, critical minerals, biomass, water and low-carbon land rise, countries such as Brazil acquire bargaining power that, historically, they did not possess to the same degree. That stronger position can be used strategically: not simply to sell assets faster, but to negotiate more favourable terms for technology transfer, co-production, local processing, supplier development, long-term offtake arrangements and regulatory cooperation. The rise in green relative prices should, therefore, be read not only as a commercial opportunity, but as an opportunity to improve the terms on which Brazil engages with the world economy and avoids passive specialisation in low-value segments of the transition (Arbache, 2025a).

Brazil may need to avoid two symmetrical errors: passive extraction under a green label, and aspirational industrial policy disconnected from structural endowments. The developmental middle path is more demanding. It requires identifying where Brazil's geography creates genuine advantages, using policy to solve the constraints that prevent those advantages from becoming industrial capabilities, and ensuring that the relevant value-chain segments generate spillovers substantial enough to improve not just the quantity but also the quality of growth (Arbache, 2025a).

The risk that Brazil will remain primarily a supplier of greener commodities rather than achieve deeper industrial and technological transformation is real and should not be underestimated. The strategy we propose does not assume that capability accumulates automatically; rather, it depends on the successful implementation of complementary policies in education, skills development, innovation, infrastructure, technology diffusion, and industrial ecosystem formation. The more credible and sustained the strategy becomes, and the more effectively supporting policies are designed and implemented, the greater the likelihood that learning by doing, technological advancement and capability accumulation lead to gradual movement up the value chain. In this sense, the transition from static comparative advantages to dynamic comparative advantages is not guaranteed but constitutes one of the central objectives, and key challenges, of the proposed development strategy.

2.7. Trade, powershoring and the geography of decarbonisation

In a decarbonising world, trade can become a vector of climate efficiency by relocating production to places where it is cleanest and cheapest. If one tonne of an energy-intensive product can be manufactured with substantially lower emissions in one location than another, the geography of production becomes an important determinant of mitigation costs. Decarbonisation can occur not only through technological diffusion, but also through the reallocation of production across locations (Arbache, 2025a; 2025b).

Powershoring is not merely a development strategy for countries with clean energy; it is a solution concept for firms and countries seeking to decarbonise under cost and security constraints. By providing embedded renewable energy, low-carbon industrial inputs, sustainable fuels and processed minerals and bio-based materials, Brazil could function as a low-carbon industrial platform that helps other economies decarbonise while diversifying supply chains away from more fragile or geopolitically exposed geographies (Arbache, 2025a).

As discussed, Brazil combines large-scale clean electricity, biofuel maturity, fossil fuel capacity during the transition, mineral resources, land, water and geopolitical stability. A country with these advantages can be well-positioned to contribute to three increasingly important global objectives: decarbonisation, food security and energy security. The same strategy that seeks to industrialise comparative advantage through low-carbon value chain integration may also help lower the global cost of decarbonisation and make the transition more feasible for partner economies. This alignment between domestic development objectives and broader global needs helps explain why the current transformation may represent more than a continuation of past commodity cycles.

3. Industrialising comparative advantages: sectoral pathways, investment capture and structural transformation

This section examines how Brazil's structural advantages could be translated into concrete investment opportunities, industrial capabilities and domestic spillovers. It identifies sectoral entry points including green steel, sustainable aviation fuels, green hydrogen, critical minerals and low-carbon value chains, while assessing the enabling conditions required for these opportunities to become bankable projects.

Given that the central challenge is not simply in exploiting comparative advantage but in industrialising it, Brazil needs to translate its favourable structural conditions into a coherent investment, trade and industrial agenda capable of generating durable domestic spillovers. The strategy cannot be reduced to a list of attractive sectors. Rather, it requires a sequence through which structural advantage produces bankable investments and, ultimately, productive capabilities: from endowments to price signals, investor interest, industrial ecosystems and, eventually, sustained productivity growth. Each stage depends on supporting institutions. Without reliable demand and offtake agreements, even highly competitive projects may not become bankable; without infrastructure and transmission, resource abundance may not produce industrial advantage; without technical skills and supplier ecosystems, large projects may remain enclaves; without coherent trade diplomacy, competitive production may struggle to access relevant markets.

3.1. Quantifying the opportunity: investment reallocation at scale

The global energy transition is mobilising investment at an unprecedented scale. For Brazil, however, the key question concerns not the total volume of investment, but the part of it that is both energy-intensive and trade-exposed, involving activities for which location decisions are highly sensitive to electricity costs, carbon intensity, resilience and supply-chain configurations. Annual transition-related investment already exceeds US$4 trillion and is expected to remain at that scale (BloombergNEF, 2025). Sectoral compositions suggest that around 15% to 20% of this investment, or roughly US$600 billion to US$800 billion per year, is concentrated in industries whose competitiveness directly depends on the economics of clean power, such as steel, chemicals, fertilisers, sustainable fuels and other electricity-intensive activities (IEA, 2025; IEA, 2023a; 2023b; OECD, 2022).

Over a ten-year horizon, this implies a cumulative reallocation pool of US$6 trillion to US$8 trillion that could potentially be influenced by powershoring dynamics. The central issue is not whether this investment will occur, but where it will be located and under what policy and industrial conditions. Brazil's challenge is, therefore, one of investment capture and positioning. The relevant benchmark is not historical market share, but the country's ability to position itself as a low-cost, low-carbon, resilient and scalable location for selected segments of the value chain.

Quantitative simulations for northeastern Brazil provide a concrete illustration of the broader opportunity (Arbache, 2026b). In a conservative estimate that the region captures between 0.25% and 1% of global investment sensitive to energy-related locational advantages, cumulative inflows could reach US$15 billion to US$60 billion over a decade. In an intermediate scenario (US$30 billion), around

US$21 billion would be operational by 2035, generating approximately US$5.25 billion in annual direct value-added (around 1.8% of regional GDP). In an advanced scenario, annual direct value-added could reach US$10.5 billion, or around 3.6% of GDP, with multiplier effects lifting the total impact towards 5% (Arbache, 2026b).

Employment and external accounts effects could also be significant. Increases in permanent, direct and qualified employment could range from 40,000 to 170,000 jobs by 2035, while total employment (accounting for indirect and induced effects) could reach 300,000 to 350,000. Export gains are estimated at around US$3 billion annually in the intermediate scenario and US$6 billion to US$7 billion in the advanced one. Direct fiscal gains range from US$1 billion to US$2.1 billion per year, rising to as much as US$3 billion when broader spillovers are considered (Arbache, 2026b).

These estimates refer to northeastern Brazil, but illustrate a broader national opportunity. The region provides a useful case study because renewable energy potential, port access and locational advantages are particularly concentrated there; the underlying mechanism, however, is not region-specific. Even modest participation in a large global reallocation could generate macroeconomically meaningful outcomes. From this perspective, powershoring is not a niche environmental agenda but a mechanism through which Brazil could capture part of a structural reorganisation of global production while affecting productivity, exports, employment, income generation, fiscal capacity and social mobility.

3.2. Sectoral entry points: where structural advantage materialises

The most promising entry points are sectors where energy, biomass, land, water, minerals, logistics and traceability interact to create measurable cost differentials. Three sectors illustrate this opportunity particularly clearly, while critical minerals processing operates as a cross-cutting platform that can reinforce the competitiveness of all three.

Green steel is among the clearest near-term examples. As the industry shifts towards hydrogen-based direct reduced iron and electric arc furnace steelmaking, electricity costs and carbon intensity become decisive. Near-zero-emission steel production in Europe ranges from US$700–900 per tonne, against comparable estimates for Brazil of US$550–750 per tonne (IEA, 2020; Energy Transitions Commission, 2021). A cost differential of US$150–350 per tonne is large enough to change decisions about global location, especially given that carbon border adjustment mechanisms and green procurement regimes penalise higher-emission routes. With global steel production above 1.8 billion tonnes per year, even marginal gains in Brazil's participation in low-carbon steel could have meaningful implications for exports and upstream linkages (World Steel Association, 2024).

Sustainable aviation fuels are another important entry point, characterised by structural supply constraints and strong expected growth in demand. Aviation is among the most difficult sectors to decarbonise through electrification, and sustainable aviation fuels are widely regarded as the most scalable near-term option (International Civil Aviation Organization, 2017). Brazil has rare advantages in this market: large-scale biomass production, a mature ethanol and biofuels industry, accumulated technological know-how, a broad feedstock base and the opportunity to integrate agricultural and industrial systems at scale (McKinsey & Company, 2024; Arbache, 2025a).

Another entry point is green hydrogen and its industrial derivatives, such as ammonia, methanol and reducing agents for steelmaking. Brazil’s renewable resource base, particularly that in the northeast, supports some of the lowest projected production costs globally. Nonetheless, the development of Brazil’s green hydrogen industry will depend on the extent to which the fuel is used as an input for domestic industry rather than an export commodity, as this will have implications for local value-added, industrial linkages, and the development of local supplier networks and industrial ecosystems (Arbache, 2026c).

Critical minerals processing acts as a cross-cutting industrial platform because mineral resources become more valuable when they are connected to refining, electro-processing and materials

transformation, drawing on Brazil's clean electricity, engineering capabilities, logistics and trade relationships. In this sense, critical minerals are less a standalone sector than a force multiplier for green steel, chemicals, advanced materials, batteries and other electricity-intensive supply chains.

Table 3.1. Sectoral entry points: comparative advantage, scale and investment potential

Sector	Core advantage	Development role	Investment potential
Green steel	Large cost advantage (approximately US$150–350 per tonne) from low-carbon energy	Deepens industrial base with strong upstream linkages (mining, engineering)	Part of a global pool worth US$600–800 billion per year; multi-billion inflows even with a small market share
Sustainable aviation fuels (SAF)/biofuels	Biomass scale, mature ethanol industry, logistics and know-how	Integrates agriculture into advanced industrial value chains	High-growth, supply-constrained global market within low-carbon fuels
Green hydrogen and its derivatives	Very low renewable energy costs; improving competitiveness relative to fossil fuel alternatives	Enables integrated industrial hubs (steel, fertilisers, chemicals, fuels)	Large ecosystem investment (ammonia, methanol, industrial uses), supported by carbon pricing
Critical minerals processing	Large reserves but underdeveloped downstream capacity	Shift from extraction to refining, processing and advanced materials	Value could rise from around US$5bn to up to around US$15bn by 2030; strong FDI and value-chain effects
Electricity-intensive industries	Competitive energy cost and carbon intensity	Supports key sectors (chemicals, fertilisers, materials) and exports	Embedded in US$600–800 billion per year global reallocation
Integrated value chains (powershoring)	Combined advantage: energy, land, water, logistics and stability	Economy-wide transformation: industry, services, exports, jobs	Global opportunity worth approximately US$6–8 trillion over 10 years; a small share of this could have large macroeconomic impact

Source: Authors. Note: All estimates depend on energy costs, infrastructure, financing conditions and market access.

3.3. Geography and agglomeration: northeastern Brazil as a first mover platform

The spatial dimension is central to this strategy. Northeastern Brazil may represent one of the most attractive first-mover locations for powershoring in the developing world, as it combines abundant renewable resources and available industrial land with port infrastructure and integration into the national grid. Wind capacity factors above 50%, very high solar power potential, access to deep-water ports and comparatively low land costs are particularly favourable for energy-intensive industrial activity (Arbache, 2025a; Arbache and Esteves, 2023). Northeastern Brazil matters not as a generic recipient of regional policy, but as a geography where the economic logic of powershoring is especially strong.

The deeper economic rationale for economic development in northeastern Brazil lies in agglomeration effects. First-mover projects in green steel, advanced biofuels, green molecules and minerals processing could act as anchors around which supplier networks, specialised labour pools, certification ecosystems, research capabilities, training institutions and logistics services develop. This cumulative process can lower costs and reduce uncertainty for subsequent investors, creating self-reinforcing industrial ecosystems. Green corridors are particularly important in this context. When properly designed, they connect generation, transmission, industrial production, water infrastructure, logistics, certification, finance and export channels, helping transform dispersed advantages into integrated value chain platforms.

What is at stake is not simply the installation of a small number of large industrial projects, but the development of broader ecosystems of suppliers, technical services, logistics, maintenance, automation, certification, engineering, training and local business opportunities. On a successful trajectory, northeastern Brazil could capture a significant share of the economic and social gains associated with the transition through higher-quality employment, rising incomes, stronger urban dynamism, expanded opportunities for small and medium-sized enterprises, and increased fiscal capacity. This is the mechanism through which a locational advantage can evolve into a broader development process.

3.4. Bankability, offtake and trade constraints

Even when a project is competitive on paper, it will not scale without reliable demand. Projects that lack predictable access to consumer markets and long-term offtake arrangements remain difficult to finance regardless of their technological and environmental profiles – particularly in sectors that require large sunk investments, long amortisation horizons and contractual certainty, such as green steel, sustainable fuels and chemicals.

Many of the industries that are most rhetorically committed to decarbonisation also maintain barriers that may limit the deployment of projects capable of delivering emissions reductions at lower cost. Tariffs, local-content rules, restrictive sustainability criteria, non-recognition of equivalent certification systems, restrictive standards and procurement bias reduce the bankability of projects in countries with strong structural advantages. In this sense, green protectionism is not only a trade issue but also an investment issue, as it may slow the diffusion of lower-cost and lower-carbon production by restricting access to major consumer markets.

An important implication of this is that market access, regulatory cooperation, certification equivalence and long-term commercial relationships become part of the broader enabling environment for investment. The viability of many low-carbon projects depends not only on domestic competitiveness, but also on access to external markets and the predictability of demand. Instruments such as green trade corridors, mutual recognition frameworks, export finance and partnerships involving development banks and multilateral institutions may, therefore, play an important role in reducing investor uncertainty and supporting project bankability (Arbache, 2025a).

