THE AMAZON'S MARATHON:

Brazil to lead a low-carbon economy from the Amazon to the world

Summary Report | Consultation Document
November 2022

AYA EARTH PARTNERS

Human prosperity empowered by nature

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ACKNOWLEDGEMENTS

'The Amazon's Marathon: Brazil to lead a low-carbon economy from the Amazon to the world' report was prepared by Systemiq Ltd and Systemiq LatAm as part of the AYA Earth Partners Coalition. Authored by Anne-Titia Bové, Jeremy Oppenheim, Morten Rossé and Patricia Ellen, this is a consultation report commissioned by the AYA Earth Partners Coalition.

We would like to thank all specialists, institutions and organizations that provided significant input to this report, particularly identifying and profiling best-practice case studies. We would also like to thank a number of individuals and institutions that have generously dedicated their time and energy to this effort:

Beto Veríssimo and Brenda Brito (Instituto do Homem e Meio Ambiente da Amazônia), Carlos Nobre (Universidade de São Paulo), David Hertz (Gastromotiva), Duda Alcântara (Instituto Vivenda), Eduardo Bastos (MyCarbon), Fábio Correa Soares (Instituto Alok), Fábio Tozzi (Projeto Saúde e Alegria), Felipe Faria (Partnerships for Forests), Fernanda Camargo (Wright Capital Wealth Management), Geraldo Vieira (Bhaskar) (Instituto Alok), Gilberto Câmara (Instituto Nacional de Pesquisas Espaciais), Ilona Szabó and Melina Risso (Instituto Igarapé), Mikolaj Sekutowicz, Lelia de Lucchi and Marta Cavallé (Impact One), Luciana Temer (Instituto Liberta), Marcelo Furtado (World Resources Institute), Mariano Cenamo (Instituto de Conservação e Desenvolvimento Sustentável da Amazônia), Marina Grossi (Conselho Empresarial Brasileiro para o Desenvolvimento Sustentável), Paula Costa (PRETATERRA), Raíssa Ferreira (Climate and Land Use Alliance), Renata Piazzon (Instituto Arapyaú), Tasso Azevedo (MapBiomas), Victor Salviati and Virgílio Viana (Fundação Amazônia Sustentável), Roberto Waack (Uma Concertação pela Amazonia).

We also wish to thank the core team at Systemiq Ltd and Systemiq LatAm for delivering the bulk of this report: Alasdair Graham, Anne-Titia Bové, Caroline Américo, Carolina da Silva Paes, Fernanda Sue, Fernando Chan, Guido Schmidt-Traub, Jeremy Oppenheim, Morten Rossé and Patricia Ellen.

We would like to recognize the Food and Land Use Coalition, the Energy Transitions Commission, the Mission Possible Partnership, the Blended Finance Taskforce, Uma Concertação pela Amazônia, Coalizão Brasil Clima, Florestas e Agricultura and Conselho Empresarial Brasileiro para o Desenvolvimento Sustentável (CEBDS) for their robust analyses in recent publications which we used as input for this report, including Growing Better[33], Making Mission Possible[30], Better Food, Better Brazil[1], Land-based Measures to Mitigate Climate Change, Amazônia Legal em Dados[2], Visão 2030-2050 – O futuro das florestas e da agricultura no Brasil[3], and CEBDS – Visão 2050[4].

We would also like to acknowledge AYA Earth Partners for their efforts in consolidating a Brazilian coalition towards accelerating the net-zero transition, and for inspiring Global South unity in the race towards a nature-positive economy and climate justice. The ambitions detailed in this report are part of AYA Earth Partners' dream, and we would like to thank Alexandre Allard, Eduardo Aranibar and Patricia Ellen for their efforts to make them a reality. The purpose of this consultation report is to engage cross-sectoral stakeholders in the Race to Zero and to Resilience in the Amazon and beyond. It lays out the pathways to reach net zero in land use, industry and energy systems, while ensuring resilience in the Amazon. An initial set of solutions is proposed to catalyse action for the transition.

The purpose of this consultation report is to engage cross-sectoral stakeholders in the Race to Zero and to Resilience in the Amazon and beyond

Finally, we would also like to acknowledge the support of collaborators in the publication of this report, represented by the following partners: Banco Bradesco, Creators Academy, Deloitte, Fundação Amazônia Sustentável, Gastromotiva, Instituto Alok, Laces, NINT | Natural Intelligence, Partnerships for Forests, Ramboll, Telos Transition and the United Nations Global Compact (Pacto Global Rede Brasil).

The institutions with which AYA Earth Partners is affiliated have not been asked to formally endorse this report.

Race to Zero and to Resilience is a field in which institutions and talent do exceptional work, with a rich, extensive body of research and analysis. The references sections informing this report includes multiple reports and analyses selected by the authors. Finally, AYA Earth Partners Coalition would like to thank the large number of individuals and institutions that have generously dedicated time and energy to comment on various drafts of this report, including:

ABBUD RIGHI, Ciro
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(Instituto Vivenda)

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AZEVEDO, Tasso
(MapBiomas)

BASTOS, Eduardo
(MyCarbon)

BECKER, Mathias
(Valoren)

BENSON, Scarlett
(Systemiq Ltd)

BOVÉ, Anne-Titia
(Systemiq LatAm)

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(Instituto do Homem e Meio Ambiente da Amazônia)

BRITO, Marco
(Systemiq LatAm)

CÂMARA, Gilberto
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(Gastromotiva)

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(Systemiq LatAm)

COSTA, Paula
(PRETATERRA)

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(NoCarbon Milk)

DA SILVA, Edson José Vidal
(Universidade de São Paulo)

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(Systemiq LatAm)

DE LUCCHI, Leila
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FERRO, Pedro
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FURTADO, Marcelo
(World Resources Institute)

GRAHAM, Alasdair
(Energy Transitions Commission)

GROSSI, Marina
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GUIMARÃES, André
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HARFUCH, Leila
(Agroicone)

HERTZ, David
(Gastromotiva)

LIMA, Rafael Pontes
(Conselho Nacional de Secretários Estaduais para Assuntos de CT&I)

LOUISE, Winnee
(Gastromotiva)

MARMONTI, Adolfo
(Companhia Siderúrgica Nacional)

MEIRELLES, Antônio
(Mosaic)

METZ, Maurício
(Gerdau)

NATACCI, Vinícius
(Systemiq LatAm)

NOBRE, Carlos
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(Universidade de São Paulo)

PASQUNI, Marcelo
(Bradesco)

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(Systemiq LatAm)

PIAZZON, Renata
(Instituto Arapyaú)

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TEMER, Luciana
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TOZZI, Fábio
(Projeto Saúde e Alegria)

VERÍSSIMO, Beto
(Instituto do Homem e Meio Ambiente da Amazônia)

VIANA, Virgílio
(Fundação Amazônia Sustentável)

VIEIRA, Geraldo (Bhaskar)
(Instituto Alok)

WAACK, Roberto
(Uma Concertação pela Amazonia)

ZERBINI, Fabíola
(World Resources Institute)

1

THE TIME TO ACT IS NOW

MOVING AWAY FROM RESOURCE-INTENSIVE ECONOMIC MODELS

The United Nations-backed Race to Zero and Race to Resilience are the most important global initiatives of this century. The need to achieve net-zero has never been so urgent. If business as usual (BAU) continues, in the next decade the world will exceed the 500 gigatonne (Gt) carbon budget – the total amount of carbon that can be emitted for temperatures to stay within a 1.5°C limit above pre-industrial levels. Recent estimates suggest there is a 50% chance that global warming will exceed 1.5°C in at least one of the coming five years.[5] Meanwhile, 4 billion people living in vulnerable conditions around the world are being disproportionately impacted by climate change.

In recent decades, Brazil has endeavoured to emulate this resource-intensive economic model, but it has not enjoyed the same level of success in terms of either economic growth or include distribution.

Countries such as China (from the 1980s to the 2010s) and South Korea (from the 1970s to the 1990s) more than doubled their per-capita GDP each decade by pursuing a resource-intensive economic model (see Figure 1). However, as sustainable levels of economic growth and income distribution have become harder to achieve, there is an urgent need to transition to a more resource-efficient, people-centric model to avert the worst potential impacts and costs of climate change.

In recent decades, Brazil has endeavoured to emulate this resource-intensive economic model; but it has not enjoyed the same level of success in terms of either economic growth or income distribution. In fact, Brazil's economic growth rate has stagnated at less than 2.5% per year since 1991 (around 1.1% growth on a per-capita basis); and the country has fallen into the middle-income trap, with per-capita GDP of less than $8,000 (2021).[6] Moreover, Brazil's existing economic model is failing

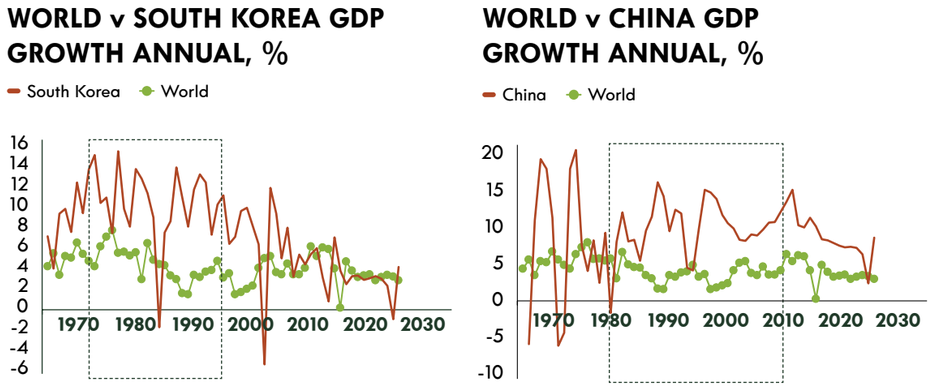


Figure 1: World GDP % growth v China v South Korea

Source: The World Bank

the local population. The COVID-19 pandemic caused a nearly 30-year decline across many socioeconomic indicators, exacerbating an already dire situation. After making significant advances during the 2000s, Brazil returned to the hunger map in recent years, sliding back to levels last seen in the 1990s: more than 33 million people now suffer from hunger, equivalent to more than 15% of the Brazilian population;[7] while approximately 37 million tonnes of food (about 30% of production) are wasted each year.[4,8] Brazilian society is plagued by glaring income disparities, with the richest 10% of the population capturing nearly 60% of total national income, while the poorest 50% capture just 10%.[9,10]

After making significant advances during the 2000s, Brazil returned to the hunger map in recent years, sliding back to levels last seen in the 1990s: more than 33 million people now suffer from hunger (see Figure 2)

Environmental indicators have also regressed. We have seen a change in course over the last seven years, as deforestation has increased steadily after an 80% decline between 2004 and 2012.

From 2010 to 2021, more than 24.3 million hectares of forest were deforested, accounting for nearly half of the total national greenhouse gas (GHG) emissions per year (see Figure 3).

Socioeconomic indicators have returned to previous levels

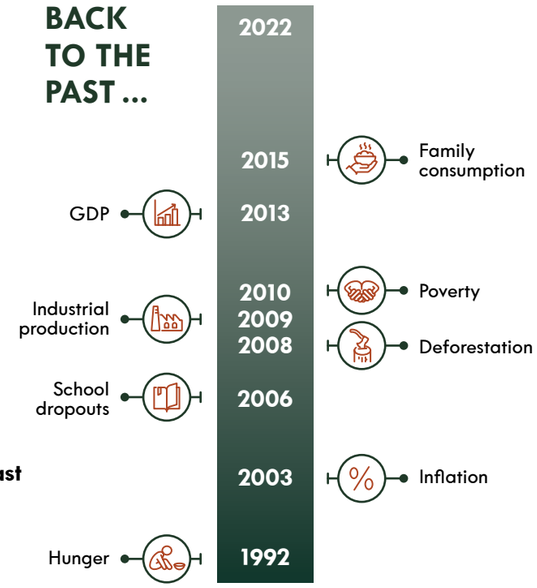


Figure 2: Brazil has returned to the past

Source: Senado Federal; Instituto Brasileiro de Geografia e Estatística; Fundação Getúlio Vargas; Departamento Intersindical de Estatística e Estudos Socioeconômicos; SciencesPo.

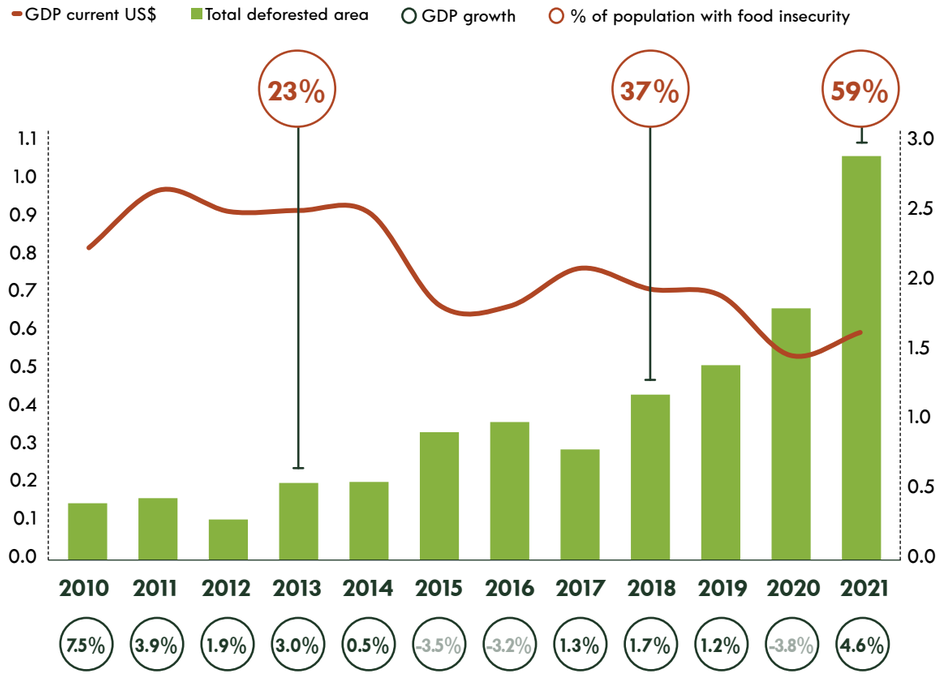


Figure 3: Brazil's GDP, total deforested area in the Legal Amazon (see Box 1 for definition), and food insecurity

Source: Instituto do Homem e Meio Ambiente da Amazônia; World Bank

Box 1: Defining the 'Amazon' region

The focus of this report is on the Brazilian Legal Amazon, also known simply as the Legal Amazon. It is an area that spans 5 million square kilometres (km^2), nine different states (Acre, Amazonas, Amapá, Mato Grosso, Maranhão, Pará, Rondônia, Roraima and Tocantins) and three different biomes (Amazon, parts of the Cerrado and Pantanal). In size alone, the Legal Amazon would be the sixth largest country in the world.[11] Even though the term is used in this report to refer specifically to Brazil's share, the Amazon forest extends for an additional 2.8 million square kilometres (km^2) across another eight countries.[12] While we recognize the importance of the Amazon as a whole, prioritizing a transition for the Legal Amazon would accelerate action, as it falls under a single jurisdiction which represents the largest share of the rainforest. Action in Brazil could then trigger positive spillovers to the remaining countries of the Pan-Amazon and drive broader systemic changes.

