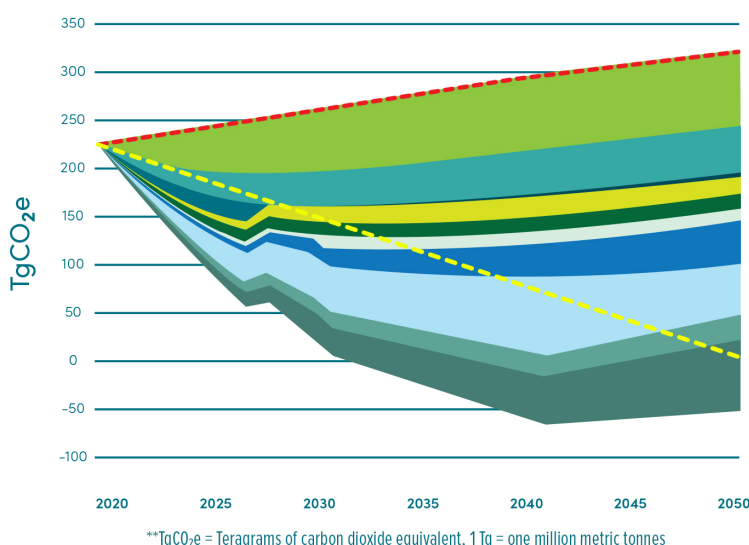# Portfolio of actions : Climate Pathway Project

The Government of Mato Grosso, Brazil has completed a 2.5 year process to develop its decarbonisation pathway.
The pathway was based on Mato Grosso's net zero by **2050 target***.
(*By the time of publication, with evidence from this project, the state government has increased the ambition of their goal to net zero emissions by 2035.)
As part of the process, the government prioritised the 12 mitigation actions shown below.

Projected GHG emission reductions from prioritised actions in Mato Grosso

$TgCO_2e$ (y-axis), years 2020–2050 (x-axis)

**TgCO_2e = Teragrams of carbon dioxide equivalent, 1 Tg = one million metric tonnes
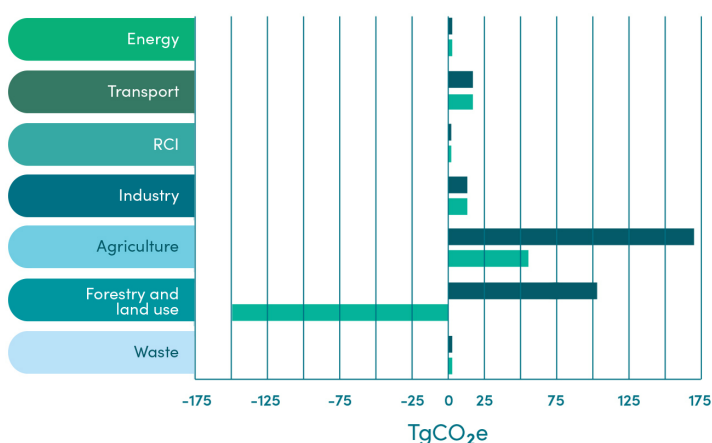
PRIORITY ACTIONS

- Maintenance of the state's forest assets, with socio-economic incentives for conservation
- Sustainable forest management
- Land tenure regularisation and consolidation of legal rights to the land
- Creation and expansion of boundaries and improved management of Protected Areas under the state's influence
- Commercial reforestations
- Restoration of the forest landscape
- Reduction of the risk of forest fires
- Increase the productivity of farming activities in already cleared areas by applying good agricultural management practices
- Protection of secondary vegetation in areas subject to legal deforestation
- Recovery of degraded pastures
- Crop-Livestock-Forestry Integration

- - - Baseline / BAU
- - - Decarbonisation targets
★ 2050 target = 0 $TgCO_2e$

As shown by the graph, the priority actions would amount to a **118% reduction** in BAU emissions by 2050.