3.5. Territorial strategy: clusters, corridors and differentiated geographies

Brazil's structural advantages are national, but their industrial expression is territorial. Northeastern Brazil combines abundant wind and solar resources, growing transmission potential and strategic ports oriented towards Europe and Africa. However, the national strategy extends beyond a single regional narrative: mineral processing and metallurgical clusters linked to mining regions; biofuel and bioeconomy platforms tied to agricultural and industrial ecosystems; logistics and refining hubs connected to existing industrial capacity; and service, engineering and technological centres in major metropolitan areas.

Green corridors are a useful coordination mechanism for connecting these geographies. They link generation, transmission, industrial production, logistics, certification, finance and export markets, not merely as transport routes but as coordination mechanisms that synchronise infrastructure with industrial demand and highlight opportunities in the value chain for investors and trading partners. The Low Carbon Fuels Hub at the Port of Suape in Pernambuco is one example of such a project. The objective is to create connected territorial systems in which anchor investments draw in suppliers, technical services, training centres, logistics operators and innovation institutions, contributing to the development of denser local industrial ecosystems.

3.6. Enabling architecture: finance, infrastructure, skills and governance

Three broad enabling factors determine whether the strategy can be implemented. One of these is finance. Brazil's cost of capital remains high relative to competing destinations. Unless this issue is addressed, structurally attractive projects may fail to materialise. Mobilising investment at scale requires more than financial instruments: it depends on credible policy frameworks, a pipeline of bankable projects and clear signals of a sustained industrial transition. In this context, de-risking instruments, blended finance structures, public guarantees, development bank participation and long-term offtake or power contracts play an important role. Their purpose is not to subsidise uncompetitive activities, but to reduce financing costs for projects that are economically viable but whose risk profile remains too high for private capital alone.

Equally important is the transition of Brazil's existing carbon-intensive sectors. Strengthening their competitiveness and resilience through decarbonisation (rather than replacing them) could increase domestic demand for clean energy, productivity gains, employment and fiscal revenues. This, in turn, could strengthen the investment case for low-carbon infrastructure and industrial projects. Existing initiatives, including carbon markets, green taxonomies, and de-risking frameworks, are important steps, but further progress may be required to align financial conditions with Brazil's structural advantages.

The development of Brazil's regulated carbon market can play an important supporting role within this broader investment architecture. Its primary contribution is not necessarily fiscal revenue generation, but the creation of clearer and more credible long-term price signals that improve investment decisions, projects' bankability, and capital allocation. By attaching an economic value to emissions reductions, carbon markets can strengthen incentives for low-carbon industrial investment, facilitate access to international climate finance, improve compatibility with emerging carbon-border adjustment mechanisms and capitalise on Brazil's comparative advantages in clean energy, sustainable agriculture, bioeconomy activities and nature-based solutions. When combined with green taxonomies, transition plans and risk-sharing mechanisms, carbon markets can help reduce investment uncertainty and improve the attractiveness of transition-related capital.

Another enabling factor, and arguably the most structurally important, is the electricity sector. If Brazil is to industrialise its comparative advantages, it cannot treat clean electricity as a background issue. The country needs a competitive, modern, secure and scalable electricity system capable of delivering

low-cost clean power predictably. This requires viewing the sector not only through the lens of system operation, but as a core component of development strategy: tariffs, contracting structures, transmission expansion, curtailment management, storage, grid digitalisation, connection rules, system reliability and long-term investment signals all become key determinants of industrial competitiveness. Abundant renewable potential has no industrial value if electricity is intermittent, costly or subject to regulatory uncertainty, or if grid constraints prevent its connection to industrial clusters and ports. The performance of the electricity system is, therefore, a critical enabling factor in industrial development, logistics integration and trade competitiveness.

The third factor is human capital and governance. New low-carbon sectors require engineers, technicians, industrial operators, environmental specialists and managerial capabilities. Without investment in technical education and industry-linked training, projects risk generating limited domestic spillovers. Governance is equally important. Because the development agenda spans energy, industry, trade, finance, infrastructure and territorial planning, fragmented policymaking is likely to produce fragmented outcomes. Effective implementation requires coordination across levels of government and stable interfaces between public and private actors.

The social dimension is also important. The long-term viability of the strategy depends on whether its benefits are broadly internalised through employment, wage gains, supplier development and regional inclusion. If the strategy's benefits remain highly concentrated, it may face both economic and political constraints. If it is instead anchored in value chain development, territorial integration and broad-based participation, it is more likely to contribute to inclusive and durable growth.

3.7. A narrow but transformative window

Brazil's development opportunity is likely to be time sensitive. The country already has a largely decarbonised electricity base, while many competitors are only beginning the most capital-intensive phases of electricity decarbonisation. This creates a window in which Brazil may be able to attract investment, establish supply relationships, build certification credibility and embed itself in low-carbon value chains before its competitors catch up. North Africa, the Gulf, Australia, parts of Latin America and some European countries are positioning themselves in related segments of the market to gain first-mover advantages in contracts, logistics, standards and investor perceptions. Such advantages can become self-reinforcing.

Brazil requires clear policy in these areas. The country would benefit from a coherent sequence of actions that secured early anchor investments, aligned infrastructure and skills accordingly, and used each successful platform to reduce the risks and costs of subsequent investments. Demonstration effects, supplier development, financing familiarity and certification routines can generate cumulative advantages. In contrast, delays in coordination and implementation can increase the likelihood that some of the most mobile segments of these value chains are established elsewhere.

If well executed, this strategy could help Brazil move from being a largely peripheral supplier of natural-resource-intensive goods to being a more central participant in the value chains that are most relevant to future industrial competitiveness. This could support higher-productivity investment, stronger urban labour demand, deeper industrial ecosystems, new learning channels, and a more sophisticated pattern of global integration. Endowments do not determine outcomes in the way that institutions, sequencing and political choices do, but they can shape the range of opportunities available. A central challenge is, therefore, in aligning public policy, private investment and external economic engagement with one another while Brazil still has a competitive advantage.

4. Agriculture, land use and the bioeconomy

This section examines the role of agriculture, land use and the bioeconomy in Brazil's investment-led ecological transition. It discusses how agricultural productivity, clean fuels, natural capital, nature restoration and biodiversity-based value chains could contribute to food and energy security. We highlight the risks associated with deforestation, ecosystem degradation, financing constraints and weak implementation.

Agriculture, land use and the bioeconomy constitute another strategic dimension of Brazil's asset-instrument endowment base. Brazilian agriculture is not merely a productive sector; it is a foundational platform for food security, the energy transition, and the management of the natural capital and ecosystem services that underpin long-term economic resilience. Sustainable aviation fuels, maritime fuels, bio-based inputs, biomethane, and carbon capture and sequestration services provide Brazil's agricultural platform with higher value-added and products for which there is global demand. The sustainable use of biodiversity and natural capital, anchored in the Forest Code, is increasingly valued in environmental markets. Brazil can provide this by combining mitigation, adaptation and development objectives in ways that few other countries can match (CBD, 2022). At the same time, there is growing evidence that biodiversity loss and ecosystem degradation can create significant economic and financial risks through their impacts on agricultural productivity, water availability, climate resilience and supply chains (Almeida et al., 2025).

To realise these opportunities and manage these risks, Brazil should accelerate its efforts to end illegal deforestation, create value to discourage legal clearing of native vegetation permitted under existing regulations, and enhance transparency about land use. Acting early is not only an environmental imperative but also an important part of an economic strategy: managing deforestation in supply chains is a precondition of avoiding trade barriers, attracting long-term FDI, preserving market access and avoiding a costly and reactive adaptation process in the future. This will require efforts to strengthen land tenure, promote sustainable production, foster continuous innovation, reduce dependency on imported fertilisers, add value to agricultural exports, integrate producers into resilient and innovative paths of production, and transform finance into a lever of sustainable development.

4.1. Agriculture as a strategic asset for food and energy security

Agriculture in Brazil has undergone a remarkable transformation over the past quarter-century, establishing the country as one of the world's most important food and energy producers. Food exports reached US$169 billion in 2025, serving more than 200 countries, while agriculture represented 7.54% of GDP (Confederação da Agricultura e Pecuária do Brasil, 2026). Grain production grew by 324% between 2000 and 2025, while planted area expanded by 122% to 81.7 million hectares, with the 2025–26 harvest expected to reach a record 356.3 million tonnes (CONAB, 2025). Livestock productivity rose by 83% over the same period (Instituto Brasileiro de Geografia e Estatística [IBGE], 2024). These gains reflect a distinctive pattern: output growing substantially faster than land use, driven by sustained technological innovation and improved management practices.

The energy dimension of Brazilian agriculture is equally significant, and directly reinforces the powershoring logic. Agriculture accounted for approximately 60% of all renewable energy supplied in Brazil in 2023; without its contribution, the share of renewables in the national energy mix would fall from 49.1% to approximately 20% (Rodrigues et al., 2025). The maize ethanol market illustrates the

dynamism of this platform: production grew from 0.52 billion litres in 2017–18 to 8.19 billion litres in 2024–25, and is projected to reach 10 billion litres in 2025–26 (União Nacional do Etanol de Milho, 2026). This positions Brazilian agriculture as not only a food production platform but also a foundational input into the country's clean energy architecture and its capacity to supply low-carbon fuels to global markets.

This productive strength, however, coexists with significant domestic vulnerabilities. More than 54.7 million Brazilians lived with some level of food insecurity in 2024 (IBGE, 2025), reflecting structural inequalities in access to nutritious food that the investment-led strategy must address. The global food security context reinforces the urgency of this: between 638 million and 720 million people faced hunger in 2024, with 512 million projected to be food insecure in 2030, concentrated disproportionately in Africa (Food and Agriculture Organization of the United Nations et al., 2025).

Climate change intensifies these pressures. In dry years, crop yields can decline by up to 22%, while a doubling of drought duration could reduce soy and corn production by up to 10% (OECD, 2025). Model simulations suggest that, without adaptation measures, Brazilian agricultural production could fall by up to 2% and food imports could rise from 3.9% to 5.9% of GDP by 2050 (Chen et al., 2024). Global crop yields could be 8% lower by 2050 and 24% lower by 2100 (Hultgren et al., 2025). More broadly, the productivity and resilience of Brazilian agriculture depend on ecosystem services provided by forests, biodiversity, soils and water systems. Recent research highlights the fact that deforestation, biodiversity loss and ecosystem degradation can generate macroeconomic risks through their effects on agricultural productivity, water availability, trade competitiveness and financial stability (Almeida et al., 2025; Klein Martins et al., 2026). Therefore, preserving natural capital is not only an environmental objective but also a condition for sustaining the long-term competitiveness of the agricultural sector.

These vulnerabilities highlight the need for resilience in the investment-led strategy. In a world characterised by geopolitical fragmentation, food insecurity, climate pressures and growing concerns about supply chain resilience, Brazil's capacity to produce sustainable and affordable food and energy at scale constitutes a significant strategic asset. However, maintaining this position will depend not only on productivity growth and technological innovation, but also on the conservation of the natural capital on which agricultural production ultimately depends. Agriculture can, therefore, be understood not only as a productive sector but also as a platform on which food security, energy security, climate adaptation and natural capital become increasingly interconnected.

4.2. Sustainable land use and deforestation reduction

The productive expansion described above has not occurred without environmental costs. Deforestation remains a central challenge for Brazil: deforestation rates in the Amazon rose to 10,129 km² in 2019 after reaching a historic low of 4,571 km² in 2012. This reflects the importance of sustained command-and-control enforcement combined with land use planning and restoration incentives. In the Cerrado, a biome with large agricultural presence, deforestation has averaged around 7,000 km² per year over the past decade. Illegal deforestation through activities such as land grabbing, logging and mining accounted for 93% of all deforestation in Brazil in 2023 (MapBiomas, 2024).

Decoupling agricultural value chains from deforestation is increasingly necessary due to two interconnected factors: access to climate and sustainable finance, and compliance with the international due diligence requirements that are reshaping trade flows. Brazil's Forest Code provides a critical institutional foundation for this decoupling. It requires farmers to conserve native vegetation as Permanent Preservation Areas along rivers, hills and mountains, and as Legal Reserve Areas covering 20% to 80% of total farm area (depending on the biome). As of March 2026, 218.10 million hectares of Legal Reserve areas and 29.29 million hectares of Permanent Preservation Areas were registered on private farms (Ministério do Meio Ambiente e Mudança do Clima [MMA], 2026). The ongoing validation of Rural Environmental Registries by state authorities is expected to strengthen transparency across value chains and expand the basis for sustainable finance flows to agriculture.

The Climate Plan the Brazilian government approved in early 2026 introduces additional instruments intended to reinforce this framework, such as market incentives to reduce the legal conversion of native vegetation, carbon markets, payment for environmental services, reduced interest rates on official credit and other financial instruments (Interministerial Committee on Climate Change [IMCCC],

2026). Forest conservation is not only an environmental imperative; it is also an indispensable adaptation tool for Brazilian agriculture, given the fundamental role forests play in soil conservation, water cycles, pollination and temperature regulation. These are the ecosystem services on which agricultural productivity depends.

Addressing deforestation is, therefore, not a constraint on Brazil's agricultural development strategy; it is a precondition for it. Decoupled, traceable and certified supply chains are increasingly the price of entry into the premium markets and sustainable finance flows that the strategy seeks to attract. Brazil's regulatory framework provides an important institutional basis for demonstrating that agricultural expansion, productivity growth and conservation objectives can be pursued simultaneously, even if the outcomes of this process will depend on implementation and enforcement.