THE RACE TO ZERO – A GLOBAL SOUTH PERSPECTIVE

Gross GHG emissions, $MtCO_2e$, 2020

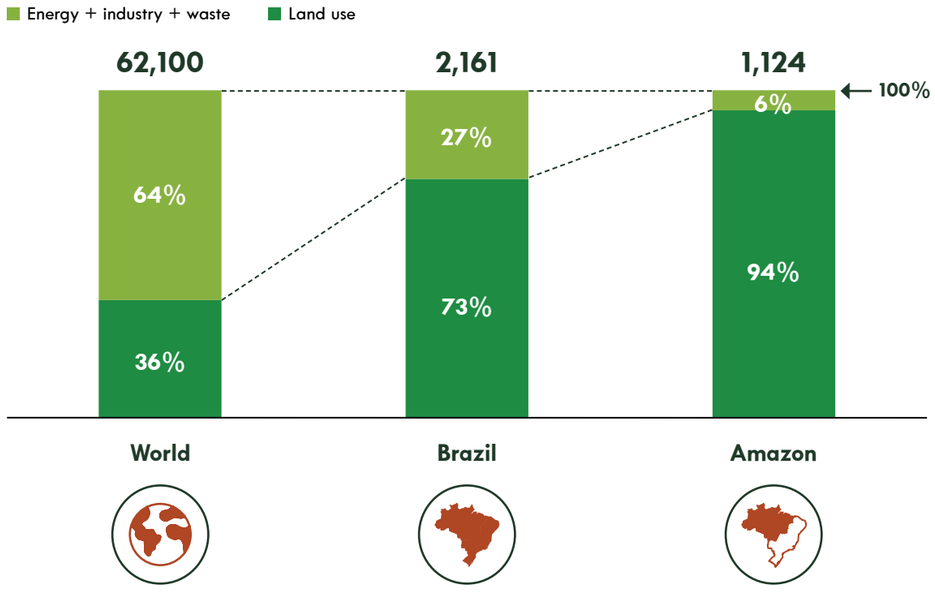


Figure 4: Brazil's GHG emission sources

Source: Carbon Budget; Sistema de Estimativas de Emissões e Remoções de Gases de Efeito Estufa

Brazil is now largely a resource-inefficient economy. In 2020, national emissions exceeded 2 Gt per tonne of carbon dioxide equivalent (tCO_2e), with per-capita emissions of 7.5 tCO_2e – higher than those of the EU, at 7.2 tCO_2e[13] – but per-capita income remained less than 25% of the EU's.[14,15]

Brazil also has a distinctive emissions profile: while the bulk of global emissions (64%) come from energy and industry, in Brazil it is rather the land use system that accounts for the overwhelming majority of emissions (73%), due to the intensive use of land resources (see Figure 4).

Despite its poor performance in terms of resource and carbon productivity, Brazil has abundant potential to build a stronger, more resilient, more productive economy, while simultaneously cutting emissions. Brazil has five major assets which make it a potential winner in the shift to a net-zero economy (see Figure 5).

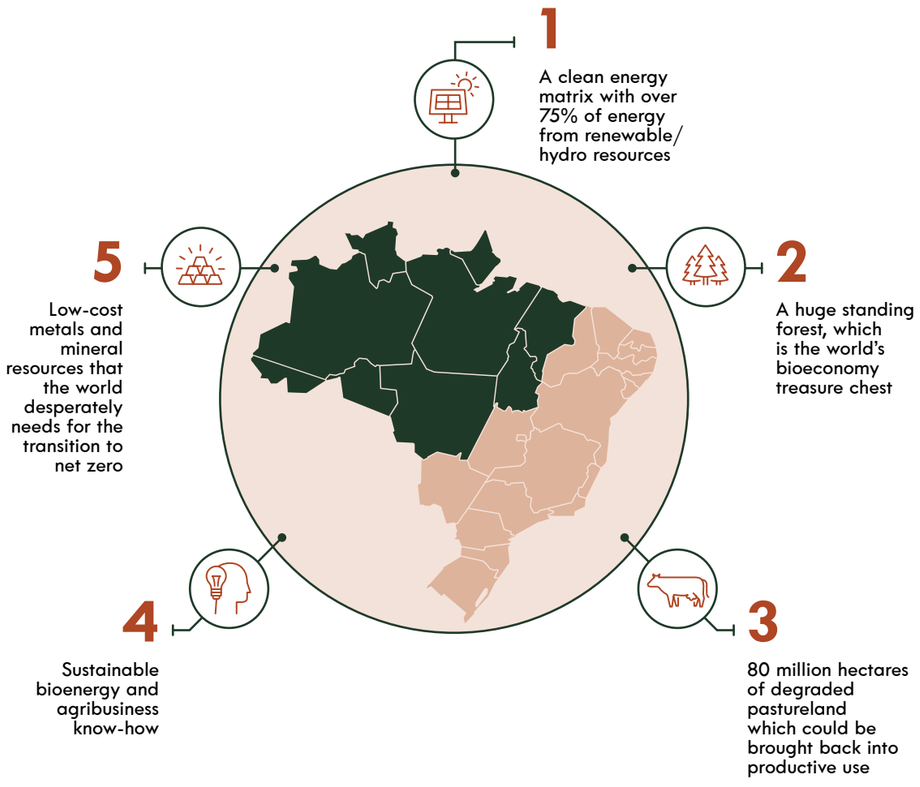


Figure 5: Brazil's five greatest green assets

2

BRAZIL'S PIVOT TO BECOME A GREEN GROWTH ENGINE

Over the next eight years, Brazil can become the first major economy – whether middle or high-income – to achieve net-zero while at the same time boosting economic growth.

We estimate that Brazil can increase its GDP by between $100 billion and $150 billion per year on top of the BAU rate of growth (2.5% per year), while also reducing emissions by 1.3 $GtCO_2e$, thereby reaching net-zero by 2030. This would position Brazil as the world's leading green economy, potentially opening up major new export markets and opportunities for foreign direct investment.

This strategy rests upon:

- major improvements in productivity within the food and land use sectors; and
- decarbonization pathways for the energy and industry sectors.

LAND USE OPTIMIZATION

Deforestation and agricultural growth have significantly changed the landscape of land use management, especially in the Amazon.

Brazil has become one of the top agricultural commodity exporters: it is the fourth largest grain producer and the largest beef exporter in the world. However, this success has taken a heavy social and environmental toll, creating several market failures which need to be addressed in the coming years, including high deforestation rates, land degradation and abandonment, loss of biodiversity and low productivity. The land use system nonetheless offers a range of potential sustainable business models which are rooted in the idea of creating value through standing forest products, sustainable agricultural intensification, restoration and conservation. These models have been discussed for years, but a lack of proper incentives and infrastructure has prevented them from developing on a greater scale (see Figure 6).

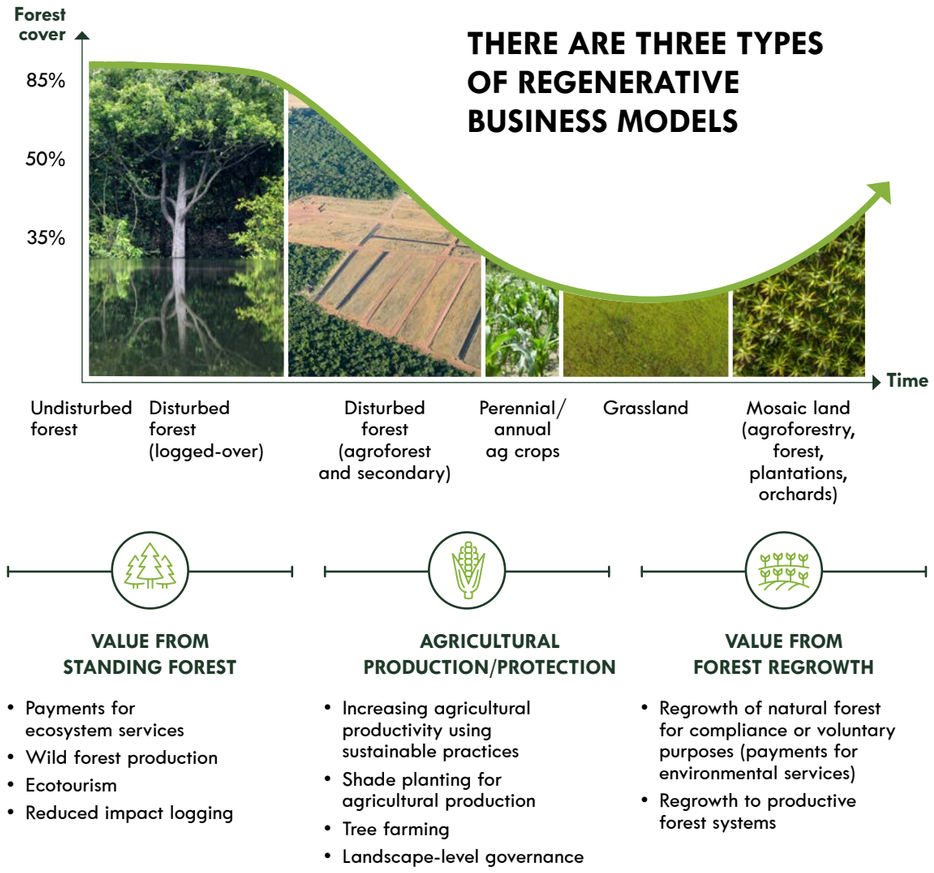


Figure 6: Ecosystem of regenerative business models

Source: Food and Land Use Coalition

One such opportunity lies in restoration and reforestation. There are an estimated 80 million hectares of degraded pastureland in Brazil (see Figure 7), which could be reforested or restored for other green activities (eg, solar farms; integrated crop-livestock-forestry (ICLF); cocoa and coffee production). Restoration projects could also generate revenue for communities through the sale of credits on the carbon market.

Deforestation has been directly connected to the rapid expansion of agricultural activities (ie, livestock husbandry; soy production). In the Legal Amazon, a staggering 95% of deforestation is illegal; nearly all of it takes place on non-designated public lands through illicit land grabs.

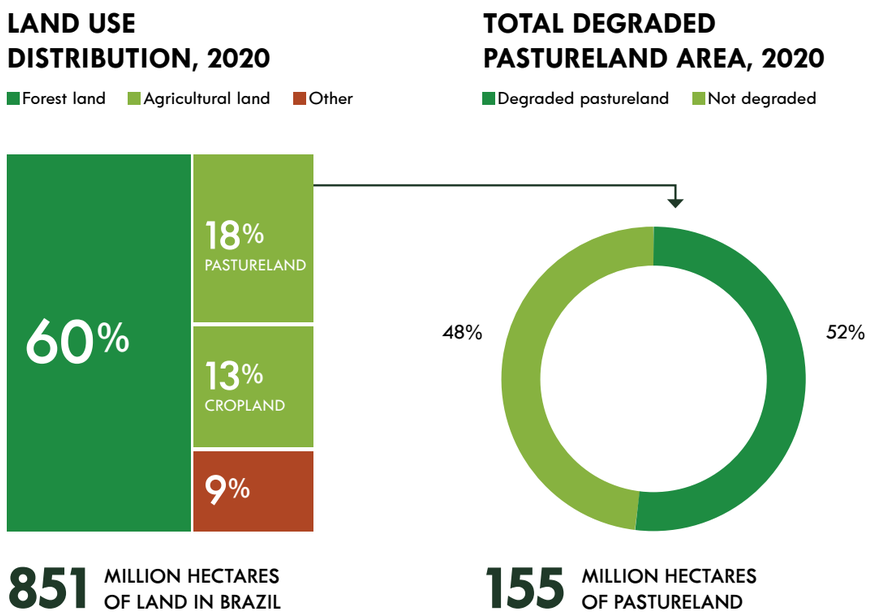


Figure 7: Land use distribution and total degraded pastureland

Source: MapBiomas

Poor monitoring has eroded transparency along the supply chain; while inadequate law enforcement has created a vicious cycle of land grabbing, deforestation and land degradation. There is little incentive to increase the productivity of existing land, restore degraded land or invest in yield improvements. Cattle ranching has become a cost-effective ploy to appropriate land by demonstrating 'productive use' – a legal requirement to claim land ownership in Brazil;[16] having acquired the land on these dubious grounds, the 'rancher' can then exploit the land or simply sell it on for a profit. Indeed, cattle ranches in the Legal Amazon are the least productive in the country, with stocking rates of 0.5 animal units per hectare (AU/Ha), compared to triple this figure in the southern region of Brazil (1.6 AU/Ha, in 2018).[17]

... Inadequate law enforcement has created a vicious cycle of land grabbing, deforestation and land degradation

Curbing deforestation is thus a key driver for addressing ongoing market failures.

Strengthening the Forest Code and stepping up law enforcement would have a trickledown effect on other economic activities in the region, creating positive spillovers:

- **For livestock producers,** especially in the Amazon, this would create incentives to increase the productivity of existing land. Studies have shown that by 2030, a large share of Brazil's 80 million hectares of degraded pastureland could be reforested or restored for crop production in place of cattle ranching, while still meeting demand for meat. This would enable producers to diversify their income sources while maintaining or even increasing current levels of cattle production.

- **For soy producers,** Brazilian know-how is already world class. Yields have increased steadily in the past few years and are well above global averages (see Figure 8). However, deforestation in the Cerrado biome remains a challenge. To meet 2030 demand for food under BAU, an additional 12 million to 27 million hectares of land for increased agricultural production would be required. Instead of meeting this demand through further deforestation, producers could recover 20 million to 50 million hectares of abandoned degraded land in the Cerrado biome which is suitable for soy cultivation.[1]

BRAZIL SOY YIELD v AVERAGE GLOBAL YIELD, 2010-20

Kg/Ha

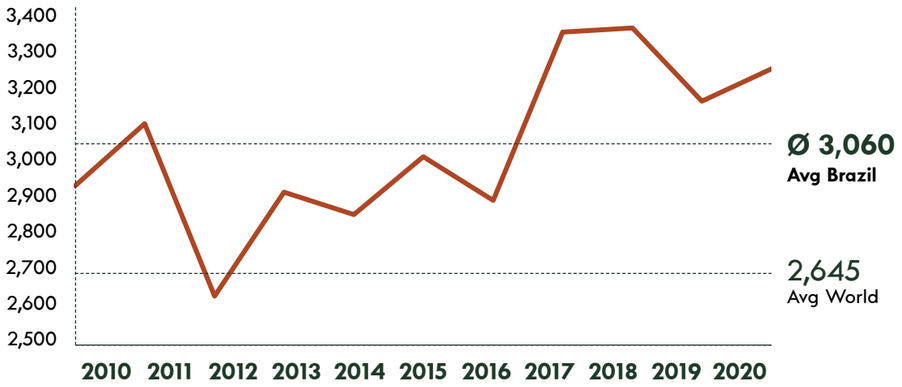


Figure 8: Brazil soy yield v average global yield 2010-20

Source: FAO stat

- **For the bioeconomy,** curbing deforestation would allow for more value to be generated from the standing forest, empowering communities, creating green jobs and retaining economic value locally. Estimates of the market potential of the bioeconomy vary widely (from $7.7 trillion by 2030 globally[18] to as much as $7 trillion in the Amazon alone).[19] Given the Amazon's unparalleled biodiversity and depth of traditional knowledge, Brazil should be able to leverage the abundant potential of the bioeconomy across sectors including pharmaceuticals, superfoods (see Box 2), genomics, biofuels and wellness. We estimate that the bioeconomy could generate between $40 billion and $53 billion in value-add for the Brazil economy annually by 2030 (see Figure 9).[20]

Box 2: Superfoods in Brazil and their socio-economic impact

Cocoa, açaí berries and Brazil nuts are among the best-known superfoods grown in Brazil. Traditionally used by indigenous communities to prevent disease, they are now widely available in Western markets and are particularly popular among middle and high-income consumers.[21] The global bioeconomy is already valued at more than $1 trillion and superfoods account for more than $200 million per year. While Brazilian entrepreneurs have created sustainable businesses by engaging in long-term business partnerships for export (eg, to European markets), most value-add associated with these superfoods is captured outside of Brazil.

Brazil's Pará state is the largest producer of many of these superfoods, including cocoa, Brazil nuts and açaí berries. However, activities in Pará and other states in the Brazilian Amazon overwhelmingly focus on primary extraction, forgoing value of between 7 and 22 times (see Figure 9) from processing raw products into more sophisticated end products. Initiatives such as COOPAVAM,[22] the Poço de Carbono Juruena project[23] and the Amazon Institute of Technology (further described in Pathway IV),[24] which focus on developing these value chains in local communities, are critical to help capture a larger share of this value-add domestically. This would generate a significant additional income stream for local producers, while helping Brazil build a stronger, fairer economy.

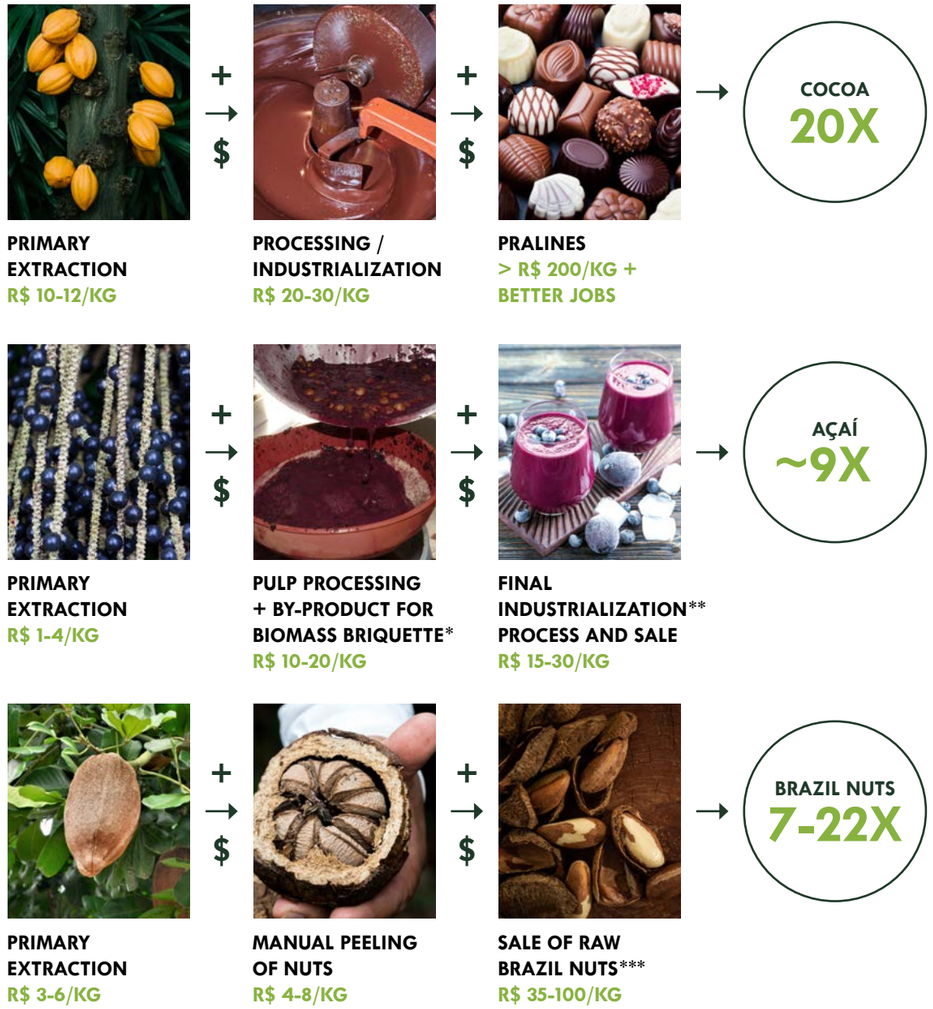


Figure 9: Value-add of superfood value chains

* R$ 1-4/Kg
** Only 12% açaí
*** Unpeeled and dehydrated

Source: Adapted from Rota do Cacau, Rota do Açaí; Systemiq team analysis

ENERGY AND INDUSTRY DECARBONIZATION

In Brazil, the Race to Zero in the energy and industry sectors could deliver 235 megatonnes of CO_2e ($MtCO_2e$) in annual emissions reductions by 2030. Emissions in these sectors currently account for approximately 27% of Brazil's total emissions (~494 $MtCO_2e$ per year), with transport, metals and mining, fuel production and electric power the highest-emitting segments (see Figure 10).

The share of renewables in Brazil's electricity mix is 82%, versus just 22% globally

However, Brazil is home to abundant renewable resources and ranks in the top 15 countries for renewables per capita.[25] Green energy sources represent 46% of Brazil's overall energy matrix (versus ~14% globally), including 18% from sugarcane biomass and 12.4% from hydropower. The share of renewables in Brazil's electricity mix is 82%, versus just 22% globally.[26] Installed capacity of wind and solar energy has increased significantly since 2017 (21% for wind and 1,700% for solar).[27] This notwithstanding, additional efforts are needed to accelerate the transition and win the Race to Zero. To meet the COP26 target of halving emissions by 2030, Brazil will need to scale up renewables, with careful consideration of the diverse impacts of various low-carbon options, including better deployment of technology to support distributed solar; more efficient and robust public policies to support non-hydro renewables; and training for wind and solar sector employment.

Brazil's power sector matrix will also become increasingly favourable for the electrification of transport. While electric vehicles (EVs) are still mostly restricted to luxury vehicles, falling battery and infrastructure costs are expected to drive adoption of electrification in public bus, commercial and passenger fleets. The regulatory environment must be strengthened to accelerate this transition (eg, fuel efficiency standards, EV subsidies, internal combustion engine bans).[28] Net-zero pathways that define exactly what is required (including technology investments, policy support and supply chain engagement) in each heavy-emitting sector are critically needed to meet this trajectory.

ESTIMATED BRAZIL GREENHOUSE GAS EMISSIONS, 2020

$MtCO_2e$, %

ESTIMATED GROWTH OF RENEWABLES IN BRAZIL ELECTRICITY MATRIX, 2020-2040

GW, %

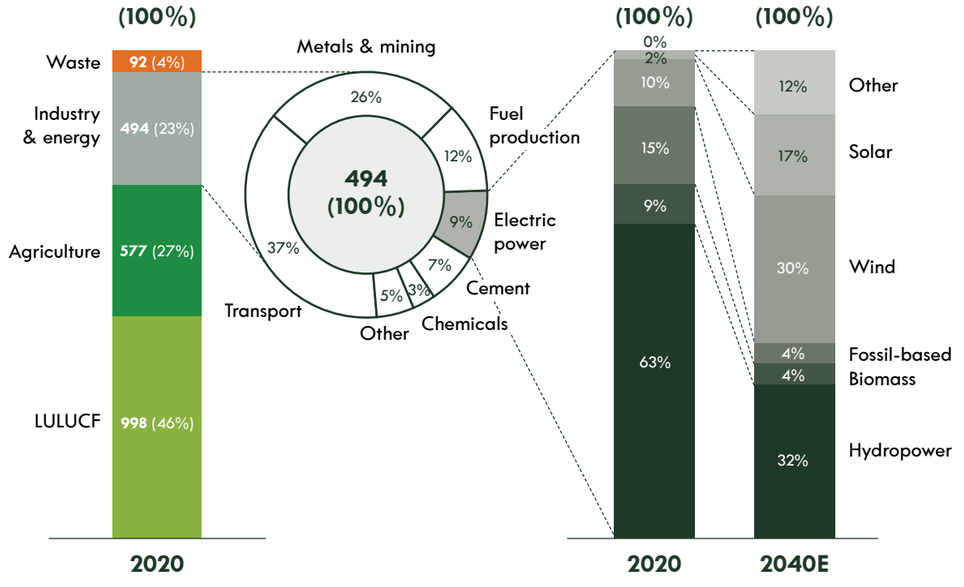


Figure 10: Brazil GHG emissions breakdown

Sources: Carbon Budget; Sistema de Estimativas de Emissões e Remoções de Gases de Efeito Estufa; Empresa de Pesquisa Energética; Brazil Ministry of Mining and Energy; McKinsey, 2022; SYSTEMIQ team analysis

In summary, a green growth strategy has the potential to deliver a high return on investment, with cost-benefit analysis suggesting a nearly 3:1 return of economic value-add to investment and over 1 Gt of emissions reductions by 2030 (see Figure 11).

AN INVESTMENT OF $35 TO 76B PER YEAR UNTIL 2030 CAN GENERATE $100 TO $153B IN VALUE-ADD TO THE ECONOMY AND 1.3 GTCO$_2$e IN MITIGATION

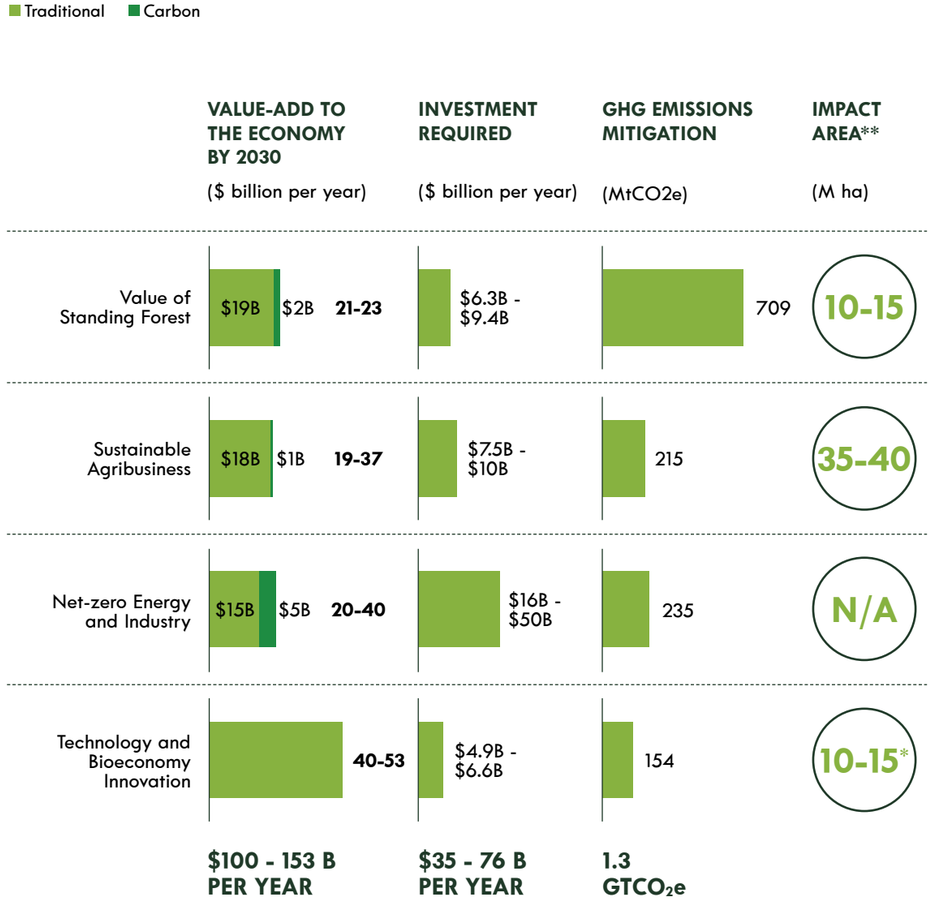


Figure 11: Agriculture, forestry and other land use and industry cost-benefit analysis

Note: These are estimates
* Area related to biochar, potential overlap with area in sustainable agribusiness and value of standing forest; investments in tech & bioeconomy innovation will indirectly impact value add across entire area of standing forest & land
** Area directly impacted by investment

However, Brazil will only be able to achieve this aspiration by placing the Amazon and its local communities at the heart of a new nature-based, people-centric economic development strategy.

The opportunity to turn Brazil into a green growth engine hinges on the Amazon region, as this represents the country's greatest bioeconomy potential, housing at least 10% of the world's known biodiversity and 60% of its land-based climate mitigation potential. It is estimated that savings of 1 $GtCO_2e$ per year could be realized through emissions reductions and increased carbon sequestration in the Amazon (see Figure 12). A significant reduction in deforestation through stricter law enforcement could accelerate the transition to net zero by 2030. Brazil successfully reduced deforestation by 80% between 2004 and 2012; an equivalent reduction by 2030 could mitigate two-thirds of the emissions from land use change and thus help reach net zero on target.

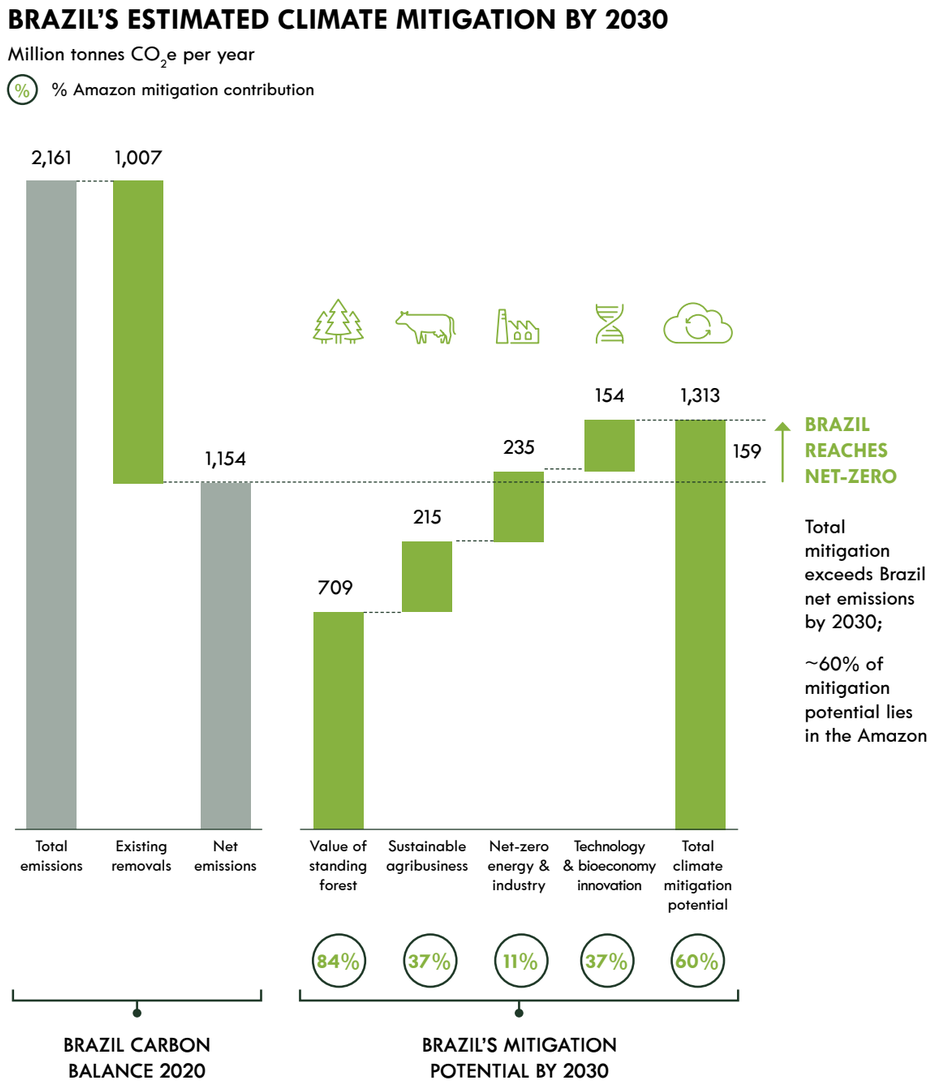


Figure 12: Brazil estimated carbon budget

Note: Mitigation solutions include: decarbonization of industry and energy sectors, forest and ecosystem protection, management and restoration, reduction in agriculture emissions and sequestration in agriculture including biochar, and existing removals include: additional land sink estimates

Sources: Roe et al., 2019 - Contribution of the Land Sector to a 1.5 °C World'; Roe et al. 2021 - Land-based Measures to Mitigate Climate Change: Potential and Feasibility by Country; Food & Land Use Coalition; Systemiq team analysis; SEEG

Indeed, we forecast that by pursuing the opportunities outlined on the previous pages, Brazil not only could reach net zero by 2030, but could also go further by 2050, contributing a ~1.9 $GtCO_2e$ surplus to the global carbon budget (see Figure 13). In doing so, it could also double its GDP by 2050, showing the rest of the world – and particularly other resource-rich nations of the Global South, such as Indonesia and the Democratic Republic of Congo – how a more resource-efficient, nature-based model can deliver sustainable growth. Through this new model, Brazil can pivot to a new climate-positive economy that delivers better outcomes for the Amazon, Brazil and the wider world.