4.3. Productive transformation and bioeconomy integration

The evolution of Brazilian agriculture over recent decades demonstrates that productivity growth and environmental objectives need not be mutually exclusive. In the decade that followed the approval of Brazil's Low-Carbon Agriculture Plan in 2010, 26.8 million hectares of degraded land were restored, emissions were reduced by 193.67 million tonnes of CO_2 equivalent, and low-carbon technologies were adopted across 54 million hectares (Ministry of Agriculture, 2023a). The Low-Carbon Agriculture Plan's successor, the ABC+ Plan, aims to recover 30 million hectares of degraded pastures, expand integrated crop-livestock-forestry systems, and reduce emissions by up to 1 billion tonnes of CO_2 equivalent through the implementation of climate policy in agricultural activities affecting 72.68 million hectares of land (Ministry of Agriculture, 2023b).

These developments point to a broader opportunity at the intersection of agriculture, bioeconomy, restoration and industrial transformation. Brazil's combination of agricultural scale, biodiversity, scientific capabilities and renewable energy resources creates favourable conditions for the development of bio-based value chains. Recent initiatives related to sustainable aviation fuels, bioenergy and bioeconomy development reflect growing interest in sectors that combine agricultural production, industrial processing and environmental sustainability. The 2026 Climate Plan includes the production target of 1.6 billion litres (in total) of sustainable aviation fuel by 2030, rising to 2.6–4.5 billion litres by 2035, and the development of bioenergy with carbon capture and storage to integrate sugarcane and corn ethanol into geological CO_2 storage (IMCCC, 2026). Similarly, Brazil's National Bioeconomy Development Plan, approved in March 2026, seeks to strengthen socio-biodiversity enterprises, expand productive microcredit for smallholders, support the restoration of degraded land, and broaden participation in international bio-based markets in cosmetics, pharmaceuticals and agri-technology (G20 Brazil, 2024).

However, the long-term viability of these initiatives depends not only on technological progress and market development, but also on the conservation of the ecosystems on which bioeconomy activities ultimately depend. Many bioeconomy value chains derive their competitiveness from biodiversity, ecosystem services and natural resources whose degradation would undermine both environmental and economic outcomes. In this sense, conservation and productive transformation should be understood as complementary rather than competing objectives.

At the same time, a significant structural gap persists between technology-intensive, market-integrated agriculture and low-productivity smallholder farming. Smallholders represent 76.8% of Brazil's 5.07 million agricultural holdings but occupy only 23% of agricultural land. Only 15.6% of all farms access rural credit, and only 20% receive technical assistance (IBGE, 2017). Among smallholders, 3 million holdings manage 32.3 million hectares of degraded pastureland, but only 7.5% of the livestock programme under the Program for Strengthening Family Farming is aligned with sustainability objectives. Closing this gap is not only a social imperative but also an economic and strategic one: the effort to integrate smallholders into bioeconomy chains provides one of the most important opportunities to position Brazil's natural capital as a driver of inclusive socioeconomic development.

4.4. Environmental markets and monetisation mechanisms

Environmental markets are increasingly being explored as one mechanism for aligning economic incentives with conservation and restoration objectives. Brazil has received US$1.2 billion in payments based on REDD+ results (results-based payments for reducing emissions from deforestation and forest degradation) from Norway and Germany (MMA, 2025). Emerging carbon, biodiversity and ecosystem-service markets may provide additional sources of finance for conservation, restoration and sustainable land use. Of approximately 70 million hectares eligible for legal deforestation, around 30 million have high agricultural aptitude, representing a frontier where economic incentives can influence land-use decisions. The Agrotools initiative, for example, aims to attract US$15 billion over five years through annual lease payments of US$100 per hectare of preserved native vegetation (Mano, 2026).

The Brazilian Greenhouse Gas Emissions Trading System, approved in 2025, places forest carbon at the centre of the domestic carbon market. The incorporation of agriculture into eligible sectors could create additional incentives for technologies and production systems that generate mitigation, adaptation and food security co-benefits (Lima et al., 2025). The Brazilian Development Bank (BNDES) has also approved R$384.3 million in financing for an innovative Bioenergy with Carbon Capture and Storage (BECCS) project for corn ethanol production in Mato Grosso (BNDES, 2025b). Similarly, the Pro-Floresta+ initiative aims to restore up to 50,000 hectares in the Amazon, capturing 15 million tonnes of CO_2 equivalent, with R$1.5 billion in BNDES-Petrobras investments for restoration-based carbon credits over the next two years (BNDES, 2025a).

These initiatives are part of a broader shift in the treatment of natural capital within economic and financial systems. Historically, many ecosystem services provided by forests, biodiversity, water systems and carbon stocks remained largely outside market valuation and investment decisions. Environmental markets seek to recognise part of this value by creating financial mechanisms linked to conservation and restoration outcomes. Accordingly, their significance extends beyond the generation of revenue streams: they may help strengthen the economic case for conservation, expand sources of financing for restoration and support the integration of environmental considerations into investment decisions.

4.5. Financing and scaling degraded land restoration: governance and the global context

The restoration of degraded land is one of the largest and least developed investment opportunities associated with Brazil's ecological transition. Of approximately 179 million hectares of pastureland, roughly 60%, or 107.6 million hectares, show some level of degradation (LAPIG, 2026). Estimates suggest that at least 27.7 million hectares are suitable for productive conversion, with an associated investment requirement of around R$240 billion (Ministry of Agriculture, 2024). Initiatives such as Green Path Brazil, which aims to restore 40 million hectares of degraded pastureland, illustrate the scale of both the opportunity and the financing challenge.

The economic rationale for restoration extends beyond environmental benefits. Restored lands can support higher agricultural productivity, reduce pressure for agricultural expansion into native ecosystems, strengthen climate resilience and create opportunities for investment in agriculture, forestry, bioeconomy activities and carbon-related markets. However, translating this potential into investable opportunities requires financing mechanisms capable of operating at scale and across diverse territorial contexts.

Access to finance remains a major constraint. Instruments such as the Eco Invest Brasil programme follow one approach to mobilising private and foreign capital by addressing important limitations, particularly exchange rate risk and long-term financing gaps. Its initial mobilisation of approximately R$30 billion suggests that de-risking mechanisms can play an important role in attracting investment. However, scaling investments to the required level will likely depend on broader risk-sharing

frameworks, project standardisation, technical assistance and the development of pipelines of bankable projects.

A further challenge lies in access to finance and technical capacity at the local level, particularly for smallholders. In regions such as Pará, where a significant share of degraded land is under smallholder control, low levels of access to credit and technical assistance continue to limit adoption of restoration practices (Vicari et al., 2026). Addressing this gap is not only a social imperative but a core condition for scaling up investment: without mechanisms to aggregate projects, reduce transaction costs and provide technical support, a large share of potential investment is effectively non-bankable.

Governance and institutional coordination are, therefore, important determinants of success. Restoring degraded land at scale requires aligning land-use regulation, credit systems, technical assistance and monitoring frameworks, while ensuring legal certainty and preserving environmental integrity. Fragmentation across institutions and policy instruments can significantly increase costs and delay project implementation, reducing the attractiveness of investment.

The evolving global climate finance architecture provides a potentially supportive external framework. However, the availability of global climate finance does not automatically translate into investment flows at the country level. Multilateral funds and international initiatives are expanding in scale, with commitments reaching up to US$1.3 trillion annually by 2035. However, their effective mobilisation depends on the existence of credible national frameworks, bankable project pipelines and instruments capable of leveraging private capital at scale. Participants in the conference of the parties (COP) 31 are expected to adopt a decision on how to develop agriculture in line with the implementation of the Paris Agreement. This centres on efforts to address the challenges of leveraging financial resources and providing favoured access to innovative instruments, guarantee schemes and insurance. Initiatives such as RAIZ (Resilient Agriculture Investment for Net Zero Land Degradation), launched at COP 30, reflect a push to connect international financing commitments with restoration and sustainable land-use objectives. Nonetheless, the effectiveness of these efforts will depend on how they are implemented and their scale.

Brazil's agricultural base, natural capital and restoration potential place the country in a favourable position within this evolving landscape. However, capitalising on this opportunity requires moving beyond isolated programmes and towards a coherent financing and governance framework capable of scaling investment, reducing risks, and aligning domestic and international capital flows. In these conditions, degraded land restoration could simultaneously contribute to productivity growth, environmental resilience, rural development and the broader objectives of an investment-led ecological transition.

Table 4.1 illustrates how Brazil's agricultural and natural capital sectors can function as platforms for attracting investment in multiple areas. In this context, investment flows are influenced by the interaction between resource endowments, low-carbon inputs, scalability and policy frameworks, shaping Brazil's potential role in emerging sustainable production and investment networks.

Table 4.1. Agriculture, natural capital and powershoring: investment opportunities and capital flows

Strategic segment	Investment type	Illustrative scale/instruments	FDI/capital source	Powershoring rationale
Low-carbon agriculture (ABC/ABC+)	Public and private investment	72 million hectares under low-carbon systems; potential for mitigation of ~1 Gt in CO_2 equivalent	Domestic and climate funds	High productivity and low emissions provide a competitive agri-production platform

Degraded land restoration	Blended finance/ large-scale capital expenditure	~R$240 billion investment potential; 30 million hectares convertible up to 2035 under the Climate Plan	Multilateral development banks; climate funds; private equity	Expansion without deforestation results in scalable, low-risk, land-based production
Forest conservation	Financial assets/ recurring income	Carbon credits; payments for ecosystem services; forest leasing (~$100 per hectare per year)	International carbon markets; institutional investors	Natural capital monetisation produces stable long-term returns
Biofuels (ethanol, SAF, biomethane)	Industrial and energy investment	Rapid expansion (e.g. Brazil now produces 15 times more maize ethanol than it did in 2017); scaling sustainable aviation fuel production to 2030–35	Energy majors; global funds	Low-cost biomass and energy transitions lead to the relocation of clean fuel production
Bioeconomy (bioindustry, pharma, cosmetics)	Venture capital and industrial investment	National Bioeconomy Development Plan targets; biodiversity-based value chains	Multinationals; innovation funds	Unique biodiversity supports high-value niche production
Bioenergy with Carbon Capture and Storage (BECCS)	Infrastructure and technology investment	Pilot projects financed (e.g. BNDES)	Strategic investors; climate finance	Negative emissions potential is at a premium and meets global demand
Integrated value chains (food–energy–industry)	FDI and domestic investment	Scaling through agro-industry clusters	Multinationals; sovereign funds	Co-location of inputs allows for optimised cost structures
Climate finance platforms (EcoInvest, GCF, etc.)	Blended finance/ de-risking	~R$30bn mobilised through EcoInvest; expansion of global financial pipelines	Public and private global capital	Risk reduction helps crowd-in private investment

Source: Authors.

5. Aligning macroeconomic policies with structural transformation and investment-led growth

This section examines the macroeconomic and institutional conditions required to support an investment-led ecological transition in Brazil. We discuss how fiscal policy, FDI and innovative financial instruments can be used to mobilise private capital, strengthen macroeconomic credibility and support structural transformation. We also explore pathways through which higher investment could contribute to stronger growth, lower risk premia, improved fiscal sustainability and greater economic resilience.

The opportunities outlined in the preceding sections depend on a macroeconomic and institutional framework capable of aligning trade, industrial, financial, fiscal and monetary policies with the objective of positioning Brazil as an attractive destination for investment in a decarbonising and increasingly fragmented global economy.

Brazil would launch an investment-led strategy from a position of limited fiscal space and low fiscal credibility (Pires et al., 2026). The country remains under pressure from public debt dynamics: its nominal deficits are elevated (largely because of high interest payments), its real interest rates are among the highest in the world and its investment rates are insufficient to generate sustained productivity growth and stronger fiscal revenues. Growth has remained modest and volatile, while the economy continues to be highly sensitive to changes in domestic confidence and global financial conditions. Therefore, macroeconomic credibility, fiscal discipline and monetary stability are indispensable conditions for any successful development strategy.

The approach proposed here recognises those constraints but explores how they might be addressed through a different policy configuration. A central question concerns how limited public balance-sheet capacity can be used more strategically and catalytically, directing scarce public resources towards infrastructure, coordination mechanisms, project preparation, de-risking instruments and targeted financing structures that can crowd in much larger volumes of domestic private investment and FDI. In this framework, the state is not envisioned as the primary financer of the transition, but rather as a coordinator, facilitator and risk-sharing platform that helps unlock investment flows into sectors where Brazil already has strong structural advantages. The objective is not a large expansion of public spending, but a recalibration of policy priorities towards high-multiplier investments and instruments that are capable of reducing risk premia, lowering the cost of capital and supporting an investment-led growth trajectory.

There are two interconnected imperatives for Brazil. The first is to actively foster FDI as a central vector of transformation – not only as a source of capital, but also as a mechanism to embed Brazil in evolving global value chains, facilitate technology transfer and scale new business ecosystems linked to its structural advantages.

The second imperative is to progressively rebalance the macroeconomic policy mix in a manner consistent with both macroeconomic credibility and an investment-led growth trajectory. Such a rebalancing cannot result from policy decisions alone, nor from a simple relaxation of fiscal or monetary discipline. It depends on a broader virtuous interaction between gradual fiscal consolidation, improved private sector confidence, stronger investment opportunities associated with the ecological transition, and improved perceptions of macroeconomic and political risk. If successful, these dynamics could gradually reduce risk premia, lower the cost of capital and provide greater debt

sustainability through increased growth, productivity gains, exports and fiscal revenues. This would contrast with the traditional emerging market doom loop in which low growth, high interest rates, weak investment and deteriorating fiscal dynamics reinforce one another.

This perspective is not based on voluntarist assumptions about automatic convergence or unlimited financing capacity. It is grounded in the structural opportunities discussed in Sections 2, 3 and 4, namely the large-scale global reallocation of investment associated with decarbonisation, the growing importance of clean energy and natural capital in industrial location decisions, and Brazil's unusually strong position in sectors such as renewable energy, sustainable agriculture, biofuels, critical minerals and low-carbon industrial production. Our central argument is, therefore, not that macroeconomic constraints will disappear, but that a coherent strategy capable of mobilising these structural advantages can progressively improve macroeconomic conditions by attracting investment, strengthening productivity growth and reducing the economy's structural vulnerability over time.