BRAZIL CAN REACH NET ZERO BY 2030

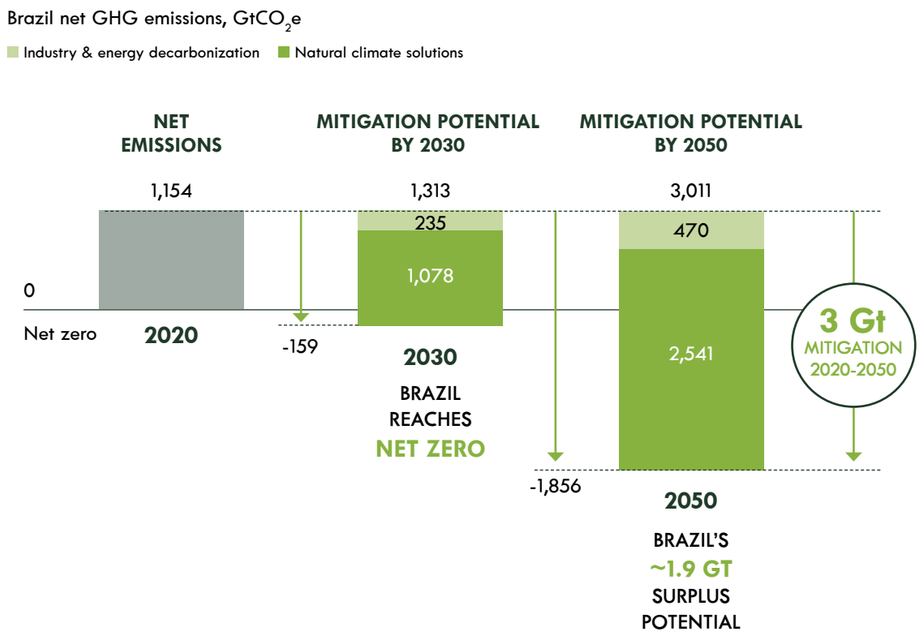


Figure 13: Brazil mitigation potential 2030-50

Source: Carbon Budget; SEEG; Why Nature, Why Now; Roe et al.; Systemiq team analysis

This strategy should be guided by a people-centric approach – especially for indigenous groups and rural, riverside and urban communities in the Legal Amazon. Despite its vast natural wealth, this region – home to over 28 million people – is still one of the poorest and most climate vulnerable in the country.[29] Without progress on the social and economic agendas, it will not be possible to address negative environmental impacts. A nature-focused approach to issues such as deforestation is insufficient to solve those problems by itself, since widespread poverty in the region is driving deforestation merely for survival, to the detriment of sustainable growth. Both a people-centric and nature-centric approach to economic growth is thus required. An investment of $3 billion to $3.6 billion per year could unlock human capital potential through key enablers such as wellbeing, prosperity and wellness, ancestral culture and wisdom, and greentech jobs and activities (see Figure 14).

AN INVESTMENT OF $3 TO $3.6B PER YEAR UNTIL 2030 CAN DRIVE THE RESILIENCY OF 43 TO 48 MILLION PEOPLE IN BRAZIL, AND ESPECIALLY IN THE AMAZON

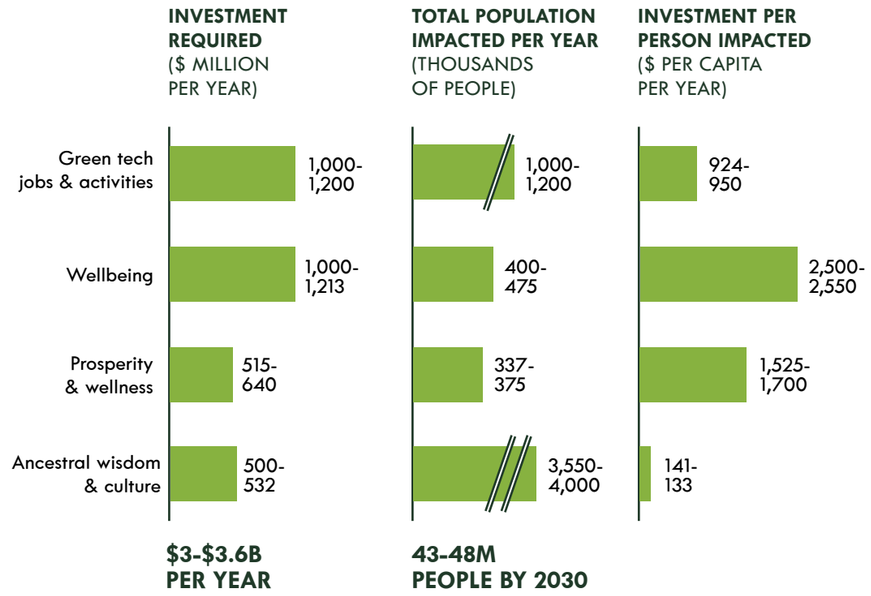


Figure 14: Social cost benefit analysis

Note: These are estimates
Some different initiatives affect different numbers of people for varying lengths of time.

3

'THE AMAZON'S MARATHON'

PIVOTING THE BRAZILIAN ECONOMY TO DELIVER BETTER OUTCOMES FOR THE REGION, THE COUNTRY AND THE WORLD

Our theory of change to transform Brazil's economy based on a new nature-based, people-centric and climate-positive approach, with the Amazon at its heart – 'the Amazon's marathon' – encompasses 11 critical pathways (see Figure 15) that could help win the Race to Zero in Brazil and beyond (Pathways I to IV); support the Race to Resilience for the 28 million people living in the Amazon (Pathways V to VIII); and ensure that the right infrastructure and enabling conditions are in place to prevail in both (Pathways IX to XI).

THE AMAZON'S MARATHON: BRAZIL TO LEAD A LOW-CARBON ECONOMY FROM THE AMAZON TO THE WORLD

Figure 15: Eleven critical pathways for The Amazon's Marathon

RACE TO ZERO PATHWAYS:

I. **Value of the standing forest:** Redefine the value of the standing forest by developing a robust bioeconomy.

II. **Sustainable agribusiness:** Foster nature-based, people-centric agricultural practices.

III. **Net-zero energy and industry:** Decarbonize the energy sector and heavy-emitting industries.

IV. **Bioeconomy innovation:** Promote technology and innovation to support a thriving bioeconomy.

RACE TO RESILIENCE PATHWAYS:

V. **Greentech jobs and activities:** Develop the workforce of the future for greentech activities.

VI. **Wellbeing:** Ensure the Amazon people's wellbeing and resilience by bridging the social inequality gap.

VII. **Prosperity and wellness:** Promote prosperity by providing communities in the Amazon with the tools to build a thriving bioeconomy.

VIII. **Ancestral wisdom and culture:** Protect ancestral knowledge to fuel social, spiritual and economic development.

ENABLER PATHWAYS:

IX. **Rule of law:** Re-establish the rule of law and strengthen institutions.

X. **Financial infrastructure:** Develop the necessary financial infrastructure to mobilize capital for the Race to Zero and to Resilience.

XI. **Global collaboration:** Foster stakeholder cooperation through coalition building while positioning the Global South as a system and rule shaper.

Pursued aggressively over the next eight years, these pathways would enable Brazil to become the first major net-zero nation by 2030 and unlock the full potential of the transition by 2050. Our analysis shows that the potential value-add to the economy in shifting to a stronger, more inclusive, more productive economy would far outweigh the costs.

Shifting Brazil to a new green growth trajectory would require investment of between $35 billion and $76 billion per year

Shifting Brazil to a new green growth trajectory would require investment (above BAU levels) of between $35 billion and $76 billion per year, or an additional 2% to 4% of GDP (2021), which reflects the need to invest in both industrial and natural capital. The Energy Transitions Commission (ETC) estimates the cost of decarbonizing heavy-emitting sectors by 2050 at between 0.17% and 0.49% of projected global GDP (globally, up to $1.6 trillion per year).[30] In Brazil, this would represent between $16 billion and $50 billion per year;[31] but given its access to clean energy, abundant natural resources and relatively low-cost labour, the country could find itself at the lower end of this range. Restoring degraded land for cattle ranching requires significant investment – for example, to cover the costs of clearing and preparing the land; reforesting areas; constructing infrastructure such as fences, drinking and feeding platforms; and training staff to actively manage pastureland. In Brazil, we estimate these costs at between $7.5 billion and $10 billion. Likewise, the protection, restoration and management of land and forests require investments to allow for regeneration (eg, seeds, seedlings, labour), estimated at between $6.3 million and $9.4 billion per year to 2030.

These costs are in line with global estimates.

Recent figures from the International Monetary Fund suggest that $6 trillion to $10 trillion in global investment (equivalent to a cumulative 6% to 10% of annual global GDP) – both public and private – is needed this decade to reach net zero by 2050.[32] The Food and Land Use Coalition (FOLU) has produced the following estimates of the additional global investment required up to 2030:

- between $35 billion and $40 billion to shift to productive and regenerative agriculture;
- between $45 billion and $65 billion to protect and restore nature; and
- between $95 billion and $110 billion to ensure stronger rural livelihoods.[33]

Adjusted to Brazil's agricultural and forest areas, these investments would translate to between $11.6 billion and $15 billion per year by 2030. However, these investment requirements pale in comparison to the cost of the potential impacts under the likely temperature rise trajectory of 2°C to 2.6°C: an estimated reduction in mid-century GDP of between 11% and 14%, with poorer households and communities being hardest hit.[34]

These investments have the potential to unlock increased productivity across the economy and open up important new markets for Brazilian exports.

Key new or growth markets for Brazil could include green hydrogen, payments for ecosystem services (PES), low-carbon metals and mining, and sustainable animal protein.

- **Brazil is well placed to play a major role in the hydrogen market,** given its clean energy matrix, significant domestic demand (primarily for heavy transport and steel) and cost competitiveness for exports. Global annual hydrogen production will need to reach 500 Mt to 800 Mt by 2050 (from 60 Mt today) to meet end-use demand for hydrogen (eg, mining), ammonia (eg, shipping, fertilizers) and synfuels (eg, aviation).[29] In Brazil, estimates for domestic demand for hydrogen are between 7.2 Mt and 9 Mt by 2040, driven by trucking, steel and industrial heating, representing a $10 billion to $12 billion domestic market. The export market – mainly to the US and Europe – is estimated at between 2 Mt and 4 Mt, such that hydrogen could become a $15 billion to $20 billion revenue opportunity by 2040, anchored by a $200 billion investment to scale renewable energy and develop the technology.[35]

- **PES[36] can play an important role in protecting forests and biodiversity in Brazil.** Brazil has the world's highest cost-effective land-based mitigation potential (1.7 $GtCO_2e$ per year, representing 12% of the global potential of 13.8 $GtCO_2e$ per year between 2020 and 2050).[37] Natural climate solutions are significantly more cost effective and offer more co-benefits than engineered carbon removal (see Figure 16). These solutions should therefore attract significant investment for the protection, restoration and management of natural ecosystems – not least in the Amazon. At an estimated share of 60% of Brazil's cost-effective land-based mitigation potential, the Amazon could deliver approximately 1 $GtCO_2e$ per year between 2020 and 2050, which represents a carbon price of between $50 and $100 per tCO_2. PES can provide a tangible financial benefit to farmers and communities, including an estimated 215,000 new jobs[38] aimed at the conservation and restoration of forests that might otherwise be destroyed, alongside the biodiversity within them. Closer monitoring of deforestation and stricter law enforcement, including sanctions, are critical to ensure the effectiveness and efficiency of PES programmes. Furthermore, technological advances and spatial intelligence are critical to minimize the risk of reversals (eg, from fires or illegal deforestation) and adequate measurement of sequestration. Jurisdictional approaches to land-based solutions at a regional or national level can help to ensure that emissions are genuinely reduced, rather than simply displaced.

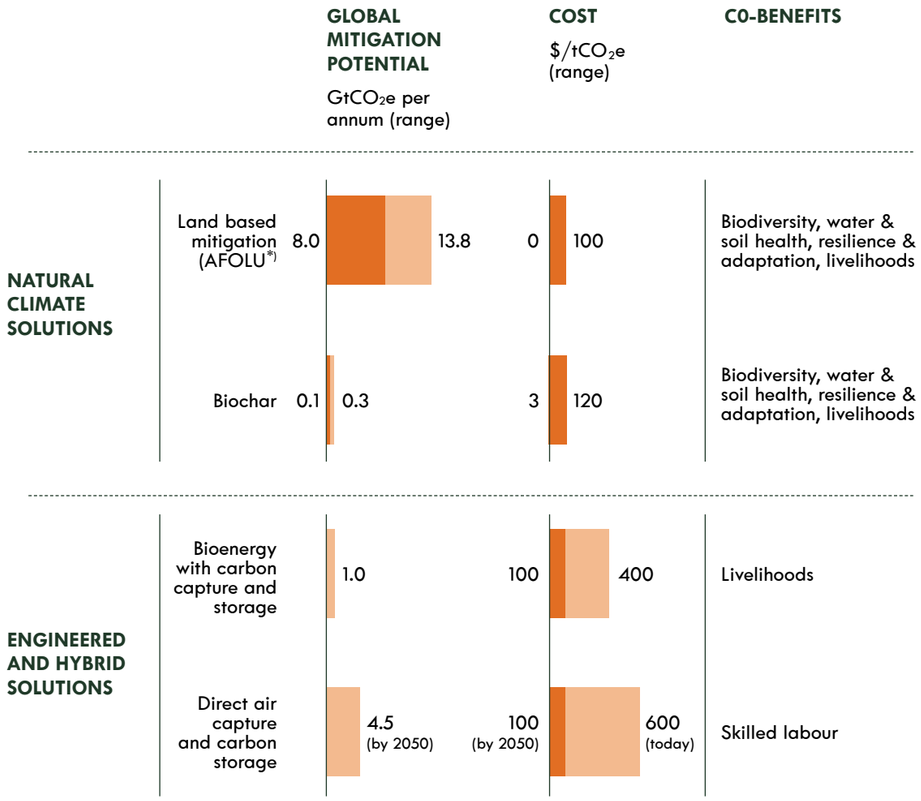


Figure 16: Natural climate solutions are more cost-effective than engineered solutions and offer more co-benefits

* Land-based mitigation measures include supply-side interventions in forests and other ecosystems (to protect, manage, and restore), agriculture (to reduce emissions and enhance carbon sequestration), and bioenergy (to reduce fossil fuel emissions and sequester carbon), as well as demand-side interventions on food waste, diets, andresource use.

Source: Food and Land Use Coalition; Energy Transitions Commission; Roe et al. - Land-based measures to mitigate climate change: Potential and feasibility by country (2020)

- **Brazil has a competitive advantage in positioning itself as a low-carbon metals and mining hub.** Under a decoupled, Paris-aligned decarbonization scenario, Latin America and the Caribbean are forecast to increase their market share for iron ore from 25% under BAU to over 30% by 2030.[39] Brazil is uniquely placed to become a low-carbon metals and solutions hub, given its low-cost position on the global supply curve and abundant access to renewable electricity, nature-based solutions and green hydrogen. Brazil's private and public sectors could further support the development of a low-carbon metals hub by investing in new traceability services, the local refurbishing industry and the global advanced recycling and resources recovery industries.

- **Seizing the opportunities of sustainable animal protein.** One of Brazil's largest animal protein companies recently sold 280,000 tonnes of CORSIA-compliant and Verra-registered carbon credits on the Saudi Arabia Public Investment Fund's regional voluntary carbon market.[40] This was the world's largest-ever voluntary carbon credit auction, with 1.4 million tonnes of carbon credits sold, representing 20% of all negotiated credits. Through regenerative agriculture practices and ICLF production, Brazil is uniquely placed to become a leading exporter of low-carbon beef. ICLF increased by more than 50% between 2015 and 2020, reaching 17 million hectares in 2020; this has helped to reduce emissions and minimise the risk of diversification for producers.[41] Success cases are already emerging (eg, Minerva has started selling carbon-neutral beef at a significant premium on international markets). These developments demonstrate a belief in the business value of decarbonizing the industry, supported by carbon markets.

Several scalable and investable projects in Brazil were identified through this consultation report that could catalyse the transition to net zero by 2030. If scaled, these projects could quickly accelerate and expand impact in their respective pathways. Taken together, they represent an opportunity to drive the changes needed in the land use system, the energy and industrial systems, and local communities in the Amazon.

RACE TO ZERO PATHWAYS

RACE TO ZERO – LEVERS

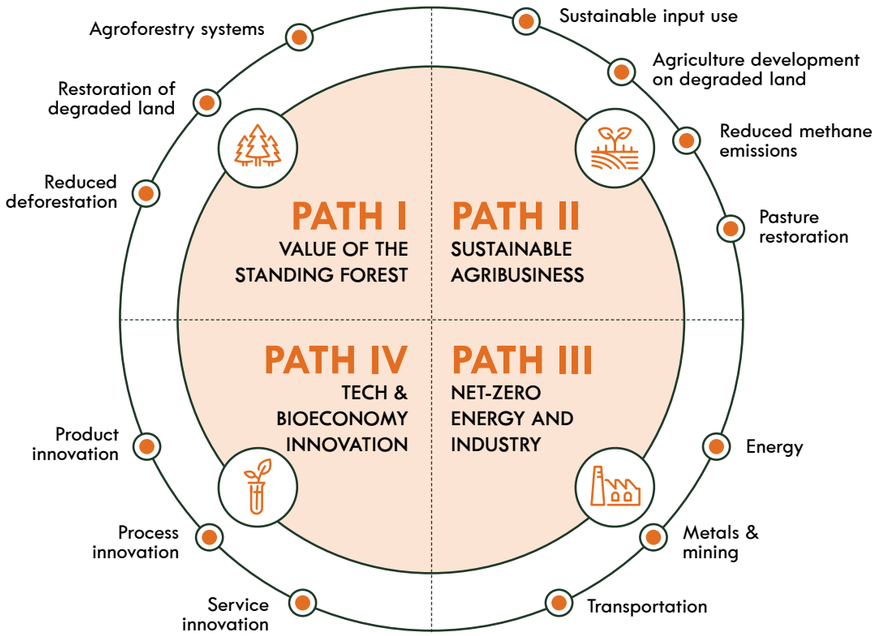


Figure 17: Race to zero – levers

The Race to Zero requires a total investment of $35 billion to $76 billion per year, with a value-add potential of $100 billion to $153 billion and an estimated impact of 55 million to 70 million hectares restored, protected or managed and 1.3 $GtCO_2e$ saved by 2030.

PATHWAY I: VALUE OF THE STANDING FOREST

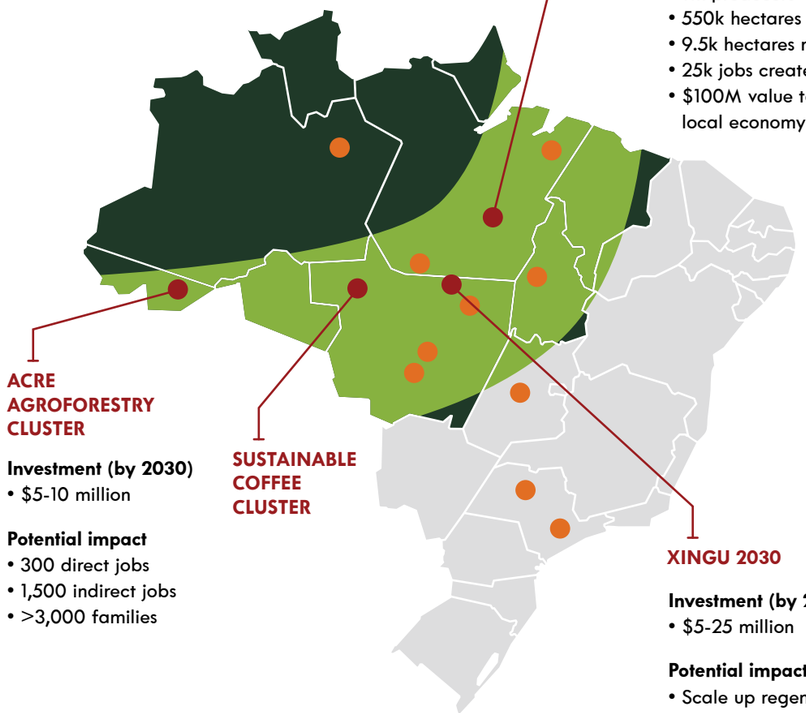
An investment of $6.3 billion to $9.4 billion per year will be required to achieve land-based climate mitigation of over 700 $MtCO_2e$ and impact over 10 million hectares of degraded pastureland. Agroforestry systems, the restoration of degraded land and reduced deforestation will be the key enablers for the transition, generating an estimated $21 billion to $24 billion per year in value-add to the economy. There is an urgent need to scale up successful small bioeconomy business models and enhance shared value from sustainable forests and sustainable land use. The Prosperous Forests report (2019), published by FOLU, estimates that sealing off the forest frontier of 20% of all tropical forests in the world would avert climate tipping points. Several success cases are currently being implemented in the Amazon that are ready to be scaled, including Partnerships for Forests (P4F), Xingu 2030 and the Sustainable Cocoa Corridor:

- **P4F** is the largest incubator of small-scale forest economy models in the Amazon, with over 1 million hectares impacted.
- **Xingu 2030** aims to secure the sustainability of the Xingu Indigenous Territory by scaling up regenerative businesses, increasing productivity and boosting the local economy, while promoting nature conservation, restoration and improved land use management.
- **The Sustainable Cocoa Corridor** promotes sustainable growth of agroforestry production and deforestation-free cocoa production, while restoring degraded pasturelands in the Amazon and promoting good working conditions and a living income for smallholders.

By integrating these small to medium-sized projects, we could create a project similar in scale and ambition to the Great Green Wall in Africa (www.greatgreenwall.org/about-great-green-wall), establishing what could be called the Amazon Green Belt.

THE AMAZON GREEN BELT

An investment of $1.2 billion to $1.9 billion in the Amazon's standing forest economy could mitigate 225 $MtCO_2$ per year and support the livelihoods of 1 million people. Scaling similar models would create sustainable production clusters to foster the alignment and coordination of private and public stakeholders in zones with high potential to produce sustainable commodities and prevent deforestation.



SUSTAINABLE COCOA CORRIDOR

Investment (by 2030)
- $15 million

Potential impact
- 11k producers
- 550k hectares improved
- 9.5k hectares restored
- 25k jobs created
- $100M value to local economy

ACRE AGROFORESTRY CLUSTER

Investment (by 2030)
- $5-10 million

Potential impact
- 300 direct jobs
- 1,500 indirect jobs
- >3,000 families

SUSTAINABLE COFFEE CLUSTER

XINGU 2030

Investment (by 2030)
- $5-25 million

Potential impact
- Scale up regenerative businesses, increase productivity and boost the local economy, while promoting nature conservation, restoration and improving land-use management

Existing P4F projects discussed in chapter 5

Figure 18: Illustrative great green belt

Note: This is illustrative.

PATHWAY II: SUSTAINABLE AGRIBUSINESS

Sustainable agribusiness will require an investment of $7.5 billion to $10 billion per year and could generate a value-add of $19 billion to $37 billion per year for the economy, while mitigating over 200 $MtCO_2e$ and impacting over 35 million hectares of degraded pastureland.

A thriving agribusiness sector is an essential driver of economic growth for Brazil, and especially for the Amazon

A thriving agribusiness sector is an essential driver of economic growth for Brazil, and especially for the Amazon. Brazil has become a meat and soy export powerhouse at the expense of increasing illegal deforestation, most of which occurs in the Amazon. Several levers – pasture restoration, methane emissions reductions, agricultural development on degraded land and sustainable input use – could unlock the value of a truly sustainable agriculture system that could become a global reference not only in terms of technology and productivity, but also in low carbon emissions. In recent years, successful coalitions have emerged in Brazil to support this transition. In this regard, Coalizão Brasil Clima, Florestas e Agricultura – a 'movement', made up of more than 300 representatives from the private sector, the financial sector, academia and civil society to promote synergy between the agendas of protection, conservation, sustainable use of natural and planted forests, agriculture and adaptation to climate change – has been mobilizing actors from the private, public and social sectors for more than six years now. In order to accelerate this process, Brazil should connect with these global coalitions to amplify both its own voice and that of the wider Global South, and ensure its participation in defining global standards. For example, in creating a biodiversity framework, strong representation from the Global South is imperative in defining the goals, policy actions and means of implementation to ensure climate justice and address the need for local development in harmony with biodiversity. The Global South should also play a role in determining how the protection of high-integrity forests (which may not be at high risk of deforestation) could be included in carbon market mechanisms. One concrete action would be to create a Brazilian chapter of FOLU, today coordinated by the World Resources Institute (WRI).

FOOD AND LAND USE BRAZIL

FOLU can kickstart collaboration across the entire value chain and across a variety of organizations. FOLU has already established operations in countries such as Australia, China, Colombia, Ethiopia, India, Indonesia, the Scandinavian (Sweden, Norway, Denmark and Iceland) and the UK, and is driving meaningful industry impact – most recently in Colombia, where it has been working with new President Petro on his food systems agenda. The transition will require large investments in capacity building; widespread supply chain commitment to stop deforestation; well-funded law enforcement to provide oversight; land use reform; and clear consumer demand for sustainable commodities. FOLU takes a systems view and works through a coalition to support the necessary transition in the food and land use system (see Figure 19). FOLU's global secretariat is staffed by 33 employees who sit across the WRI, Systemiq and the Sustainable Development Solutions Network, delivering policy and international engagement, knowledge generation and strategic initiatives.

GROWING BETTER: 10 CRITICAL TRANSITIONS TO TRANSFORM FOOD AND LAND USE

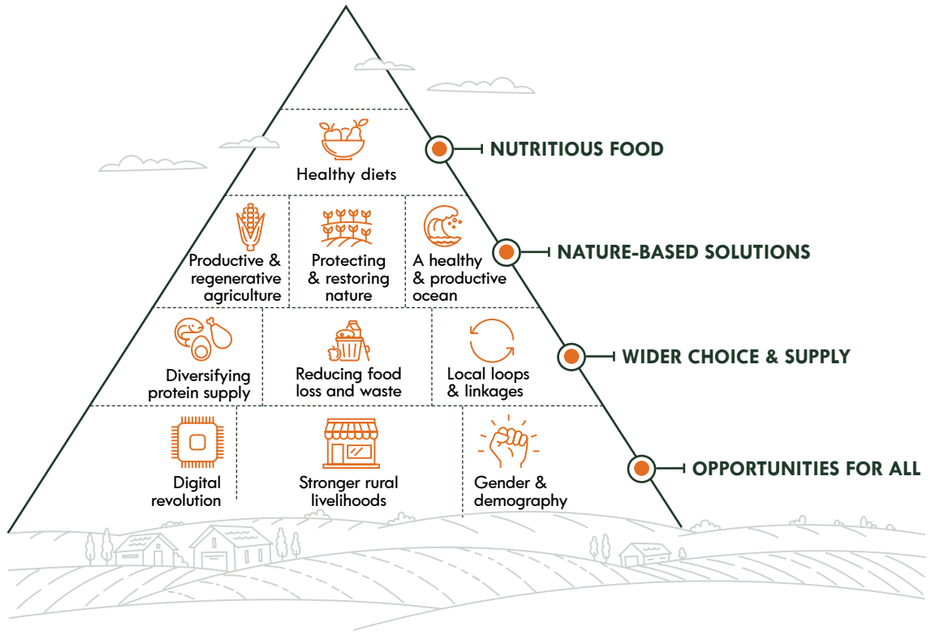


Figure 19: FOLU 10 critical transitions

Source: Food and Land Use Coalition

PATHWAY III: NET-ZERO ENERGY AND INDUSTRY

Decarbonizing energy and industry will require an investment of $16 billion to $50 billion per year and generate a value-add of $20 billion to $40 billion per year. The Race to Zero requires that energy and industry emissions be halved this decade. With the energy, industry and waste sectors responsible for nearly two-thirds of global GHG emissions, decarbonization solutions to zero emissions in each of these sectors are urgently needed. The transition includes actions around three major sectors: energy, metals and mining and transportation. Unlocking the potential of hydrogen and turning Brazil into a global low-carbon metals and mining hub are some of the levers that could accelerate the decarbonization of industry. Developing a vision of the optimal path to accelerate the energy and industry transition requires both global insights and local knowledge. The major hard-to-abate sectors took a bold step in 2021 by committing to decarbonization pathways through the launch of the Mission Possible Partnership (MPP) – a global alliance of climate leaders focused on supercharging decarbonization across the entire value chain of the world's highest-emitting industries in the next 10 years. During Climate Week 2022, the MPP and the Science-Based Targets Initiative (SBTI) joined forces to scale corporate climate action in high-emitting sectors in line with the Paris target of limiting global warming to 1.5°C. Establishing a Brazilian chapter of the MPP would not only accelerate the decarbonization of Brazilian industry, but also strengthen the Global South's connection to the SBTI.

The Race to Zero requires that energy and industry emissions be halved this decade

MISSION POSSIBLE PARTNERSHIP BRAZIL

The ETC's MPP programme can be leveraged to tailor sector transition strategies for the Brazil context. The objective of this initiative is to accelerate the energy transition in Brazil by developing roadmaps and tools that build on robust analysis and extensive exchanges with experts and practitioners across energy-intensive value chains (see Figure 20). Global sector transition strategies have been developed by the MPP in the past year. The MPP's most recently published industry transition strategies (for ammonia, steel and aluminium) indicate that 75% of the investments needed for decarbonization are required in the energy sector. And while Brazil's energy matrix is among the cleanest in the world, hydropower – particularly that produced in the Amazon – bears significant social and environmental costs. As such, hydropower must be weighed carefully against other renewable sources, including bioenergy, wind and solar.