Unlike advanced economies, Brazil cannot rely on large-scale fiscal subsidies comparable to those associated with the European Green Deal, the US Inflation Reduction Act or China's state-led industrial policies. This places greater emphasis on policy selectivity, institutional coordination and the use of limited public resources to mobilise private capital. The challenge is not in relaxing fiscal or monetary discipline, but in recalibrating policy priorities so they are consistent with an investment-led growth path. In contrast to China, whose growth model is characterised by excess investment and constrained consumption, Brazil starts from the position of underinvestment and relatively strong consumption. The objective is, therefore, to scale up targeted productive investment, raising productivity and growth without undermining domestic demand.

The investment-led strategy also recognises that attracting large-scale domestic and foreign investment depends not only on structural advantages but also on the quality of the regulatory and institutional environment. Brazil has long suffered from well-known regulatory uncertainties, complex administrative procedures, judicial unpredictability, licensing delays, tax complexity and frequent changes in sectoral rules, all of which increase the perceived costs and risks of long-term investment.[5] These factors can weaken Brazil's competitiveness despite its favourable endowment profile. Accordingly, a successful investment-led transition strategy also depends on strengthening regulatory stability, improving legal predictability, streamlining permitting and infrastructure processes, enhancing the quality of public governance, and creating clearer long-term policy signals for investors. In this sense, macroeconomic and institutional credibility are mutually reinforcing elements of the broader investment environment.

5.1. Initial macroeconomic conditions (2026–27)

The projected macroeconomic environment in which this strategy would be implemented is informed by both domestic and international assessments, including those of the International Monetary Fund (IMF, 2026b). That environment is characterised by elevated geopolitical uncertainty. Brazil's GDP growth is expected to remain below 2% in 2026 before recovering modestly in 2027, reflecting constrained investment, weaker business confidence and the lagging effects of tight financial conditions. Inflation is projected to remain at around 4–4.5%, while monetary policy is expected to continue to be restrictive, keeping the real cost of capital among the highest in the world. The policy rate is projected to remain in the range of 12.5–13.5% by the end of 2027.

On the fiscal side, the nominal deficit has hovered at around 8% of GDP over the past four years, primarily due to interest payments of approximately 7% of GDP, with the primary deficit improving from 2.3% of GDP in 2023 to 0.4% in 2025 (IMF, 2026a). Gross public debt is projected to exceed 80% of GDP on a trajectory diverging from the average of other emerging market economies. Externally, conditions

[5] Institutional and regulatory reforms remain essential to reduce legal uncertainty, lower transaction costs, improve regulatory quality, and create a more stable environment for long-term domestic and foreign investment. Such reforms could help reduce risk premia and strengthen Brazil's attractiveness as an investment destination.

remain manageable, with the BRL/USD exchange rate at around 5.0–5.5, a current account deficit of 2–2.5% of GDP, and FDI providing a relatively stable source of external financing.

Three interrelated challenges shape the implementation context. First, persistently high real interest rates risk trapping the economy in a high-cost equilibrium: sustainable progress requires not only fiscal credibility but also reduced macroeconomic volatility, improved policy coordination and credible long-term growth prospects capable of reducing risk premia. Second, the global environment introduces significant uncertainty, particularly through energy market disruptions that could simultaneously increase inflation and reduce economic activity. Third, the growing importance of supply-side shocks, climate-related risks and geoeconomic fragmentation increases the need for effective coordination across fiscal, monetary and financial policies, underscoring the case for a more adaptive and forward-looking macroeconomic framework.

5.2. The central mechanism: investment-led transformation driven primarily by private capital and FDI

The central policy question for Brazil's transition concerns not simply how to increase investment, but how to mobilise and coordinate large-scale private and foreign capital towards productive transformation. The strategy proposed here is led by private investment: the dominant share of financing is expected to come from domestic private investment, FDI, global infrastructure investors, pension and sovereign wealth funds, multilateral development bank (MDB) co-financing, export finance, and green capital markets, while public resources play a more limited but catalytic role. In this framework, the state is not envisaged primarily as the financer of the transition, but as a coordinator, de-risker, infrastructure provider and market-maker capable of reducing barriers that prevent investment from materialising despite strong underlying economic conditions.

Public intervention, therefore, focuses on addressing the structural constraints that continue to inhibit long-term investment in Brazil, including coordination failures, country and foreign exchange (FX) risk, high capital costs, infrastructure gaps, long maturities and regulatory uncertainty. Instruments such as project preparation, transmission and logistics infrastructure, blended finance, public guarantees, FX risk mitigation, green budgeting, certification systems and value chain coordination aim to crowd in investment that would otherwise not occur at sufficient scale. The objective is not simply to expand fiscal space, but to use limited public balance sheet capacity strategically to mobilise much larger volumes of productive investment that is capable of generating productivity gains, industrial upgrades, export capacity and long-term growth.

Several studies illustrate both the scale of the investment challenge and the rationale for a catalytic government role. The World Bank's OMEGA model shows that a coordinated package of public investment, carbon pricing and financial incentives could generate GDP levels 20–25% higher than the baseline by 2050, with fiscal balances improving by up to 0.5 percentage points of GDP as growth and carbon revenues increase (Ministério da Fazenda, 2024). The World Bank estimates that there are additional climate-related investment needs of 0.8% of GDP annually in the short term, rising to 1.2% by 2050, against current infrastructure investment of only around 1.7% of GDP (World Bank, 2023). The Independent High-Level Expert Group on Climate Finance (IHLEG) estimates that emerging markets and developing economies (excluding China) will require approximately US$2.4 trillion of climate-related investment per year by 2030, rising to US$3.2 trillion by 2035 (Bhattacharya et al., 2025). Yet around 80% of climate finance is currently mobilised domestically, and private capital remains heavily concentrated in lower-risk markets; institutional investors typically allocate only 5–10% of portfolios to EMDE public markets, with exposure to EMDE private markets often below 1% of total assets (EMDE Investor Taskforce, 2026).

This suggests that the transition challenge is not solely one of resource mobilisation, but also of investment allocation, risk management and policy coordination. It is important to create frameworks capable of supporting investment while preserving macroeconomic sustainability. OMEGA and Country Climate and Development Reports (CCDRs) emphasise the potential role of investment in long-term growth and fiscal outcomes, while more traditional frameworks, such as the report produced by CDPP (Centro de Debate de Políticas Públicas), place greater emphasis on fiscal

stabilisation as a precondition for growth (Mendes et al., 2026). Rather than presenting these perspectives as mutually exclusive, the main policy question concerns sequencing and complementarity: how to strengthen macroeconomic credibility while simultaneously expanding productive investment in areas with strong long-term growth potential.

A related insight from international experience is that the developmental impact of investment depends not only on its scale but also on its composition. Investment aligned with structural advantages is more likely to generate productivity gains and attract private capital, while investment weakly connected to domestic capabilities may have more limited long-term effects. For Brazil, the composition of investment may be at least as important as its aggregate volume, given that many of the country's transition opportunities are concentrated in land use, sustainable agriculture and infrastructure.

5.3. Fiscal consolidation, fiscal space and priority investment domains

Our proposed framework departs from the conventional notion of fiscal space as a static constraint defined by debt and deficit thresholds, adopting a dynamic perspective in which fiscal space is endogenous to the quality of public action and its interaction with growth, risk, and private investment (Barmes et al., 2024; Pereira da Silva, 2025a), and is assessed through the broader lens of the public sector balance sheet. Investment expands future fiscal capacity when it raises productivity, crowds in private capital and reduces the long-term fiscal risks associated with climate shocks and growth volatility. Climate-related investment should, therefore, be treated not as discretionary expenditure competing with other budgetary priorities, but as risk-reducing spending that improves the sovereign's balance sheet over time. Within this framework, adaptive fiscal policy combines a credible medium-term fiscal anchor with sufficient flexibility to accommodate high-return investment opportunities when this is justified by economic conditions. The emphasis is not on relaxing fiscal discipline but on improving the allocation and effectiveness of limited public resources while maintaining a transparent path for debt sustainability.

Fiscal space

Within our framework, fiscal space has four complementary dimensions. First, fiscal space is the path consistent with medium-term debt sustainability under dynamic assumptions that incorporate the potential effects of higher investment, stronger growth and lower risk premia. This perspective differs from approaches based primarily on static debt and deficit projections by recognising that credible policies capable of crowding in private investment may influence fiscal outcomes through their effects on growth, revenues and financing costs.

Second, fiscal space is built through targeted fiscal consolidation based on structural reforms rather than adjustment across the board. This involves improving the composition and efficiency of public spending, reducing distortions such as inefficient subsidies and tax expenditures, and strengthening revenues through tax and institutional reforms. The objective is to improve the quality of fiscal adjustment while preserving macroeconomic credibility and creating room for productive investment.

Third, fiscal space is operationalised through a three-layer financing architecture. At its core is a relatively limited direct fiscal effort focused on targeting public spending to create incentives that crowd in investment, including FDI. This is complemented by a second layer based on the public and para-fiscal balance sheet, which comprises public financial institutions and off-budget instruments such as development banks, guarantees and dedicated funds. A third layer consists of targeted incentives for risk-taking, such as Eco Invest–type mechanisms, de-risking tools and financial innovations designed to mobilise large-scale private capital. Together, these layers illustrate how a relatively limited fiscal contribution may support substantially larger investment flows while remaining consistent with fiscal discipline.

Fourth, fiscal space should be assessed from a public-sector balance-sheet perspective that considers assets as well as liabilities. Beyond debt and fiscal flows, governments hold valuable

financial and non-financial assets, including public enterprises, infrastructure and natural capital. In Brazil's case, the ecological transition may increase the value of such assets and create opportunities to mobilise them through public asset management strategies and sovereign wealth funds. As discussed below, this broader balance-sheet approach complements conventional debt sustainability analysis by focusing on public sector net worth and its capacity to support long-term investment.

Priority investment domains follow a clear organising principle: public action should concentrate on areas where Brazil's structural endowments can be transformed into dynamic competitive advantages through integration with value chains (Aghion et al., 2021; Stern, 2025; Arbache, 2025a). This framework covers four key domains.

The first of these is clean energy systems. Brazil's largely decarbonised electricity mix constitutes a structural advantage that could be further scaled through investment in generation, transmission, storage and grid reliability, transforming clean electricity into an industrial input embedded in value chains (IEA, 2023; EPE, 2024). The second domain is agriculture, land use and the bioeconomy. These areas provide a platform for sustainable aviation fuels, advanced biofuels, bio-based chemicals and sustainable food systems, while also linking agricultural productivity with industrial development and export competitiveness (Arbache, 2025a; World Bank, 2024). The third domain is industrial ecosystems linked to energy and natural capital, including green steel, green hydrogen and its derivatives, fertilisers, and critical minerals processing (IEA, 2020; Energy Transitions Commission, 2021). The fourth domain is infrastructure and logistics as enabling factors that connect energy, resources and industrial activities to domestic and international markets.

Within this framework, the role of fiscal policy is not primarily to finance investment directly, but to support the conditions in which larger volumes of private and foreign investment can be mobilised in sectors where Brazil appears to have strong structural advantages.

The proposed initial fiscal consolidation

Given Brazil's fiscal vulnerabilities, the investment-led strategy we outline is assumed to operate alongside a process of gradual fiscal consolidation. An initial fiscal consolidation is a necessary part of the strategy. However, rather than relying on front-loaded expenditure cuts, we focus on a range of structural measures that have been identified in the Brazilian policy debate as potentially capable of improving fiscal sustainability while preserving productive investment capacity.

This approach combines institutional improvements in fiscal governance with targeted budgetary restructuring. Three institutional reforms are particularly relevant here. The first is the adoption of a permanent spending review process aimed at identifying efficiency gains within existing programmes (with preliminary estimates of around R$25 billion, or 0.2% of GDP, from administrative measures alone; Pires et al., forthcoming). The second is the adoption of a Medium-Term Expenditure Framework providing a multi-year budgetary perspective. The third is the development of a debt-based fiscal anchor linking annual targets to a medium-term debt stabilisation path, while retaining the flexibility to respond to shocks. These measures must address the structural rigidity of the public budget, including revenue earmarking and indexation mechanisms that have driven primary expenditure growth above that of the economy.[6] Together, these reforms seek to address longstanding features of Brazil's fiscal framework, including rigidities in expenditure associated with earmarking and indexation mechanisms.

Indeed, a gradual fiscal consolidation strategy should prioritise reforms that address the structural drivers of expenditure growth. One central issue is the indexation of primary social spending to the minimum wage, which is often perceived by markets as a key source of medium- and long-term fiscal unsustainability. A pragmatic approach could, therefore, proceed step by step: first, by opening a transparent public discussion on the fiscal implications of linking a large share of social expenditure to the minimum wage; second, by assessing whether some benefits and transfers could gradually be

[6] Many items of Brazilian primary spending are directly or indirectly linked to the evolution of the minimum wage. The minimum wage serves as the baseline for social security benefits, welfare transfers and unemployment-related policies. Consequently, minimum-wage adjustments have significant fiscal implications. With an ageing population, this fiscal burden has grown steadily, contributing to concerns about the long-term dynamics of public expenditure.

delinked from the minimum wage without weakening social protection; and third, by considering alternative indexation rules that are more closely aligned with Brazil's macroeconomic fundamentals. Given the sensitivity of this issue and the absence of a broad consensus, any reform would need to be gradual and designed to preserve social the protection role of affected programmes.