For each sector pathway, the roadmap will include the following elements: investment requirements; a supporting regulatory framework; capability-building needs; job creation potential; and ancillary business opportunities.

NET-ZERO INDUSTRY PLATFORMS

A replicable, four-step approach that can be tailored to individual sectors and countries

1 FORGE A SHARED VISION

Convene high-ambition stakeholders within a dedicated net-zero sector initiative

- Industry players across value chain
- Major buyers across value chain
- Lenders
- Shareholders
- Asset managers
- Governments
- International governing bodies

2 SELECT NET-ZERO ROADMAP & METRICS

Develop a comprehensive roadmap to net zero by 2050 with five-year increments

- Demand projections
- Technology deployment curves
- Policy & demand prerequisites
- Corporate investment needs
- Infrastructure investment needs
- Asset retirement plan
- Role of transitional offsets and nature-based solutions
- Resulting GHG trajectory

Align on relevant metrics of climate-alignment:

- CO_2 emissions targets
- Other relevant KPIs demonstrating sectoral decarbonization

3 COMMIT TO ACTION

Agree on relevant targets & commitments with a focus on the 2025-2030 timeframe

- Emissions targets
- Investment commitments
- Demand signals
- Procurement rules
- Lending guidelines
- Investment principles
- Gov't R&D
- Gov't procurement
- National policies

4 SUPPORT IMPLEMENTATION

Develop practical resources and toolkits to help operationalize commitments

- Collaborative R&D
- Blueprint for zero-carbon value chain pilots
- Green product labels & standards
- Demonstration & scale-up financing blueprints
- Assessment tools
- Monitoring of commitments
- Develop emissions traceability protocols to underpin commitments and enable verification
- Integrate metrics into existing climate disclosure frameworks

Figure 20: MPP four-step approach to net-zero industry

Source: Mission Possible Partnership

PATHWAY IV: BIOECONOMY INNOVATION

Bioeconomy innovation will require an investment of $4.9 billion to $6.6 billion per year and generate a value-add of $40 billion to $53 billion per year for the economy by 2030. Investment in research and development (R&D) and innovation is needed to unlock the value of Brazil's bioeconomy. For example, the Aeronautics Institute of Technology – established in 1950 and now a pioneer in aerospace and defence R&D and one of Brazil's top engineering universities – was instrumental in building a thriving aviation industry (its alumni created EMBRAER). Similarly, investing in a higher education institution focused on applied science and technology in natural systems would help to catalyse the bioeconomy. Brazil has a unique opportunity to build on this legacy of entrepreneurship by establishing a world-class technology institute at the heart of the global bioeconomy. To realize this opportunity, the Amazon Institute of Technology (AMIT) – an initiative co-led by renowned climate scientist Carlos Nobre – has been established to strengthen value chains, conserve river and forest ecosystems, and support socio-economic development and social inclusion in the Amazon. Local developments in science, technology and innovation could help Brazil unlock the estimated $1.3 trillion bioeconomy – a market that is still significantly untapped, as discussed earlier in this report.

Investment in research and development and innovation is needed to unlock the value of Brazil's bioeconomy

AMIT

An investment of $200 million per year is needed to create the world's first science and technology institute for sustainable and socially inclusive bioeconomy. The market potential of the global and local bioeconomy is largely unknown. Thanks to the Amazon's unparalleled biodiversity and deep traditional knowledge, Brazil should be able to capture a large share of the bioeconomy; but investment in innovation and training will be needed to capture more value-add in the Amazon bioeconomy. Currently, activities in the Amazon mainly focus on the extraction of raw materials (eg, timber, gold, Brazil nuts). As such, much value is 'left on the table'. Further investment in R&D and capacity building is thus needed to unlock this potential, simultaneously drawing on natural resources, traditional knowledge and science.

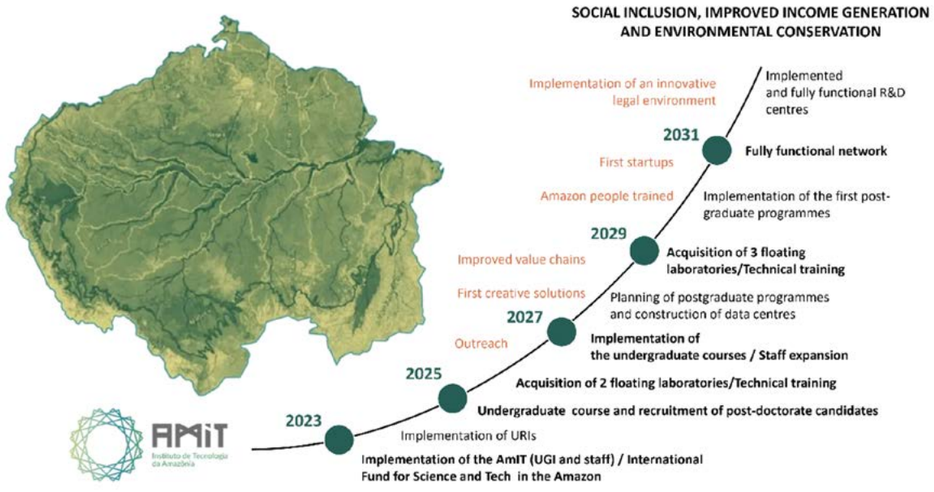


Figure 21: AMIT implementation timeline

RACE TO RESILIENCE PATHWAYS

RACE TO RESILIENCE – LEVERS

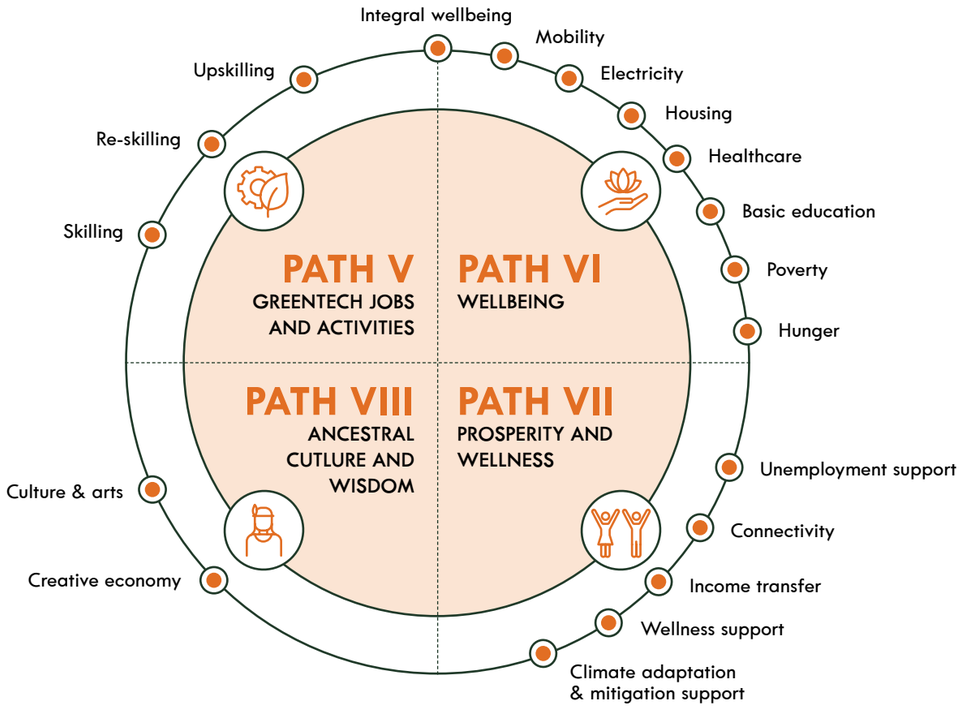


Figure 22: Race to Resilience – levers

The Race to Resilience requires a total investment of $3 billion to $3.6 billion per year by 2030 to enhance wellbeing and prosperity for between 43 million and 48 million people; retrain over 9 million people for the jobs of the future; and protect ancestral culture and wisdom.

PATHWAY V: GREENTECH JOBS AND ACTIVITIES

Greentech jobs and activities will require an investment of $1 billion to $1.2 billion per year to skill, upskill and reskill over 1 million people in the Amazon. The net-zero transition will have a profound and disruptive impact on jobs. Globally, some 185 million jobs could be lost by 2050 (eg, in oil, gas and coal); but 200 million new jobs could emerge (eg, in agriculture and renewable power).[42] In 2018, the International Labour Organization estimated (conservatively, under a 2°C scenario) that 24 million new jobs would be created globally by 2030 in the transition to a green economy. In renewables alone, the International Renewable Energy Agency estimated that 17 million new jobs could be created by 2030; while petroleum refinery and extraction could see a loss of 3 million jobs over the same period.[43]

Workforce transitions will require careful navigation, considering social, economic and cultural aspects at the regional, national and local levels. For example, in Latin America, it is estimated that 80% of job creation will occur in sectors that are currently dominated by men.[44] The transition offers an opportunity to address inequalities in the workplace (eg, ensuring gender parity in remuneration; expanding childcare services) by carefully designing training programmes and supporting policies for the new greentech labour market.

Several initiatives are already underway to support the transition to greentech activities. These include efforts in academia, such as AMIT, focused on capacity building for the Amazon bioeconomy; the Tropical Forest Institute, focused on promoting best practices (eg, reduced impact logging techniques) for multiple-use forest management in the Amazon; and the Amazon+10 Initiative, focused on promoting research on biodiversity conservation, climate change and community resilience. The private

sector is also actively engaged in capacity building – both through dedicated platforms (eg, Produzindo Certo, focused on sustainable and regenerative agriculture practices; and PretaTerra, focused on capacity building for agroforestry techniques), and through initiatives led by large corporates (eg, relating to fertilizers and sustainable agriculture).

Over the next 10 years, the Legal Amazon has a crucial window of opportunity during which a significant share of the young working age population will enter the labour market. This influx of young professionals stands in contrast to the ageing workforce throughout the rest of the country.[45] This challenge must be met by an increase in job opportunities across a range of areas and sectors (eg, greentech, innovation, bioeconomy), and the upskilling of professionals who are currently engaged in primary activities. A dedicated taskforce should be established to evaluate and help close the skills and education gap, which is currently growing both in the Amazon and across the country.

This taskforce would assess sector by sector the need to reposition today's workforce for greentech activities, leading to a sustainable, resilient, zero-carbon future

An initial pilot project would focus on mapping needs in the Brazilian market to 2030 and 2050; after which the taskforce would extend the study to other countries, both regionally and globally. This two-year research effort – conducted by a team of specialists working in collaboration with industry experts, public sector leaders and academics – would involve the following key activities:

- a sector-by-sector (eg, high-emitting sectors such as agriculture, power, transport, metals and mining, chemicals) analysis of the key risks and opportunities related to the Race to Zero and to Resilience for workers in the Brazilian job market (eg, by 2100, it is expected that the savannization of the Amazon will expose more than 11 million people to heat stress);
- the identification of regional hubs/centres of competence (eg, hydrogen, sustainable aviation fuel, agroforestry production) to identify regional needs;
- an assessment of existing education and training institutions (eg, including public, private and corporate programmes) to identify potential gaps and the need for pilots, and to explore delivery mechanisms and formats (eg, online undergraduate/graduate degrees; online corporate platforms; vocational training);
- a quantification of the investments required for vocational training to upskill and reskill workers;
- a mapping of potential sources and uses of funds; and
- the development of a national action plan to address the transition, including the roles and responsibilities of different stakeholders and a timeline for rollout.

PATHWAY VI: WELLBEING

An investment of $1 billion to $1.2 billion per year will be needed to enhance resilience and wellbeing for nearly half of the population (eg, rural, urban, riverside, indigenous) in the Legal Amazon who are living under the poverty line or in vulnerable conditions. As previously discussed in this report, the COVID-19 pandemic has caused a nearly 30-year decline across many socio-economic indicators, aggravating regional inequalities. The indicators for the Legal Amazon region are the worst in the country with respect to hunger, poverty, basic sanitation and schooling, among other things.[46] The type of poverty experienced by the Amazon population is multi-dimensional, encompassing social, economic, political and environmental aspects.[47] The tricky logistics and rich diversity of the Amazon make it difficult to identify a single overarching solution for all different sub-regions and ethnic groups.

Helping the Amazon population and overcoming the challenges in the next eight years will require a collaborative effort. Over 16,000 organizations are working on relevant projects and many successful initiatives are already underway which should be highlighted and scaled. This is a challenge of global significance and responsibility; and the participation of various actors – such as companies, government, non-governmental organisations (NGOs), academia and civil society – is essential. Scalable and impactful projects are necessary to drive resilience in a quicker, more disruptive way than what has been done previously.

The COVID-19 pandemic has caused a nearly 30-year decline across many socio-economic indicators, aggravating regional inequalities

REPLICATING INTEGRAL WELLBEING MODEL ACROSS ALL COMMUNITIES

An investment of $35 million will provide integral wellbeing to over 30 communities in the Amazon, which currently suffer from hunger, poverty and lack access to basic needs. Fundação Amazônia Sustentável (FAS) – an NGO created in 2008 by the Amazonas state government in conjunction with the Bradesco bank, which is focused on sustainable development, environmental conservation and improving the quality of life of riverside populations – has developed an integrated wellbeing model that is highly replicable and customizable for other communities in protected areas, while respecting the intrinsic particularities of each region and incorporating consultation with each local community. A pilot project has been successfully implemented in the Tumbira riverside community, with co-sponsorship by private sector companies (see Figure 23). The FAS model empowers communities and addresses a range of socio-economic challenges under the same umbrella solution. This model should be replicated in other protected areas in the region, with the capacity to reach 4,000 people.

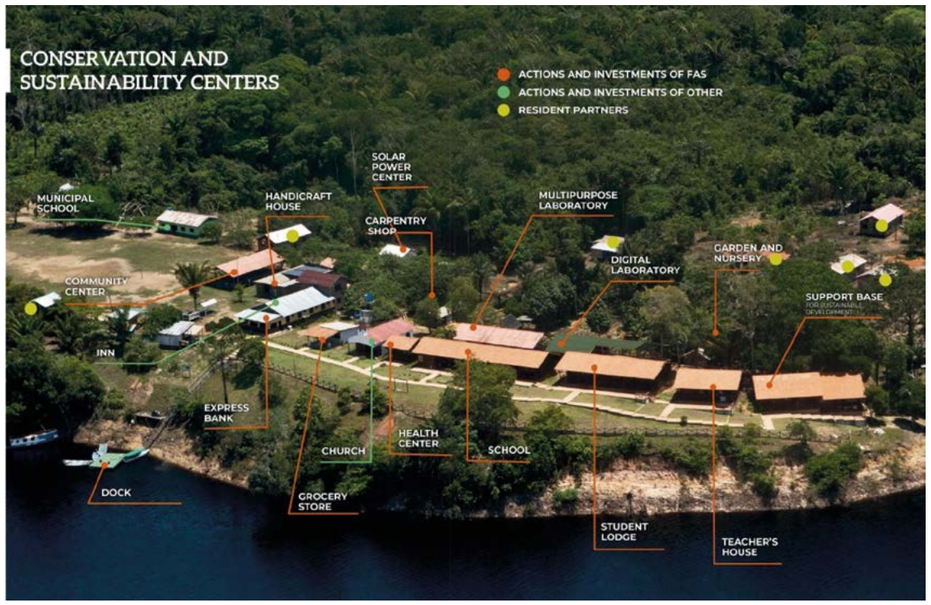


Figure 23: Blueprint of wellbeing model implemented in Tumbira

FLOATING HEALTHCARE UNITS

An investment of $64 million will scale an existing project that democratizes healthcare access for all communities in the Amazon. Health is seen as the main problem for three out of four residents of the Legal Amazon and is widely recognized as the area where infrastructure and services are most lacking.[48] Per-capita spending on health in the Legal Amazon was on average 25% lower in 2019 than in the rest of the country due to difficulties in planning and funding, a shortage of health professionals and a lack of infrastructure and basic equipment (eg, refrigerators, internet access), especially outside urban areas.[49] To address these problems, Saúde e Alegria – a non-profit civil initiative that promotes and supports participatory integrated and sustainable community development – has rolled out floating healthcare units with the aim of improving and expanding the primary healthcare network for riverside communities (traditional and indigenous), even in the most remote areas of the Amazon. These units ensure that basic healthcare is available to riverside communities and promote the inclusion of regions that are typically excluded from the public healthcare system.