Several options could be considered. One would be to index selected benefits to inflation, preserving purchasing power while avoiding automatic real expenditure growth. A second option would be to link adjustments to growth in GDP per capita, so that social spending evolved with average income rather than aggregate output. A third possibility would be to use a mixed formula combining inflation, productivity growth and demographic trends, which would more accurately reflect the economy's capacity to finance social commitments. The macroeconomic rationale for this is straightforward: an indexation rule should protect vulnerable households, but it should also be compatible with debt sustainability, an ageing population, productivity dynamics and the need to reduce Brazil's long-term risk premia. Such a reform would not involve reducing social rights but rather designing a more sustainable and economically coherent mechanism for updating them over time.

Table 5.1. Proposed fiscal consolidation measures and yields as a percentage of GDP

	First phase (2026–27)	**Second phase (2028–29)**	**Third phase (2030–35)**
Spending review/ efficiency gains	0.2%	0.2–0.3%	0.3%
Revision of tax expenditures	0.1-0.2%	~0.5%	~0.5
Budget de-indexation and reduced earmarking	—	~0.5%	0.5-1%
Pension and public wage adjustments	—	~0.5%	~1%
Direct tax reform (progressivity)	—	0.5	~0.5%
Consumption tax reform (efficiency gains)	—	Marginal (not quantified)	Moderate (not quantified)
Total primary balance improvement	~0.4%	~1–1.5%	**>2.0%**

Sources: Authors.

A gradual transition towards a more progressive direct tax system that builds on the consumption tax reform approved for 2026–33 could also help strengthen the fiscal base over time.

In illustrative scenarios discussed in the literature, the fiscal gains from a combination of institutional reforms, expenditure rationalisation and revenue measures are relatively modest in the short term but increase progressively over time. Our estimates suggest limited fiscal gains in the short term (around 0.4% of GDP), rising to about 1–1.5% of GDP in the medium term, and exceeding 2% of GDP in the long term. This should be sufficient to generate a sustained primary surplus, stabilise and reduce public debt, and create fiscal space for productive investment. The approach improves the composition and efficiency of public spending while supporting growth, ensuring that fiscal consolidation reinforces rather than constrains the investment-led development strategy. These estimates should be interpreted as illustrative orders of magnitude rather than forecasts, as outcomes depend on policy design, implementation and broader macroeconomic conditions.

5.4. Brazil's emerging three-layer transition finance architecture

The gradual fiscal consolidation and macroeconomic rebalancing discussed above do not imply a passive role for the state. Rather, they require a more strategic use of limited public balance-sheet capacity to catalyse much larger volumes of private and foreign investment. The proposed strategy combines gradual fiscal consolidation with catalytic public policies that crowd private investment (including FDI) into Brazil's unique natural and productive endowments, generating higher productivity and growth, reducing risk premia and real interest rates, and ultimately improving debt sustainability through a more favourable interest rate-growth differential.

In practice, Brazil is not starting from a blank slate. Several policy instruments the country introduced or expanded in recent years provide examples of an emerging fiscal-financial architecture that shares several characteristics with our framework. This comprises three complementary layers: a green federal budget providing the baseline of public spending and policy direction; a para-fiscal layer centred on the Fundo Clima, expanding financing capacity through balance-sheet instruments; and a mobilisation layer exemplified by Eco Invest Brasil, which is designed to crowd in private and foreign capital by reducing key investment risks.

Table 5.2. Brazil's three-layer transition finance architecture (R$ billion and % of GDP), 2015–25

Layer/ component	2015	2019	2021	2023	2024	2025
1. Green federal budget	R$29.2 (0.3%)	R$17.4 (0.2%)	R$17.3 (0.2%)	R$30.0 (0.3%)	-	-
2. Fundo Clima	R$0.58 (~0.01%)	R$0.47 (~0.01%)	R$0.37 (~0.00%)	R$0.67 (~0.01%)	**R$10.46 (0.07%)**	**R$14.03 (0.1%)**
3. Eco Invest Brasil (mobilised)	–	–	–	–	**R$75.2 (~0.6%)**	**R$52.8 (~0.4%)**

Source: Authors.

These layers are cumulative rather than substitutive. Direct government spending associated with climate and environmental objectives has fluctuated between approximately R$17 billion and R$30 billion annually, or roughly 0.2–0.3% of GDP, over the past decade; when broader tax expenditures and financial measures are included, this is close to R$90 billion, or around 0.8–0.9% of GDP. However, this layer remains relatively fragmented and only partially oriented towards investment. The Fundo Clima

has undergone a structural break: annual disbursements remained below R$1 billion until 2024, when recapitalisation through sovereign sustainable bonds raised available resources to approximately R$10.4 billion, rising to over R$14 billion in 2025. The state has moved from a narrow, flow-based fiscal logic towards a balance-sheet approach, using its capacity to issue sustainable debt to expand investment in the transition. Cumulatively, Eco Invest Brasil mobilised approximately R$120.8 billion in total investment, equivalent to about 1.1–1.2% of GDP, across three auctions between 2024 and 2026, with leverage ratios ranging from 1.8x to 6.5x converting public fiscal capacity into private investment capacity at scale. A recent fourth auction mobilised R$29.3 billion, or about 0.2% of GDP.

Two observations emerge from this. First, Brazil appears to be moving from a system dominated by budgetary spending to one increasingly structured around financial instruments and leverage mechanisms. Second, the combination of sovereign green debt through the Fundo Clima and risk-sharing mechanisms through Eco Invest Brasil illustrate how public balance sheets can be used to reduce risk, improve project bankability and crowd in private capital at scale. Whether these instruments can be scaled sufficiently to support a broader investment-led transformation remains an open question. This will depend on implementation capacity, project pipelines, investor confidence and macroeconomic conditions. The sectoral allocation of these instruments suggests that there is an increasing focus on investment-intensive and tradable sectors capable of generating growth, exports and productivity gains (see Box 5.1).

Box 5.1. Composition and sectoral allocation of Brazil's transition finance architecture

Beyond aggregate magnitudes, an important question concerns the sectoral allocation of resources within Brazil's emerging transition-finance architecture. The available data show a clear pattern: while the green federal budget remains broad and multi-sectoral, the Fundo Clima and Eco Invest Brasil are more concentrated in a set of investment-intensive transition sectors, particularly energy, transport, industry and land use. This pattern may indicate a gradual shift away from diffuse spending and towards more targeted investment platforms.

At the level of the green federal budget, expenditures are classified according to the methodology proposed by the Inter-American Development Bank, which groups spending into three categories: climate change, biodiversity and disaster risk management. Within these categories, expenditures are further classified by primary or secondary purposes, which may be positive or negative. Climate-related spending is concentrated mainly in agriculture, environmental management, labour and transport. Tax expenditures are also included, following OECD methodology, and may likewise be classified as environmentally beneficial or harmful.

By contrast, the Fundo Clima has a more concentrated sectoral profile, particularly in its reimbursable (credit) modality operated by BNDES. Between 2013 and 2025, more than 41% of resources were allocated to the energy transition, followed by 17% to FINAME Verde (supporting low-emissions machinery and equipment), 13% to green logistics and mobility, 12% to urban and sustainable development, and 11% to native forests and water resources.

The Eco Invest Brasil programme increases this concentration, as it is explicitly designed to mobilise private capital in large-scale, bankable sectors aligned with the national ecological transformation strategy (PTE). Allocations across its first three auctions show a strong focus on the energy transition (around 65%), followed by the bioeconomy (16%), green infrastructure and adaptation (10%), and the circular economy (9%). These sectors closely align with Brazil's structural advantages and areas of strong global demand.

These patterns suggest a degree of complementarity across the three layers of the architecture. While the deferral budget provides a broad enabling base, the para-fiscal and mobilisation layers concentrate resources in sectors that are both investment-intensive and tradable, and therefore capable of generating growth, exports, and productivity gains. Whether this allocation ultimately generates the expected investment, productivity and export effects will depend on implementation, project quality and broader macroeconomic conditions.

Global financial markets are already reallocating capital towards digitalisation, new technologies and opportunities in the low-carbon transition, with increasing exposure to EMDEs as part of global portfolio diversification. This is reflected in, for example, the relative resilience and appreciation phases of the Brazilian real against the US dollar in recent times. The framework proposed here assumes that Brazil could benefit from these trends through credible macroeconomic policies, stable regulatory conditions and a pipeline of bankable projects. At the same time, the strategy remains sensitive to changes in global financial conditions, investor sentiment and geopolitical developments, highlighting the importance of maintaining policy flexibility and contingency options in case external conditions become less favourable.

Looking ahead, these financial instruments can be viewed not as fixed institutional arrangements but as the first generation of a broader transition-finance architecture that will need to evolve continuously. As experience accumulates, an important policy question will concern how to allocate resources across projects, sectors and technologies in ways that maximise economic, social and environmental returns. This may require an emphasis on initiatives with higher productivity, export, innovation and decarbonisation potential rather than rigid or purely mechanical criteria. From this perspective, the effectiveness of transition finance depends not only on the volume of resources mobilised, but also on their allocation and developmental impact. The challenge is as much about improving the quality, strategic orientation and developmental impact of investment as it is about expanding financing capacity.

5.5. From an emerging architecture to a scaled transition

Brazil has put in place several of the core building blocks associated with a transition finance architecture. The central question is whether, and under what conditions, these instruments can be scaled in a manner consistent with macroeconomic constraints while supporting the investment opportunities associated with the structural transformations discussed above. Therefore, we focus on analysing the institutional arrangements, financial mechanisms and policy instruments currently available in Brazil, and assessing how they may contribute to an investment-led transition strategy.

Scaling is likely to depend on a rebalanced composition of financing rather than a simple expansion of public spending. Given Brazil's limited fiscal space, the green federal budget can only play a targeted role focused on high-multiplier expenditures, enabling infrastructure, and social and territorial cohesion. The para-fiscal layer can expand this in a fiscally consistent way, but is unlikely to be sufficient on its own. The bulk of the adjustment must, therefore, come from a significant increase in private investment (including FDI) mobilised through risk-sharing mechanisms, regulatory clarity and credible long-term policy frameworks.

In practical terms, this points towards a three-tiered structure: a core public layer combining budgetary spending and targeted fiscal incentives; an expanded para-fiscal layer using public balance-sheet instruments to de-risk investment; and a dominant private layer in which most capital formation is undertaken by private investors, supported by public risk-sharing. Public resources act as catalysts rather than substitutes for private capital.

The rationale for this structure is based on leverage. Relatively modest public spending – at around 0.5–0.8% of GDP, including para-fiscal tools – can unlock significantly larger volumes of private investment, particularly in energy-intensive and tradable sectors aligned with Brazil's comparative advantages. The para-fiscal layer (through public guarantees, blended finance, development banks and instruments such as FX hedging) can reduce perceived risk, lower the cost of capital and improve project bankability, especially in early-stage or infrastructure-intensive investments. As these conditions improve, private investment can scale structurally, supported by FDI inflows and long-term capital mobilisation.

Scaling efforts need to be tightly linked to strategic allocation towards sectors where Brazil combines structural advantages with strong global demand and the potential for value-chain integration: clean energy systems, the bioeconomy and sustainable land use, industrial ecosystems linked to energy and natural resources, and the infrastructure and logistics systems that connect them to domestic and global markets. This is the operational expression of the powershoring and industrialisation strategy.

Achieving this will require the selective use of fiscal incentives and industrial policy tools within fiscal constraints. Brazil cannot replicate the scale of the US Inflation Reduction Act, the European Green Deal, or China's state-led approach, but can deploy adapted instruments where limited fiscal costs generate large leverage effects: targeted tax incentives linked to performance, accelerated depreciation for green capital, concessional financing for strategic sectors, public guarantees and risk-sharing mechanisms, along with regulatory frameworks that reduce uncertainty and transaction costs. The objective is not to replicate large-scale subsidy programmes but to tilt relative prices and risk-return profiles in favour of strategic sectors, crowding in private investment at scale.

The constraint is not a lack of global capital, but distorted incentives and elevated risk premia that prevent investment from flowing to otherwise profitable low-carbon opportunities. Policy should, therefore, focus on correcting effective prices through carbon-related regulation, certification and the gradual removal of distortions, while improving the risk–return profile of targeted sectors via de-risking instruments, infrastructure provision and predictable policy. Even small differences in input costs translate into large competitiveness gaps, meaning that aligning price signals with Brazil's structural advantages can decisively influence decisions about investment location. This is especially true of energy, which can represent 20% to 70% of total production costs in key sectors. Rather than relying on permanent subsidies, the investment-led strategy builds bankable industrial ecosystems in sectors such as green steel, sustainable fuels and hydrogen, where cost differentials and global demand already support underlying profitability, allowing public policy to focus on reducing uncertainty and preventing coordination failures.

If successful, this approach generates a virtuous circle: higher investment supports stronger growth, improved fiscal revenues and lower risk premia, which in turn expand fiscal space and reinforce investment. The next phase of Brazil's transition strategy is, therefore, one of scaling and alignment. This involves expanding investment through leverage and private participation while ensuring that capital is directed towards sectors that maximise productivity, export capacity and resilience.

5.6. Strengthening the public sector balance sheet: a sovereign wealth fund for the transition

As discussed, the debate on fiscal sustainability in Brazil has traditionally focused on fiscal flows, including primary balances, budget deficits and public debt ratios. While these indicators remain important, a broader perspective is increasingly required. Fiscal sustainability depends not only on the evolution of public liabilities, but also on the management and accumulation of public assets. From this perspective, the relevant metric is not debt alone but the overall public sector balance sheet and, more fundamentally, public sector net worth.

This distinction is particularly important in the context of an investment-led transition strategy. The challenge facing Brazil is not simply to create fiscal space through expenditure restraint or revenue increases, but also to strengthen the asset side of the public balance sheet in ways that enhance long-term fiscal resilience, reduce sovereign risk premia and support strategic investment. The same logic that underpins the use of development banks, public guarantees, blended finance and other para-fiscal instruments can be extended to the management of the country's natural resource wealth.