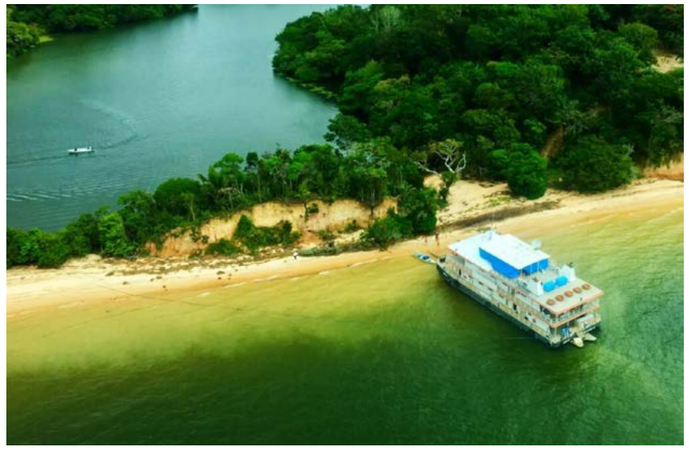


Figure 24: Distribution and construction status of UBSFF in the Amazon (MS 2018)

Photo credit: Archive Projeto Saúde e Alegria

RENOVATION OF PRECARIOUS HOUSING

An investment of $4 million will provide housing to 24,000 people and facilitate the renovation of 6,000 homes in urban areas in the next five years. The Legal Amazon has the largest relative share of the Brazilian population living in precarious housing (eg, slums) in the country. The Instituto Vivenda – an 'action tank' aimed at building and implementing initiatives that contribute to reducing the housing deficit in Brazil – has launched an initiative focused on urban centres such as Manaus (Amazonas), Belém (Pará) and adjacent areas. Around 1.2 million homes in the Amazon are considered to be precarious, with 773,000 located in urban areas and 380,000 in rural areas.[50] Such housing suffers from a lack of access to basic public services such as water distribution, sewerage, electricity and roads, making the population more vulnerable and susceptible to disease.

Figure 25: Instituto Vivenda

FOREST ARCHITECTURE

Impact One – an organization that works with various indigenous communities in the Amazon and beyond to strengthen indigenous cultural practices in symbiosis with the forest and nature – is developing novel architectural models and construction techniques to design buildings that operate in synergy with and support of the natural environment.

Forest architecture focuses on the research and implementation of materials and construction methods that are tailored to local needs and conditions, with the aim of establishing integrative and self-sustaining supply chains, minimising extractive processes and avoiding transportation networks that threaten forests and their communities.

Figure 26: Project developed in the Yawanawa Village

Photo of AYA Hub, provided by Kei Cities

PATHWAY VII: PROSPERITY AND WELLNESS

Prosperity and wellness will require an investment of $515 million to $640 million per year to drive prosperity for over 3 million people by 2030 through digital inclusion, income generation, climate adaptation and wellness support.

Ensuring that all communities can thrive in the long term is an essential building block in the socio-economic development of the Amazon

Ensuring that all communities can thrive in the long term is an essential building block in the socio-economic development of the Amazon – especially since the effects of climate change are felt unequally throughout the region.[51] While climate change is impacting urban, rural and traditional communities alike, vulnerable groups are suffering disproportionately.

Moreover, as discussed in Pathway V, the skills gap challenge must be met by an increase in job opportunities in a range of areas and sectors (eg, greentech, innovation, bioeconomy), as well as the upskilling of professionals who are currently engaged in primary activities. The issue is exacerbated by a lack of connectivity, which still impacts 36 million people in Brazil and delays access to new technologies for most of the Amazon population. Digital exclusion creates several other challenges, such as greater informality in the labor market, a reduced productivity index, delays in human and professional development and limited access to public services.[52] To combat this market failure, a new project spearheaded by Tasso Azevedo, called Internet for Forest People, aims to democratize high-speed internet access for communities which are currently digitally excluded and connect them to the rest of the world.

INTERNET FOR FOREST PEOPLE

An investment of $91 million will provide high-speed internet access to 1 million people who live in the forest by 2025. The project will target traditional and indigenous communities and quilombolas (collective territories for the descendants of black slaves who resisted the slavery regime that prevailed in Brazil for over 300 years). Internet access in the Amazon is limited at best; and even where available, it is slow, intermittent and expensive. This lack of connectivity represents an immense burden for Amazon communities, as it negatively impacts their access to health, education, safety and economic development, and constrains their ability to preserve and disseminate their culture. Moreover, with the rapid development of technology, illegal activity has increased as organized criminals often have better access to internet and communication tools, thus making them disproportionally more powerful and effective (see Figure 27).

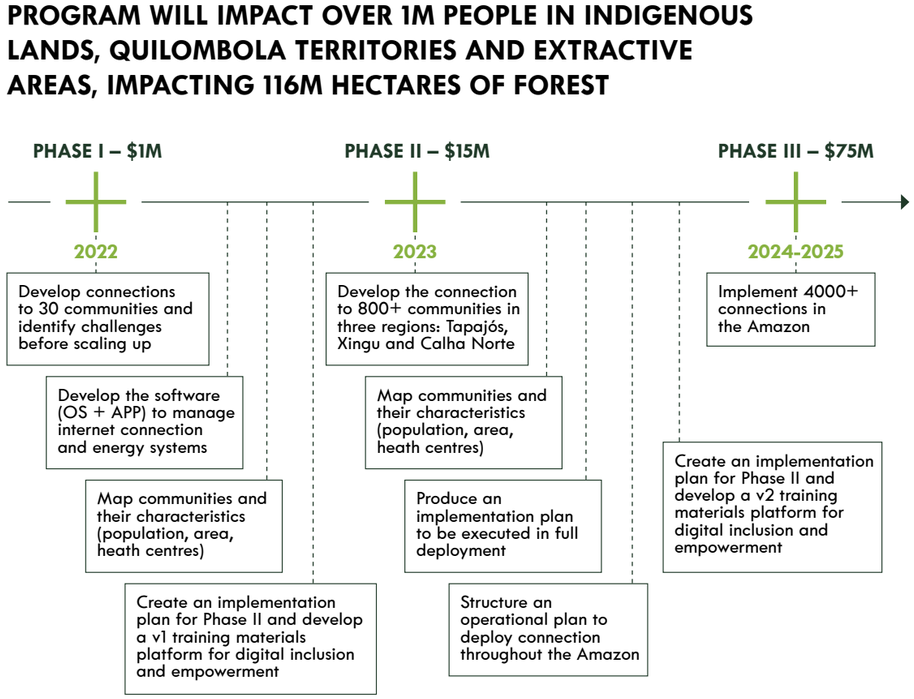
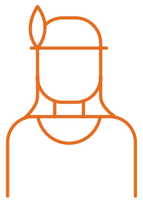


Figure 27: Project implementation timeline



PATHWAY VIII: ANCESTRAL WISDOM AND CULTURE

An investment of $500 million to $532 million per year is needed to preserve, honour and disseminate the ancestral heritage of traditional and indigenous communities in the Amazon. It is crucial to preserve traditional knowledge and practices, and the techniques and methods by which local communities and indigenous people have sustainably managed the Amazon rainforest and other biomes for decades. As discussed in Pathway VII, digital exclusion has prevented these groups from disseminating their knowledge beyond the confines of their communities – and indeed to the wider world. Connecting indigenous, quilombola and riverside communities to the rest of the Amazon – including those in urban areas, who represent 76% to 80% of the regional population – would improve livelihoods while increasing awareness of the value of the human and natural capital in the Amazon.[53] To this end, and in consultation with traditional and indigenous communities, Impact One and Instituto Alok – which works in partnerships in Brazil, Africa and India on investments focused on social transformation initiatives – have developed arts and culture projects that honour and benefit these groups, which are often excluded from mainstream markets.

It is crucial to preserve traditional knowledge and practices

ANCESTORS OF THE FUTURE FUND

In partnership with the UN Global Compact and Brazilian technology company WeLight, Instituto Alok is mobilizing the creation of the Ancestors of the Future Fund, which aims to strengthen ancestral knowledge and the development of direct relationships with indigenous leaders (see Figure 28). It also seeks to establish appropriate boundaries for any projects and programmes that are envisaged for the Legal Amazon, to ensure the preservation of ancestral knowledge while facilitating the prosperity of local economies.[54] The ultimate goal is to establish a set of cultural hubs in the Amazon designed to meet the needs of indigenous people and promote the dissemination of their knowledge. All indigenous leaders will have a voice in how their knowledge is documented, ensuring nothing is lost. The project will work directly with around 400 to 600 indigenous people in 20 to 30 villages, and will ultimately share this ancestral knowledge with between 20 million and 50 million people through cultural, entertainment and communication products.

Figure 28: Instituto Alok main activities

GENESIS PROGRAMME

Impact One works with various indigenous communities in the Amazon and beyond to strengthen indigenous cultural practices in symbiosis with the forest and nature, with practical applications such as forest architecture projects (discussed in Pathway VI); and to transfer that knowledge to global society through immersive cultural experiences. Its Genesis Programme is specifically focused on projects designed for the benefit of indigenous communities which will be presented internationally in impactful high-culture contexts. Projects under this programme include the co-creation of artworks by the Yawanawa community and artists for exhibition in leading museums and cultural institutions worldwide; and the development of a school curriculum for the Kichwa people of Sarayaku covering the transdisciplinary fields of culture, crafts, health and the natural elements, based on traditional Sarayaku wisdom.

ENABLER PATHWAYS

INFRASTRUCTURE AND ENABLING CONDITIONS

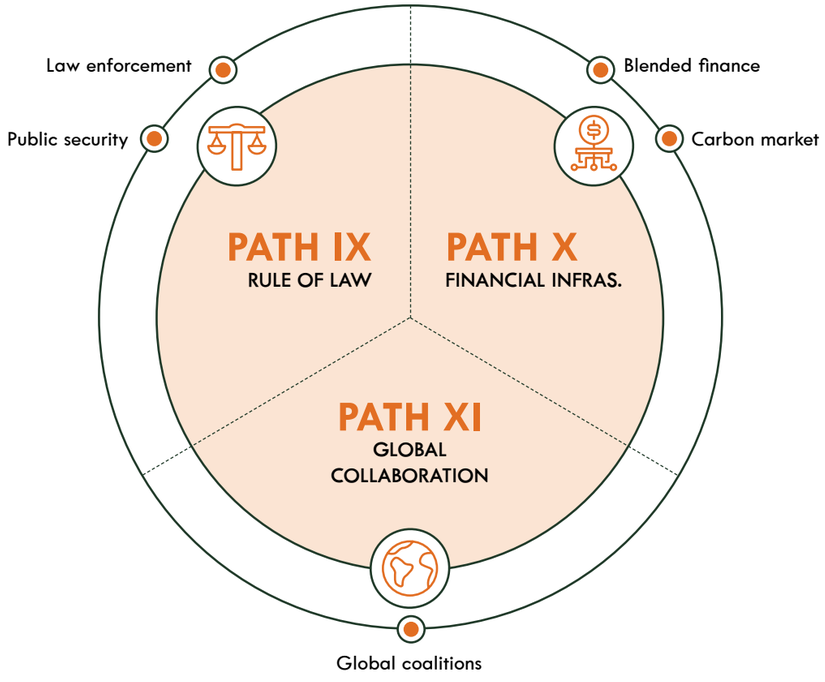


Figure 29: Infrastructure and enabling conditions

In order to meet the investment requirements for Race to Zero, Race to Resilience and Rule of Law programmes, Brazil will need to attract an additional $40 billion to $83 billion per year by 2030. For these programmes to be effective and sustainable, it is essential to re-establish the rule of law, strengthen global collaboration and create the financial infrastructure needed to mobilize capital for The Amazon's Marathon.

PATHWAY IX: RULE OF LAW

An investment of $2 billion to $4 billion per year is needed to re-establish the rule of law and strengthen institutions by 2030. As previously discussed in this report, deforestation is a leading driver of emissions and social conflict. To stop illegal deforestation and enhance the resilience and protection of local populations, it is essential to strengthen the rule of law and ensure stronger command and control (ie, a strategy of monitoring and law enforcement to combat deforestation). The institutional capacity for federal, state and municipal-level oversight has diminished dramatically in recent years; but the effective implementation of a multidimensional security agenda is crucial for socio-economic development in the region.[55]

ESTABLISHING THE RULE OF LAW IN THE AMAZON

The Igarapé Institute – a Brazilian think tank focused on emerging development and security issues – has proposed the development of a $150 million green economy bridge facility (the amount needed for a single large state) that leverages financial innovation, public-private partnership and civil society action to strengthen the rule of law and transform key states in the Brazilian Amazon into standing forest success cases. To this end, it is seeking to build partnerships to strengthen the rule of law and promote the development of a sustainable economy in the Amazon region by investing in the implementation of a multidimensional security agenda that would facilitate the creation of a green enterprise ecosystem and deliver cutting-edge research, data-enhanced transparency, innovative policymaking and agile and responsive, mission-driven governance arrangements.

The multidimensional security agenda proposed by the Igarapé Institute has three main aims: addressing structural and governance issues in the region; reducing environmental crime (see Figure 30), with a commitment to zero illegal deforestation; and tackling violent crimes, including in urban communities. The Institute strongly believes that zero deforestation can be achieved and sustained only through the rapid acceleration of a responsible green economy, based on the rule of law.

Mapping environmental crimes in the Amazon

Figure 30: Igarapé Institute

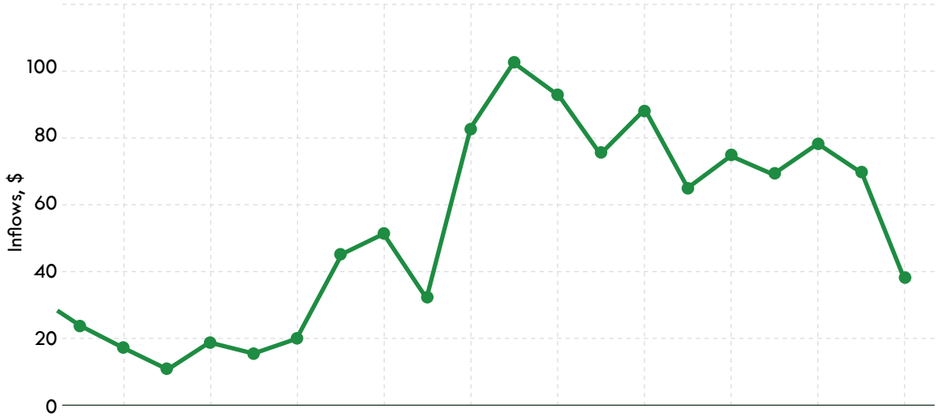
PATHWAY X: FINANCIAL INFRASTRUCTURE

With the right policies in place, Brazil has shown that it can attract substantial foreign investment. With the Central Bank's increased autonomy and the rise of middle-class consumers in the 1990s, Brazil was able to rein in federal debt and inflation, opening up the country to foreign investment (see Figure 31).[45] Brazil also has the opportunity to tap into substantial climate finance resources, including the voluntary carbon markets, which could be worth up to $50 billion per year by 2030;[56] new markets for blended finance, which could help to overcome risk-related barriers to investment; and private capital and long-term sovereign wealth fund capital, attracted by Brazil's potential to become a winner in the transition to a net-zero economy.