Brazil is now one of the world's major energy producers. Oil production has surpassed 4 million barrels per day, while combined oil and gas production reaches approximately 5.6 million barrels per day. Around 82% of this output originates from the pre-salt layer, where Petrobras remains the principal operator. Brazil has become the eighth-largest oil producer globally, and recent discoveries suggest that production may continue to expand over the coming decades. The recent announcement by BP of a major discovery in the Santos Basin and the ongoing exploration of the Equatorial Margin point to significant additional potential.

As production has increased, fiscal revenues from the extractive sector have risen substantially. Revenues associated with oil and gas production increased from approximately 0.7% of GDP in the early 2000s to around 1.4% of GDP in 2024. Current projections suggest that these revenues could approach 1.8% of GDP by the end of the decade even without major new discoveries. However, these

revenue streams are inherently volatile, reflecting fluctuations in global commodity prices, exchange rates and production conditions. They are also derived from finite resources whose economic value will eventually be exhausted.

These characteristics create a strong case for adopting a dedicated institutional framework for managing natural-resource revenues. International experience demonstrates that sovereign wealth funds can transform temporary and volatile resource revenues into diversified financial assets capable of generating stable and permanent income streams over time. By saving part of the windfall generated by natural-resource extraction, sovereign wealth funds help avoid excessive dependence on commodity cycles, reduce fiscal procyclicality and promote intergenerational equity by ensuring that future generations benefit from the exploitation of non-renewable resources.

For Brazil, a sovereign wealth fund could serve a broader strategic purpose than conventional fiscal stabilisation. Rather than viewing oil revenues solely as a source of current expenditure financing, a portion of these revenues could be converted into productive public assets that strengthen the public balance sheet and support the ecological transition. Such an approach would complement gradual fiscal consolidation by addressing both sides of the balance sheet simultaneously: stabilising liabilities through prudent fiscal management while expanding public assets through long-term investment.

Brazil has previously experimented with sovereign wealth mechanisms, including the Fundo Soberano do Brasil and the Fundo Social do Pré-Sal. While these initiatives represented important institutional innovations, neither evolved into a large-scale savings vehicle comparable to international examples such as Norway's Government Pension Fund Global. A renewed sovereign wealth fund could build on these experiences while incorporating stronger governance, greater transparency and a clearer long-term mandate.

One possible model would allocate a predetermined share of oil and gas revenues to a federal sovereign wealth fund managed independently under strict fiscal and governance rules. The fund would invest in a diversified portfolio of domestic and international assets, preserving capital and generating long-term returns. Part of these returns could then be dedicated to financing climate adaptation, climate mitigation, biodiversity conservation, sustainable infrastructure and strategic investments associated with Brazil's ecological transition. In effect, the country would transform part of its fossil-fuel wealth into a permanent source of financing for a low-carbon development strategy.

Beyond its direct financing role, such a mechanism could have important macroeconomic benefits. By improving public net worth and diversifying government assets, a sovereign wealth fund could strengthen fiscal credibility, improve resilience to external shocks, and contribute to lower sovereign risk premia. This would reinforce the broader investment strategy outlined in this paper, in which lower risk premia reduce the cost of capital, attract larger volumes of domestic and foreign investment, and support a virtuous circle of growth, fiscal strengthening and ecological transformation.

From this perspective, the creation of a sovereign wealth fund should not be viewed merely as a mechanism for managing oil revenues. It should also be understood as part of a broader shift towards public balance-sheet management, in which fiscal sustainability is assessed through the evolution of both liabilities and assets.[7] In a country endowed with substantial natural-resources wealth that has ambitious transition objectives, strengthening public net worth may become as important as reducing public debt in securing long-term macroeconomic stability and development.

[7] Norway provides a clear example of a public-balance-sheet approach to fiscal sustainability. By channelling petroleum revenues into the Government Pension Fund Global rather than current spending, it transformed finite natural-resource wealth into financial assets exceeding US$1.8 trillion in 2025. Although Brazil faces different challenges, the Norwegian experience illustrates how sovereign wealth funds can strengthen fiscal resilience and support long-term development objectives.

5.7. A shifting global risk landscape and new opportunities for FDI

Recent developments in global financial markets appear to reflect a gradual reassessment of traditional risk perceptions between advanced and emerging economies. Rising public debt levels, fiscal expansion, trade fragmentation and institutional uncertainty in several advanced economies have prompted renewed discussion about the relative pricing of sovereign and investment risk. At the same time, emerging market borrowing spreads relative to US benchmarks are approaching their lowest levels since before the global financial crisis (*Financial Times*, 2025; IMF, 2025; Georgiadis and Jarociński, 2025), reflecting both improved macroeconomic frameworks in some countries and global investors' search for diversification.

For Brazil, these developments may create a window of opportunity, albeit one that is neither freely accessible nor permanent. Lower relative risk premia would reduce the cost of capital, improve access to international financing and increase Brazil's attractiveness for long-term investors seeking diversification away from more uncertain advanced economy assets. A credible investment-led strategy, anchored in macroeconomic stability and structural transformation, could convert these cyclical conditions into sustained FDI aligned with Brazil's productive and ecological transition.

This dynamic operates through both global financial conditions and domestic policy credibility. Globally, rising debt levels, higher term premia and policy uncertainty in advanced economies are narrowing traditional risk differentials, creating space for countries such as Brazil to attract a larger share of capital flows. Domestically, credible macroeconomic frameworks and a clear investment strategy reinforce this shift by lowering perceived risk, which in turn reduces real interest rates from around 6–8% to 3–4% over time in our projections, easing financing constraints for firms and the sovereign. This supports higher FDI inflows (rising towards 3–4% of GDP) and improved access to long-term financing, particularly for infrastructure and industrial projects linked to the low-carbon transition. In this context, capital flows reflect not only short-term yield differentials but also structural portfolio reallocation, as institutional investors seek exposure to scalable, low-carbon investment opportunities that both offer returns and are resilient.

Beyond cyclical conditions, policy reforms can also help unlock larger capital flows towards EMDEs. A growing international debate has focused on prudential and regulatory reforms, the role of MDBs, the expansion of blended-finance instruments, improved risk-sharing mechanisms and the development of carbon and sustainable-finance markets. The broader objective is to reduce barriers that prevent global savings from reaching productive investment opportunities in EMDEs. Closing the external climate finance gap of around US$1.3 trillion annually for EMDEs is feasible through a combination of approximately US$650 billion from private institutional investors (requiring only a marginal reallocation of around 0.5% of global assets under management); US$300 billion from expanded MDB lending; US$100 billion from bilateral flows; US$50 billion from South-South cooperation; and US$200 billion from concessional and innovative mechanisms (IHLEG, 2025; Pereira da Silva, 2025b). Within this reallocated pool, Brazil is a well-positioned destination given its scale, diversified asset base and strong alignment with emerging low-carbon investment opportunities.

5.8. An illustrative macroeconomic trajectory

The macroeconomic figures presented in this subsection should be understood as illustrative scenarios and not forecasts. They are based on a simple macroeconomic consistency framework and are not the result of fully fledged computable general equilibrium-type models. They are intended to illustrate how an investment-led transition strategy could affect growth, investment, productivity and fiscal dynamics in line with a plausible set of assumptions. The focus is on the direction and sequencing of adjustments rather than on projections of numerical outcomes. The scenarios illustrate the possible macroeconomic trajectories of a successful investment-led transition strategy regarding investment mobilisation, productivity gains and external demand. They account for a reduction in the economy's underlying risk premia as production systems, infrastructure and value chains become

more resilient and less vulnerable to climate-related shocks, disruptions and losses, thereby reinforcing the virtuous cycle described above.

The analytical logic underpinning these scenarios is based on a combination of moderate but sustained increases in domestic private investment and FDI, selective and catalytic public intervention, gradual crowding-in effects, export expansion linked to low-carbon comparative advantages, and a progressive decline in risk premia as confidence, investment and growth reinforce one another over time.

A key transmission channel in these illustrative scenarios is the gradual improvement in Brazil's sovereign risk profile. As investors gain confidence in the durability of the investment-led transition strategy, fiscal credibility, institutional capacity and growth prospects, sovereign spreads could progressively decline. In this context, the recovery of investment-grade status would represent an important milestone, as it would expand the universe of institutional investors who are able to allocate capital to Brazil, lower borrowing costs across the economy, and strengthen the crowding-in effects that underpin the proposed development strategy.

The central macroeconomic idea in this is that even a relatively modest capture of the large-scale global reallocation of green and industrial investment flows could have meaningful effects on Brazil's growth trajectory. Because public resources are used primarily as catalytic instruments rather than as the dominant source of financing, the associated fiscal costs remain relatively contained compared to the total volume of investment mobilised. The strategy relies on multiplier and ecosystem effects: infrastructure expansion, industrial clustering, supplier development, logistics improvements, services growth, labour income expansion and technological spillovers can together generate broader increases in productivity, formal employment, exports and fiscal revenues. In these conditions, investment rates gradually rise, growth strengthens, inflation pressures moderate over time as productive capacity expands, real interest rates progressively decline with lower perceived risk, the external position remains manageable through export growth and FDI inflows, and fiscal dynamics gradually improve through stronger growth and revenue generation.

At a deeper level, the strategy aims not only to increase the quantity of investment, but also to raise total factor productivity through structural transformation effects associated with better infrastructure, cleaner and cheaper energy, improved logistics, technological diffusion, industrial clustering, supplier-network development, economies of scale, stronger integration into higher value-added global value chains, and more efficient allocation of capital towards sectors where Brazil has durable comparative advantages.

The proposed strategy includes a macroeconomic stance that continues creating synergies between the government's green investment budget, its para-fiscal green investment funds and private investment, including FDI in the main strategic sectors with dynamic comparative advantages. The strategy also includes a 'patient' monetary policy stance that maintains price stability while balancing the trade-off with green investment and activity using the accommodation band of the inflation targeting framework, while working to improve the institutional features that impede a reduction in real interest rates.

The figures presented in Table 5.3 draw on projections such as those in CCDRs, OMEGA and PTE; stylised macro-financial relationships; and the logic of an investment-led, transition-driven framework. As such, they should be interpreted as capturing the direction, sequencing and relative magnitudes of adjustment embedded in the strategy: a gradual easing of macroeconomic constraints, a temporary investment-driven fiscal expansion and progressive improvement in growth, external balances and debt dynamics.

This trajectory illustrates a gradual and internally consistent evolution of Brazil's growth path, in which improved policy coordination, credibility and targeted investment progressively relax the macroeconomic constraints that have historically limited growth. Ultimately, the success of the strategy should not be measured solely by short-term fiscal or monetary indicators, but by Brazil's ability to combine stronger growth with lower emissions, greater resilience and improved social outcomes. If successful, this strategy would also create the conditions for a lasting return to

investment-grade status, reflecting not only improved fiscal metrics but a broader transformation of Brazil's economic structure and growth prospects.

Table 5.3. Illustrative trajectory under our proposed investment-led framework

Indicator (% of GDP, unless otherwise specified)	First phase (2026–27)	Second phase (2028–29)	Third phase (2030–35)
1. Total investment	**17.5–18.5**	**19.5–21**	**21.5–23**
1.1 Private investment	15.5–16.5	16.5–18	18–19.5
1.2 Public investment (green budget)	0.3–0.5	0.5–0.7	0.6–0.8
1.3 Public investment (Para-fiscal tools/funds)	0.1–0.2	0.2–0.3	0.2–0.3
1.4 Incentives/ de-risking (Eco Invest Brasil, etc.)	0.1–0.2	0.2–0.4	0.2–0.4
2. FDI inflows	**2.5–3**	**3.0–4**	**3–3.5**
Real GDP growth	~2	2.5–3	3–3.5
Inflation	4–4.5	~3.5	~3.0
Fiscal balance	-6.0 to -7.0	-4.0 to -5.0	-3.0 to -4.0
Primary balance	-1.0 to 0.0	0.5–1	>2
Public debt	80–85	90–95	85–90
Sovereign Risk Premium	Stabilisation	Gradual decline	Structural reduction
Credit Rating	Outlook improvement	Recovery of investment-grade status	Consolidation
Real long-term interest rate (% annual)	6.0–8.0	4–5	3.0 – 4.0
Current account	-2.0 to -2.5	-1.5 to -2.0	-1.5 to -2.0
Exchange rate (BRL/USD)	5.0–5.5	4.5–5.0	~4.5

Source: Authors' estimates. Note: FDI inflows are reported as a memorandum item. They are a source of financing for investment and are, therefore, embedded within private investment, not additional to total investment.

This macroeconomic trajectory is a three-phase transition from a low-investment trap to a higher-growth equilibrium. In the first phase (2026–27), Brazil is stuck in a low-investment, high-cost equilibrium: investment remains at around 17–18% of GDP, growth is weak (1.5–2.0%), real interest rates are high (6–8%) and fiscal constraints (deficit at ~6–7%, debt at ~80–85% of GDP) limit policy space. FDI inflows are modest, reflecting elevated risk premia and uncertainty.

In the second phase (2028–29), a gradual shift begins. Investment rises to 20–21% of GDP, driven mainly by private capital crowding in around targeted public and para-fiscal support. Growth accelerates to 2.5–3%, inflation stabilises, and real interest rates decline to 4–5% as credibility improves. Fiscal balances strengthen moderately, and FDI increases to 3–4% of GDP, reflecting growing investor confidence.

In the third phase (2030–35), the economy converges on a higher-investment, lower-cost regime. Investment reaches 21.5–23% of GDP, growth strengthens to 3–3.5%, and real interest rates fall further (3–4%) as risk premia decline structurally. Fiscal accounts improve with sustained primary surpluses and public debt declines, while FDI stabilises at high levels and is increasingly directed towards strategic low-carbon sectors.

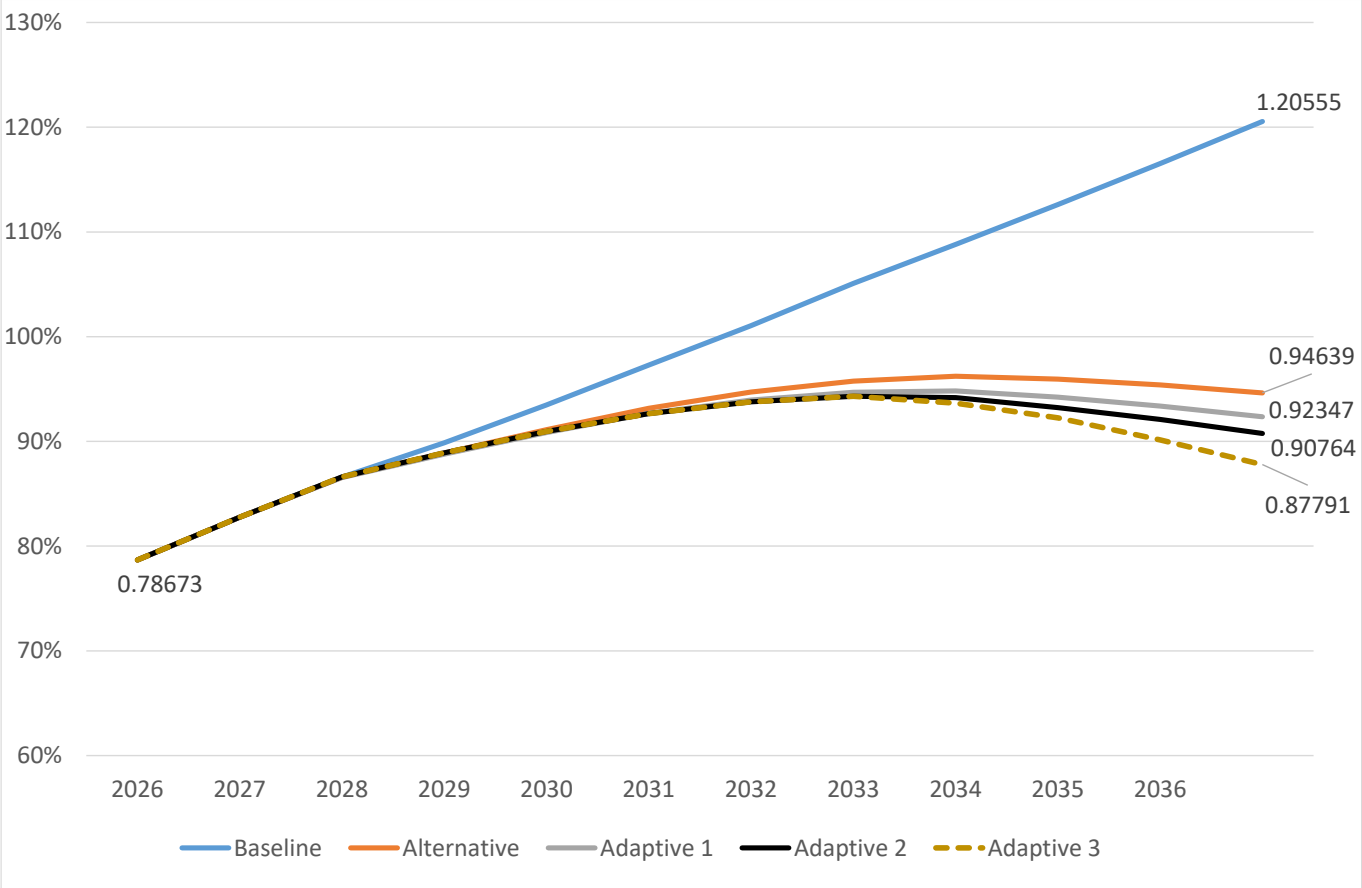
This long-term virtuous circle is consistent with more detailed simulations in Figure 5.1 (Pires et al., 2026), suggesting that Brazil could achieve a significant macroeconomic improvement with a relatively limited direct use of fiscal space, provided that public resources are used strategically to crowd in private and foreign investment through a three-layer financing architecture. On the fiscal side, the proposed adjustment is gradual and moderate, at roughly 0.3% of GDP per year on average. This reduces primary expenditure from 19.3% to 16.9% of GDP between 2026 and 2036, while gross revenues remain broadly stable at around 24% of GDP. This allows the primary balance to move from near equilibrium to a surplus close to 2% of GDP by 2036. At the same time, the strategy includes a catalytic public investment role in three complementary layers: a limited core budgetary layer (the green budget and targeted public investment); a para-fiscal and de-risking layer (the Climate Fund, Eco Invest Brasil, public guarantees, blended finance and sovereign sustainable bonds); and a dominant private and foreign investment layer mobilised through leverage mechanisms. The direct fiscal effort remains relatively small: sovereign sustainable bond issuances amount to around 0.2% of GDP, while Eco Invest Brasil's catalytic capital of R$38.2 billion mobilises approximately R$128 billion in total investment, with an average leverage ratio above 4.3. This commitment to gradually pursuing credible fiscal consolidation and crowding in investment can help lower sovereign risk premia and long-term interest rates, stimulate productivity-enhancing investment, strengthen growth dynamics and progressively stabilise and eventually reduce the debt-to-GDP ratio.

A key feature of the debt scenarios in Figure 5.1 is that debt dynamics improve despite the expansion of climate- and investment-related financing instruments. The baseline scenario involves no major fiscal reform and leads to a continued increase in debt, reaching approximately 120.6% of GDP by the end of the projection. In contrast, the alternative scenario combines gradual fiscal adjustment measures capable of improving the primary balance by approximately 2.3% of GDP by 2036, generating a debt ratio of around 94.6% of GDP. The adaptive scenarios then build on this fiscal improvement by permanently expanding transition-finance instruments, notably the Climate Fund and Eco Invest Brasil by approximately R$25 billion per year, with R$15 billion allocated to the Climate Fund and R$10 billion to Eco Invest Brasil. Assuming leverage ratios of approximately 1.8 times for the Climate Fund and 4.5 times for Eco Invest Brasil, these resources mobilise substantially larger volumes of private investment while supporting higher growth and lower risk premia. As a result, debt falls further to approximately 92.3%, 90.8% and 87.8% of GDP under the increasingly favourable adaptive scenarios. These scenarios, therefore, suggest that a combination of credible fiscal adjustment and well-designed catalytic investment instruments can improve debt sustainability not only through higher primary balances, but also through stronger growth, lower financing costs and the crowding-in of private capital.

The illustrative macroeconomic trajectory also consistently links investment, domestic savings and foreign savings. Investment acts as the leading variable. New investment opportunities, higher expected profitability, technological advancement and improved access to finance stimulate investment, which raises income, profits and productivity. Higher income then generates additional domestic savings endogenously. In this framework, the increase in investment is financed through three mutually reinforcing channels: higher public savings resulting from gradual fiscal consolidation;

higher private savings generated by stronger growth, rising profitability and expanding financial intermediation; and sustained inflows of FDI attracted by improved macroeconomic conditions and exceptional investment opportunities linked to the ecological transition. Gross national savings rise gradually from around 15–16.5% of GDP to around 19.5–21.5% of GDP, supporting a higher level of investment while maintaining external sustainability.

Figure 5.1. Simulation of the debt trajectory in different scenarios as a percentage of GDP



Source: Pires M, Awazu Pereira da Silva L, Gimenes F (forthcoming).

The increase in private savings in the illustrative scenario assumes that there will be higher private savings from households (resulting from potential structural reforms) but that the increase will primarily emerge endogenously from the growth and investment process itself. As investment accelerates, particularly in sectors with strong productivity and export potential, corporate profits rise, retained earnings increase and firms generate more internal resources to finance future expansion. Historically, in most periods of successful industrialisation, rising corporate savings have been one of the principal drivers of higher national saving rates.

In addition, stronger growth raises household incomes, particularly among middle- and upper-income groups, whose marginal propensity to save is significantly higher than that of lower-income households. As formal employment expands, pension assets grow, financial markets deepen, household wealth accumulates and a larger share of national income is channelled into financial and productive investment. The proposed strategy also assumes a gradual expansion of institutional investment from sources such as pension funds, insurance companies, infrastructure funds and other long-term investors, which increases the economy's capacity to transform income gains into long-term savings.

Finally, part of the increase in private savings reflects the interaction between domestic firms and foreign investors. Higher FDI inflows finance new productive capacity, generate export revenues, raise profitability and create additional domestic savings through supplier networks, reinvested earnings and technological advancement.

In a nutshell, the increase in investment embedded in the illustrative scenario is financed through a combination of higher public savings, higher private savings and sustained foreign capital inflows. A stylised breakdown of this suggests that approximately 2–2.5 percentage points of GDP come from fiscal adjustment and higher public savings, around 1 percentage point from increased retained corporate earnings associated with improved profitability and investment opportunities, approximately 0.5 percentage points from higher household savings resulting from rising incomes and deepening financial markets, and around 0.5 percentage points from additional FDI. Together, these sources generate approximately 4–4.5 percentage points of GDP in additional financing, which is broadly consistent with the increase in total investment envisaged in the scenario.

5.9. What if efforts to crowd in green investment are delayed or weaker than expected?

A central premise of our analysis is that limited public resources can catalyse large-scale private investment, enabling an investment-led growth trajectory in which macroeconomic stabilisation emerges endogenously. It is important to acknowledge that this mechanism is not automatic. Private investment may respond more slowly, unevenly or on a smaller scale than anticipated due to global financial conditions, domestic policy credibility, regulatory bottlenecks or insufficiently developed project pipelines.

Structural and policy conditions supporting efforts to crow in investment

Several structural factors suggest that Brazil can crowd in investment in this way. The country has a set of characteristics that are becoming increasingly valuable in a world shaped by carbon constraints and geopolitical fragmentation. As discussed, these characteristics create potential cost advantages in various sectors.

The global context may also be supportive. A large pool of capital is seeking low-carbon investment opportunities while facing a shortage of bankable projects in emerging markets. In this context, public policies that improve project preparation, reduce regulatory uncertainty, strengthen infrastructure provision and address financing constraints can help mobilise private investment. Existing Brazilian instruments, including blended-finance and risk-sharing mechanisms, provide preliminary evidence that public resources can leverage larger investment flows in the right conditions. At the same time, international experience shows that large-scale FDI is attracted by coherent production systems that combine energy, infrastructure, regulatory stability and market access rather than by individual assets.

The empirical and theoretical literature strongly supports this logic. In endogenous growth models, public investment in infrastructure and innovation increases the rate of return of private capital (Aghion and Van Reenen, 2025). Evidence from the IMF shows that public investment multipliers are significantly positive and crowd in private investment when the investment quality is high and macroeconomic conditions are stable (IMF, 2014). The London Consensus repositions fiscal policy as an active instrument for growth and structural transformation (Besley et al., 2025), while climate investment is a driver of growth rather than a cost (Stern, 2025), and public policy is critical in mobilising private capital by reducing uncertainty. Recent policy experiences support these conclusions: the US Inflation Reduction Act has demonstrated how long-term fiscal incentives can trigger substantial private investment, while the European Green Deal illustrates the role of regulatory frameworks when combined with financial instruments (Rodrik, 2004; Hausmann and Rodrik, 2003; NGFS, 2023; IEA, 2023).

Backstops and alternative policy paths

While Brazil already has many of the conditions for crowding in investment, the strategy incorporates clear backstops should private investment respond more slowly than expected.

A first response that could be seen as a built-in component of the strategy is to strengthen the enabling environment by accelerating project pipeline development, improving regulatory frameworks,

expanding risk-sharing instruments and ensuring that policy is consistent across public institutions to maintain investors' confidence.

If delays persist, a second response involves a temporary increase in public and para-fiscal efforts within the limits of fiscal sustainability: scaling up the Fundo Clima, increasing targeted public investment in infrastructure and energy systems, and expanding concessional financing and public guarantees to sustain the momentum of investment until private participation increases.

If growth does not accelerate as expected, a more traditional path of fiscal consolidation may be required to stabilise debt dynamics, involving improvements in the primary balance, a reallocation of spending towards higher-impact investment, and reduction of less efficient expenditures. In this context, the pace of green investment may need to be adjusted, prioritising the most economically viable projects while suspending others. Alternatively, if investments are effective and lead to growth and higher inflation, and this in turn raises the cost of capital, the monetary policy response would have to be adaptive. This would mean allowing for a calibrated look-through of temporary, investment-driven supply pressures while maintaining credibility through a clear medium-term inflation anchor, thereby using the flexibility of the inflation targeting regime, avoiding an excessive tightening that could undermine the investment cycle and still preventing second-round inflation dynamics from becoming entrenched (Barmes and al., 2024).

There is a real risk of delays to efforts to crowd in investment, but this does not undermine the core logic of the strategy. Rather, it highlights the importance of an adaptive and flexible policy framework capable of responding to evolving conditions. The combination of strong structural fundamentals, supportive policy instruments and credible backstops provides a robust foundation for mobilising private investment. Even in less favourable scenarios, the strategy remains viable, allowing for adjustments in the pace and composition of investment while preserving the overarching objective of investment-led structural transformation compatible with macroeconomic stability and the ecological transition.

The strategy does not place all its bets on a single mechanism for crowding in investment or on the assumption that private capital mobilisation alone will automatically generate development outcomes. Economic development and structural transformation are inherently multidimensional processes that require a combination of macroeconomic stability, public investment, institutional reform, industrial coordination, infrastructure expansion, technological advancement, human capital formation and private-sector dynamism. The investment-led transition framework proposed here should, therefore, be understood as a strategic orientation rather than a rigid model: its instruments, sequencing and policy mix should remain adaptive to evolving domestic and global conditions, implementation constraints and changing technological and geopolitical realities.