In the 1990s, Brazil was able to rein in federal debt and inflation, opening up the country to foreign investment

TOTAL FOREIGN DIRECT INVESTMENT, 2002-20

$ billions



TOTAL FOREIGN DIRECT INVESTMENT, 2002-20

% of GDP

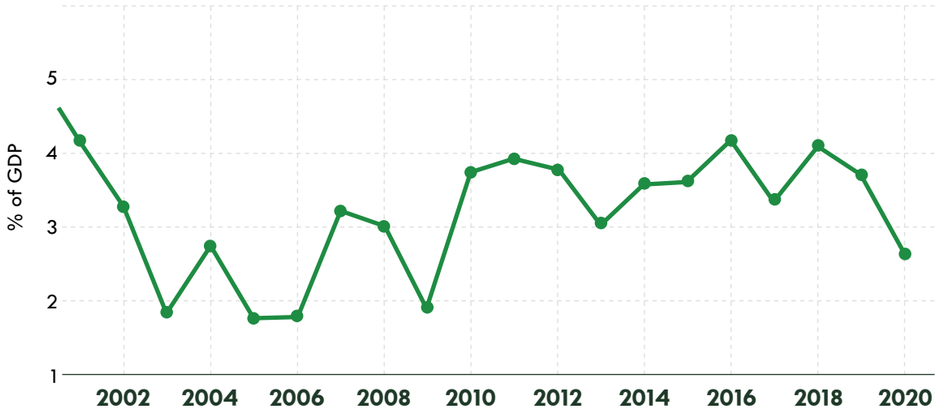
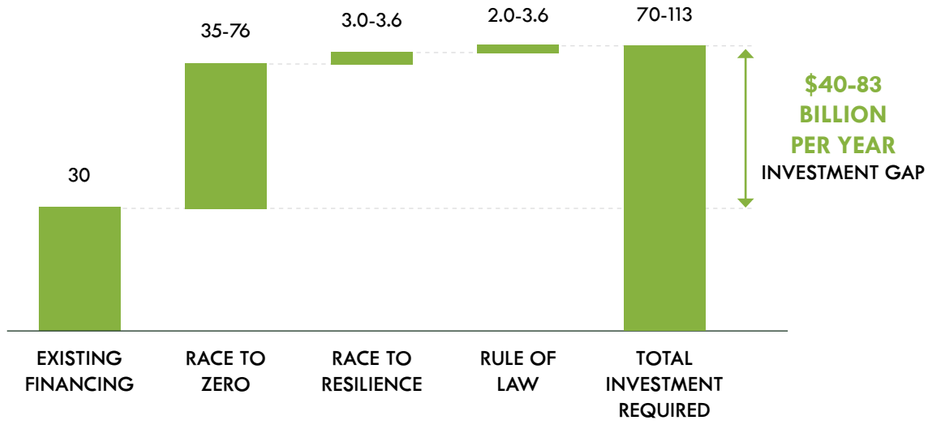


Figure 31: Foreign direct investment in Brazil

Our estimates suggest that Brazil would need to attract an additional $40 billion to $83 billion per year by 2030 (see Figure 32) in order to meet its investment requirements for Race to Zero, Race to Resilience and Rule of Law programmes. This is admittedly a large figure; but it is also an achievable investment flow for a national economy that by 2030 should be worth at least $2.5 trillion, with thriving, high-productivity clean energy, sustainable agriculture, metals and bioeconomy sectors – especially if the growth model also promotes greater social inclusion. By 2030, the international markets for all these products and services will be two to three times bigger than they are today. The voluntary carbon market, assuming a conservative carbon price of around $50 per tonne, should be worth at least $50 billion per year; and large-scale flows of climate transition or blended finance globally should be worth between $1 trillion and $2 trillion per year. If Brazil were to attract its fair share of these finance flows by positioning itself as a leading net-zero, nature-positive economy, capital availability would be no constraint.

BRIDGING AN INVESTMENT GAP OF $40 TO 83 BILLION PER YEAR WILL ENABLE A JUST TRANSITION BY 2030

Estimated Brazil climate financing and investment gap until 2030
($ billion per year)



A possible blended finance fund structure for the investment gap could require a public financing contribution of around $13–27 billion (33%) and $27–56 billion (67%) from private and social sources

Figure 32: Investment gap required for Brazil´s net-zero transition

Source: Estimates based on Climate Policy Initiative report

- **The voluntary carbon market presents a significant opportunity for Brazil.** The global voluntary carbon market has seen rapid growth in volumes and prices, surging 190% from 2020 to 2021 alone. With a value exceeding $1 billion in 2021,[56] it is estimated that the voluntary carbon market could reach $50 billion by the end of the decade, driven primarily by an increase in corporate net-zero commitments and offsets. For projects based on natural climate solutions, a carbon price of $100/t$CO_2$e (see Figure 33)[57,58,59] makes an irrefutable case for the value of the standing forest, regenerative agriculture and restoration. The issue of carbon credits can be a useful mechanism to finance the high upfront costs of the net-zero transition (eg, for livestock producers). This would facilitate the development of a thriving agribusiness sector, which is so important to the country, with a standing forest supplying ecosystem services for people and the economy. Currently, most mechanisms focus on areas at risk of deforestation in the forest frontier; but high-integrity forests – which Brazil has in abundance (it has the fifth-largest repository of intact forest in the world)[60] – should not be overlooked. The voluntary carbon market could provide the much-needed financial incentives to protect this natural capital and help corporates to meet their net-zero goals through offsetting, as well as deep decarbonization.

CARBON PRICE PROJECTIONS, 2013-30

USD per tCO_2e

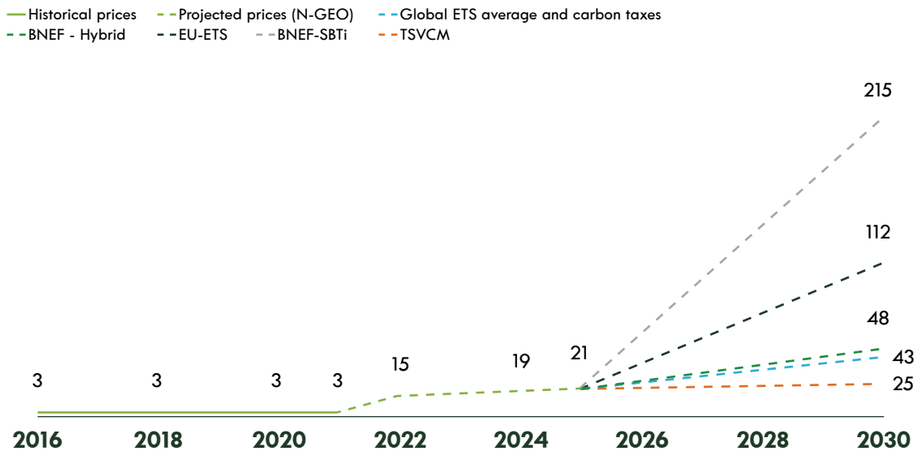


Figure 33: Global carbon price projections, 2013–2030

- **Blended finance can attract more funding for climate action by mitigating investment risks.** This vehicle will be essential to bridge the estimated investment gap for financing required for the transition (see Figure 31). Blended finance is the strategic use of concessional (below market rate) capital, provided by public or philanthropic investors, to mobilize private sector investment towards sustainable development. It allows organizations with different purposes to invest alongside each other while achieving their own objectives (eg, financial return, social impact or both). Blended finance addresses several barriers for private investors, including high perceived or real risk and low returns for risk relative to comparable investments. The participation of public or philanthropic investors improves the risk/return profile of the transaction, thus catalysing investment from the private sector. New ways of measuring impact – especially around climate and nature – are emerging, making it possible to attract blended finance at real scale (ie, in the billions) for high-quality projects and jurisdictional programmes.

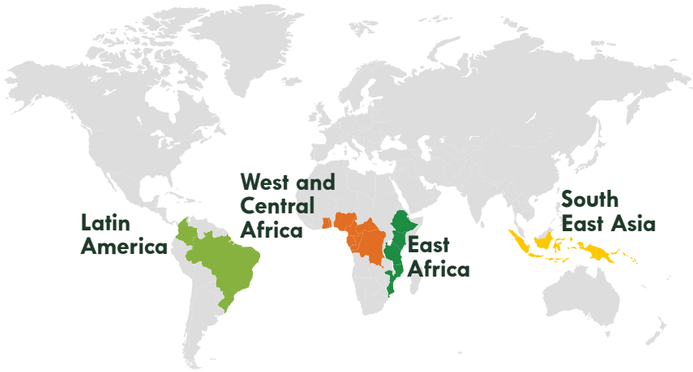
THE ROLE OF BLENDED FINANCE IN DE-RISKING INVESTMENTS IN THE AMAZON

P4F (www.partnershipsforforests.com) is the world's biggest incubator of forest projects and can support the scale-up needed in the Amazon. P4F is funded by the UK Foreign Commonwealth and Development Office and is managed by Systemiq and Palladium. Over the past six years, P4F has successfully mobilized more than £445 million in private financing, with an investment of £119 million from the UK government, towards businesses that promote forest protection and sustainable land use. The programme has directly benefited nearly 189,000 families across 2.9 million hectares around the globe through the design and implementation of more than 100 projects thanks to deep engagement from local communities, direct project partners and main beneficiaries (see Figure 34).

In Latin America, P4F is contributing to the sustainable management of over 2.5 million hectares and it is expected that the regional programme's initial targets will be significantly exceeded. The programme has already concluded 13 investments thus far and an additional 22 projects are ongoing in its regional portfolio. P4F's investment strategy for the region is centred on four archetypes: non-timber forest products; restoration; semi-intensification of cattle ranching (ie, better utilization of existing land) and soy expansion on degraded land; and native forest management for timber production in Peru and Colombia.

Scaling the P4F programme through a potential future next phase with public investment of £100 million complemented by £233 million in private financing, can drive impact across nearly 13 million hectares in the region over the next five years.

P4F – FOCUS REGIONS



P4F supports partnerships in four globally important forest regions: East Africa, West and Central Africa, South East Asia and Latin America — regions where there are significant opportunities for investments in sustainable forests and land use.

P4F IMPACT

2.9m
hectares
in tropical forest landscapes brought under improved sustainable land use management

£445m
investment
from the private sector channelled into tropical forest landscapes

189,000
people
supported through forest-friendly businesses

-65m
tonnes
of CO_2e equivalent in emissions reductions projected by 2023

Figure 34: P4F overview and key indicators

PATHWAY XI: GLOBAL COLLABORATION

A coalition of leading companies and financial institutions has come together to support this shift in economic strategy – one which will benefit not only Brazil's people and prosperity, but also the planet. We call this coalition the AYA platform (see Figure 35) and hope to open it up to the world – especially other countries in the Global South, a region which should become a more dynamic player in the economic transformation. The Global South should position itself as a system and rule shaper, rather than simply responding to existing power and market structures.

This coalition is seeking to drive more effective transformation programmes in the key systems of food/land use, energy, clean industry and blended finance; launch a set of specific projects aimed at winning the Race to Zero and to Resilience – in particular, around human capital development and establishing the necessary enabling infrastructure; and coordinating with other international efforts – especially in the Global South – in order to accelerate effective, equitable change at the scale required to meet the global transition challenge.

WHAT IS UNIQUE ABOUT AYA?

Global and based in South

88% of the world's population lives in the Global South, accounting for two-thirds of global emissions

Action-orientated

Sector and country-specific pathways for achieving net zero

Solutions hub

In-person and digital access to curated and prioritized, a local and global set of service providers, including financing

People and nature positive

Accounting for people-based solutions and impacts

Physical space

Headquartered in São Paulo in a green space dedicated to the net-zero transition; learning journeys spanning the Amazon to innovation showcase

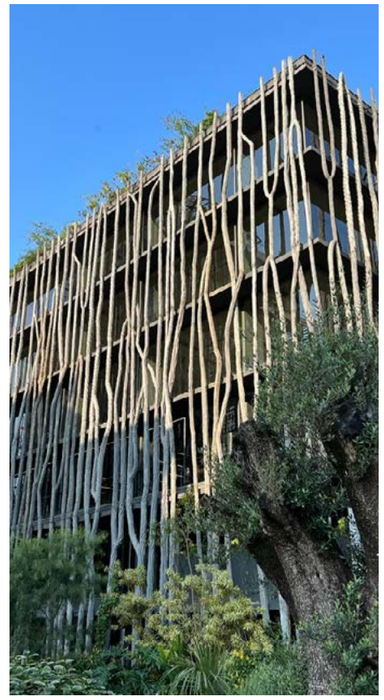


Figure 35: AYA platform

4

CALL TO ACTION

LAUNCHING COALITIONS POWERED BY NATURE AND THE GLOBAL SOUTH

Global coalitions – such as the ETC, the MPP, FOLU and the Blended Finance Taskforce (see Figure 36) – have a unique and vital role to play in the transition, not least in view of the significant coordination across sectors needed to combat climate change.

Climate change is ubiquitous, indiscriminately affecting countries, sectors and industries; and as such, enhanced collective action that transcends national boundaries – especially in the face of deglobalization – is urgently needed to mitigate the threat to the health and wellbeing of the planet and humanity. While Brazil is a vital participant in the Race to Zero and to Resilience, it has limited representation in the world's global coalitions, which are almost exclusively located in the Global North. AYA will build a bridge from these global coalitions to Brazil, engaging local actors and securing buy-in on the ground. Local engagement should strengthen North-South collaboration through shared practices and knowledge; and should further help to improve Brazil's climate governance and allow it to play a more active role in climate-related discussions and standard setting (eg, on finance mechanisms that would incentivize the protection of high-integrity forests). Finally, bringing a local perspective and analysis of the local context should help guide decision making for optimal solutions (eg, technology investments to support the decarbonization of specific sectors).

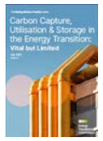
GLOBAL COALITIONS TO CATALYSE THE RACE TO ZERO AND TO RESILIENCE

The Food and Land Use Coalition

Creating actionable pathways for business, investment and policy stakeholders to drive sustainable food and land use systems.

MISSION POSSIBLE PARTNERSHIP

Supercharging efforts to decarbonise the seven hardest to abate industries: aviation, shipping, trucking, steel, aluminium, cement and chemicals.



ENERGY TRANSITIONS COMMISSION

Shaping the energy transition agenda with leading industries, investors and climate advocates who are committed to the Paris Agreement.

BLENDED FINANCE TASKFORCE

Tackling systemic barriers to mobilise large-scale climate finance for sustainable infrastructure and nature-based solutions in emerging markets.

Figure 36: Key global coalitions in the Race to Zero and to Resilience

The pivot to become a green growth engine offers Brazil an unprecedented opportunity to escape the middle-income trap and leverage the true potential of its standing forest.

We must urgently establish the foundations of a fairer, more productive society; capitalize on major shifts emerging in international markets; and contribute to addressing the existential challenges of climate change and biodiversity loss.

There is simply no time to lose

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Design by JDJ Creative.
Printed on FSC paper.

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