5.10. Towards an adaptive and investment-oriented macroeconomic framework

The broader macroeconomic implications of the strategy should not be interpreted as a call for an abrupt departure from existing macroeconomic frameworks. Rather, they emerge from the cumulative implications of structural transformations discussed above. The climate transition, geopolitical fragmentation, technological change, energy-system reconfiguration and increasingly frequent supply-side shocks are gradually altering the environment within which macroeconomic policy operates. As these transformations intensify, the boundaries between stabilisation policy, industrial policy, financial policy and development strategy become increasingly important, creating new links between macroeconomic stability and structural transformation.

In this context, the analysis connects with a growing international policy debate about the impact of climate change on macro-financial coordination and fiscal, monetary and prudential policies (Pereira da Silva, 2024; 2025). The argument is not that inflation control, fiscal discipline and central banks' credibility should be neglected but rather that macroeconomic frameworks may need to consider how to support long-term investment, manage transition-related risks and address structural bottlenecks more effectively. The ecological transition, therefore, requires not only technological and industrial

transformation but also new forms of coordination between fiscal, monetary, financial, industrial and development policies that are adapted to a more volatile, uncertain and structurally changeable global environment. In addition to the credible fiscal consolidation programme discussed above, several broader dimensions of the macroeconomic framework are increasingly relevant.

The ecological transition also raises important questions for monetary policy (even though price stability continues to be the primary mandate of such policy). A growing literature suggests that investment in innovation, infrastructure, and low-carbon technologies may be particularly sensitive to financing conditions. Monetary policy also needs to account for the need to deal with non-traditional structural transformation. In particular, central banks should better account for persistent supply-side shocks and transition-related price dynamics. It is now well documented that investment in innovation and the green transition is sensitive to monetary conditions, particularly interest rates and the availability of capital (Barmes et al., 2024). The trade-off is in taming inflation firmly while avoiding mechanical policy reactions that could excessively tighten financial conditions during upswings in investment. This implies a calibrated look-through approach to temporary inflationary pressures linked to the energy transition, infrastructure bottlenecks and relative price adjustments, while maintaining a clear medium-term inflation anchor.

Reducing Brazil's structurally high real interest rates requires a broader policy effort: this depends not only on monetary policy but also on lower risk premia driven by fiscal credibility and improved policy coordination. The process also calls for institutional improvements in efforts to measure inflation expectations, broadening beyond market-based surveys to include firms, households and independent analysts, and thereby better capturing expectations relevant to price and wage formation. As these conditions improve, the combination of fiscal reform, de-risking instruments and deeper capital markets could reduce spreads and allow real interest rates to converge towards levels consistent with higher investment and growth. Accordingly, monetary policy plays a dual role: anchoring expectations while enabling the gradual easing of financial conditions as Brazil strengthens its economic fundamentals.

A policy discussion in three dimensions should also complement the strategy. First, coordination on fiscal, monetary, financial, prudential, trade and industrial policies needs to be aligned with the objectives of investment, productivity growth and volatility reduction. Second, lowering structurally high real interest rates requires fiscal credibility, regulatory reform, financial innovation and targeted instruments such as public guarantees, blended finance and strengthened development finance institutions, along with monetary policy that better incorporates supply-side and transition-related dynamics. Third, improving institutional capacity and social sustainability depends on the state's ability to design and implement policies coherently. Robust governance is essential to complex instruments such as blended finance and climate funds, and ensuring that the transition generates employment, improves skills development, and provides broad-based income gains is critical for both economic resilience and political sustainability.

The transition towards an adaptive and investment-oriented macroeconomic framework should, therefore, be understood as a process of gradual evolution rather than institutional rupture. By strengthening coordination, enhancing credibility and linking domestic reforms to international opportunities, Brazil can enhance its capacity to mobilise capital at scale, attract FDI and transform its structural assets into sustained, resilient and inclusive growth.

5.11. The alternative: the potential costs of inaction

The costs of inaction could be substantial. Without the gradual initial fiscal adjustment and a sustained increase in productive investment, Brazil risks remaining in a vicious circle of high debt, high real interest rates, low investment, and weak productivity growth. At the same time, climate-related risks are becoming increasingly relevant from a macroeconomic perspective. More frequent and severe droughts, floods, wildfires, agricultural losses, infrastructure disruptions and energy-system shocks can generate significant fiscal and economic costs through emergency spending, reconstruction needs, lower agricultural output, supply chain disruptions and weaker export performance.

In parallel, delayed adaptation and investment may have significant opportunity costs. The global economy is undergoing a major reallocation of capital associated with decarbonisation, energy security, technological change and the reorganisation of value chains. Countries that can position themselves as attractive destinations for investment in clean energy, low-carbon industry, sustainable agriculture, bioeconomy activities and critical minerals processing may benefit from increased capital inflows, productivity gains, export growth and technological advancement. Countries that fail to do so may benefit from only a small share of these emerging opportunities.

Our central argument is, therefore, not that investment-led transformation is without risks, but that the risks associated with inaction may also be considerable. The challenge is in how Brazil manages difficult trade-offs. A strategy that combines fiscal credibility with measures to mobilise productive investment seeks to address different sets of risks simultaneously: strengthening macroeconomic resilience while positioning the country to benefit from the structural transformations already underway in the global economy.

From this perspective, the debate is not simply about the costs of action, but also about the costs of delay. As the global economy adjusts to climate, technological and geopolitical pressures, countries that can align investment, institutions and policy frameworks with these shifts may be better positioned to achieve stronger growth, greater resilience and improved fiscal sustainability over the medium and long term.

Brazil could miss a historic window to attract large-scale private and foreign investment linked to clean energy, green industrialisation, the bioeconomy, critical minerals and new global value chains reorganising around powershoring and low-carbon production. In this scenario, debt dynamics could deteriorate further as growth weakens and risk premia rise, potentially leading to a self-reinforcing debt trap marked by capital flight, exchange-rate depreciation, higher inflation, tighter monetary policy and, eventually, a fiscal crisis. The true fiscal risk is not in the strategic use of limited fiscal space to crowd in investment and reduce long-term transition risks, but rather in the much larger macroeconomic and fiscal costs associated with delayed adjustment, insufficient investment and a failure to adapt to the structural transformations already reshaping the global economy.

6. Conclusion: sequencing an investment-led strategy for Brazil

Climate change, geopolitical fragmentation and technological shifts are not temporary disturbances but structural forces redefining comparative advantage, investment patterns and the geography of production. Development is no longer primarily about overcoming inherited constraints; it is about strategically positioning economies in relation to emerging global opportunities. For Brazil, this implies a shift away from focusing primarily on vulnerabilities and towards investment, productivity growth and structural transformation that leverages structural strengths such as clean energy, natural capital, agricultural capacity, biodiversity and critical minerals. In this perspective, development becomes a process of converting location-specific advantages into competitive and scalable production systems.

The table below summarises the sequencing and policy logic underlying the investment-led strategy we propose. The central idea is not a large-scale state-led spending programme, but a gradual reorientation of macroeconomic, financial, industrial and regulatory policies towards supporting productive private investment, structural transformation and the development of dynamic comparative advantages. The strategy combines initial and sustained fiscal consolidation with targeted catalytic public intervention designed to crowd in increasing volumes of domestic and foreign private investment. The recovery of investment-grade status is not a prerequisite for the strategy but is a potential outcomes of its successful implementation.

Table 6.1. Policy recommendations and sequencing

Policy area	Short term (2026–27)	Medium term (2028–33)	Long term (2034 onward)
Fiscal policy	Gradual fiscal consolidation combined with preservation of strategic public investment; green budgeting; prioritisation of high-multiplier infrastructure; strengthened credibility of fiscal framework; selective catalytic spending through BNDES, Fundo Clima and Eco Invest Brasil	Progressive expansion of fiscal space through stronger growth, higher revenues and lower risk premia; scaling of blended finance and transition-related investment; increased public investment efficiency	Stabilisation of debt dynamics through higher growth and productivity; sustained fiscal capacity to support social inclusion, infrastructure, resilience and innovation
Monetary policy	Preserving inflation-control credibility while using inflation-targeting flexibility to avoid excessive	Gradual reduction in real interest rates as inflation expectations, confidence and risk premia improve; more supportive financial	More stable low-inflation environment compatible with structurally lower real interest

	tightening; maintaining macro stability during transition; improving policy coordination and communication	conditions for long-term investment	rates and higher productive investment
Prudential and macro-financial policy	Expanding de-risking mechanisms; strengthening FX-risk mitigation tools; improving sustainable finance frameworks and taxonomies; mobilising development finance and public guarantees	Deepening long-term domestic capital markets; scaling blended finance structures; integrating climate and transition risks into financial intermediation and prudential frameworks	Mature macro-financial ecosystem supporting long-term low-carbon investment with lower structural risk premia
Financial and investment architecture	Deploying three-layer transition finance architecture: green budget, para-fiscal layer and investment mobilisation layer; scaling up Eco Invest Brasil, Fundo Clima, MDB co-financing, public guarantees and project preparation	Expanding institutional investor participation; strengthening green capital markets; crowding in larger FDI and private infrastructure flows; scaling transition-finance ecosystems; recovering investment-grade rating	Brazil positioned as a major global destination for low-carbon industrial and infrastructure capital; lower sovereign risk premium with consolidated investment-grade credit rating
Industrial policy	Focusing on sectors with strong structural advantages: green steel, sustainable aviation fuels, the bioeconomy, green hydrogen, critical minerals; supporting anchor projects and industrial clusters; facilitating strategic projects	Developing integrated industrial ecosystems and supplier networks; increasing domestic value-added and technological advancement; scaling low-carbon industrial corridors	Consolidation of dynamic competitive advantages in low-carbon industry, advanced agriculture, energy-intensive manufacturing and bio-based value chains
Trade and external strategy	Strengthening investment promotion and strategic openness; pursuing green trade corridors, certification agreements and export finance; positioning Brazil as a	Deepening integration into low-carbon global value chains; expanding exports of low-carbon industrial products and services; strengthening strategic partnerships	Brazil becomes a 'solution economy' for food security, the energy transition, industrial decarbonisation and resilient supply chains

	reliable low-carbon platform		
Infrastructure and energy systems	Accelerating transmission, ports, logistics, grid expansion and renewable integration; reducing permitting bottlenecks; improving infrastructure planning and execution	Developing green industrial corridors and energy-intensive industrial hubs; improving system reliability and logistics integration	Brazil establishes a competitive and scalable low-carbon infrastructure platform supporting industrial transformation and export competitiveness
Regulatory and institutional reforms	Improving regulatory predictability; reducing bureaucratic red tape; streamlining licensing and permitting; strengthening coordination across institutions and levels of government	Gradually strengthening implementation capacity, regulatory governance and legal certainty; improving project execution and investor confidence	A more stable, efficient and predictable institutional environment reduces structural investment risk
Human capital and innovation	Expanding technical training linked to transition sectors; supporting research, certification and technological partnerships	Building innovation ecosystems around industrial clusters and universities; deepening technological diffusion; upgrading the workforce	Sustained gains in productivity, technological capabilities and total factor productivity
Social and regional development	Prioritising formal employment generation and regional development, especially in northeastern Brazil's industrial corridors; strengthening inclusion through productive transformation	Expanding higher-productivity formal jobs and local supplier ecosystems; strengthening fiscal revenues that support social policies	More inclusive growth model with lower inequality, stronger middle class and greater territorial integration

In the short term, the emphasis should be on strengthening macroeconomic stability, improving regulatory predictability, accelerating enabling infrastructure and deploying catalytic instruments such as green budgeting, blended finance, public guarantees and de-risking mechanisms. At the same time, the strategy seeks to facilitate early investments in sectors where Brazil already has strong structural advantages.

In the medium term, the objective is to deepen industrial ecosystems, expand integration into global low-carbon value chains, strengthen domestic capital markets and progressively reduce structural risk premia through higher investment, productivity gains, export growth and improved institutional credibility. The framework also places an increasing emphasis on human capital formation, innovation ecosystems and territorial development, particularly through industrial and logistics corridors linked to clean energy platforms.

In the longer term, the aim is to consolidate a development trajectory characterised by higher productivity, stronger export competitiveness, lower structural interest rates, more resilient fiscal dynamics and a more sophisticated pattern of global integration. More broadly, the framework envisages a greater role for Brazil in low-carbon industry, energy security, food security and related value chains.

The framework differs from approaches that primarily emphasise either fiscal consolidation or demand expansion. It focuses on investment, productivity growth and structural transformation as the mechanisms through which growth, stability and sustainability can reinforce one another. Within this framework, limited public resources are used selectively to de-risk, coordinate and crowd in larger volumes of private investment in sectors aligned with Brazil's structural advantages. At the same time, the approach remains sensitive to macroeconomic constraints and recognises the importance of policy flexibility if investment responses prove weaker or slower than anticipated.

A changing global financial landscape may reinforce the case for such an approach. The relative risk premium between advanced economies and emerging markets appears to be narrowing, potentially creating new opportunities for countries that can attract long-term investment. Capturing these opportunities requires credible domestic institutions, coherent policy frameworks and a clear investment strategy. Social inclusion is an integral part of this process rather than a separate objective. By supporting activities with high productivity and strong linkages to one another, the framework aims to expand formal employment, accelerate wage growth and reduce reliance on informal employment. However, we also recognise that inclusive outcomes depend on complementary policies in education, skills development, innovation, social protection and labour-market institutions.

Under Brazil's current constraints, a selective public effort aimed at de-risking, coordinating and crowding in private investment may offer a viable route to balancing growth and fiscal sustainability with the ecological transition and social inclusion. While grounded in Brazil's specific circumstances, the framework may also provide insights for other EMDEs navigating a world increasingly shaped by ecological constraints and geoeconomic fragmentation.

Our central conclusion is that the ecological transition and the reorganisation of the global economy may create new opportunities for investment, productivity growth and structural transformation. For Brazil, the challenge lies in aligning policy frameworks, investment incentives and institutional capabilities in ways that allow these opportunities to translate into sustainable and inclusive development outcomes.

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