SECTORAL BREAKDOWN
REMAINING DIRECT EMISSIONS IN 2050 AFTER IMPLEMENTATION OF PRIORITY ACTIONS

Baseline / BAU
Decarbonisation pathway

Sectors: Energy, Transport, RCI, Industry, Agriculture, Forestry and land use, Waste

$TgCO_2e$ (x-axis: -175, -125, -75, -25, 0, 25, 75, 125, 175)

Expected impact of priority actions on GHG emissions

The implementation of these actions would add up to approximately **236 million** tonnes of avoided emissions by **2030**

And more than **373 million** tonnes of avoided emissions by **2050**

AFOLU–1: MAINTENANCE OF STATE FOREST ASSETS, WITH SOCIOECONOMIC INCENTIVES FOR CONSERVATION

DESCRIPTION: This action aims to "implement complementary measures to comply with the Forest Code and provide economic incentives for the conservation of standing forests, benefiting the providers of environmental services that these provide". As a result of this action, it is expected that carbon stocks in forest remnants on legally allocated land in the state, are maintained through the conservation of these areas, thus reducing the advance of deforestation in areas under pressure from land use.

LEVEL OF EFFORT AND TIMING OF IMPLEMENTATION:

· By 2030, avoid the deforestation of 796.024 ha in the Amazon biome, 376.485 ha in Cerrado and 30.670 ha in Pantanal;

· By 2050, avoid the deforestation of an additional 2.765.086 ha in the Amazon biome, 1.261.550 ha in Cerrado, and 102.772 ha in Pantanal.
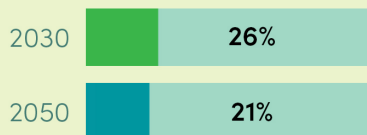
Impact on GHG emissions reduction

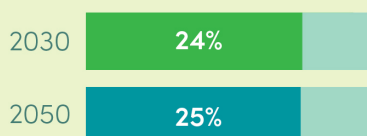Cumulative GHG emission reductions: (2020-2050)

1,898 TgCO$_2$e

AFOLU-1: <u>Very high mitigation potential</u> of **60%** of emissions in the AFOLU sector (agriculture, forestry, and other land uses).

CONTRIBUTION TO TOTAL REDUCTIONS (%)

2030	26%
2050	21%

REDUCTION FROM BAU (%)

2030	24%
2050	25%

Macroeconomic impacts

POSITIVE   NULL   NEGATIVE

LOWER NET COSTS	CHANGE IN ENERGY AND RESOURCE CONSUMPTION	CHANGE IN ENERGY AND MATERIALS SOURCING	CHANGE IN LOCAL SUPPLY CHAINS	JOB CREATION	CHANGE IN SOURCES OF INVESTMENT AND INCOME
−	+	+	+	+	+

AFOLU–1: Maintenance of state forest assets, with socioeconomic incentives for conservation

Co-benefits

HABITAT AND BIODIVERSITY PROTECTION	REGULATION OF THE WATER CYCLE	PROMOTION OF COMMUNITY ORGANISATION	SOIL RESTORATION	PROTECTED SOURCE OF DIFFERENT RAW MATERIALS

Costs and savings

Low direct costs to the state compared to typical levels of spending in the forestry, fisheries and aquaculture sectors. This estimate is based on a cost-effectiveness value for the Cerrado. A value specific to Brazilian tropical forests could be lower than that indicated for the Cerrado due to the likely higher levels of annual CO2 removals for tropical forests.

LOW COSTS   SMALL SAVINGS
MODERATE COSTS   MODERATE SAVINGS
HIGH COSTS   LARGE SAVINGS

AFOLU-2: SUSTAINABLE FOREST MANAGEMENT

DESCRIPTION: The main objective of this action is to promote the multiple use of Sustainable Forest Management (SFM), including industrial and community use. The exploitation of timber and non-timber forest products put pressure in areas of forest conversion, as a strategy SFM intends to maintain and enhance the standing Amazonian forest. It is expected that, through this action, a chain for the commercialization of forest products is encouraged, ensuring their valorisation as an alternative for economic viability against other uses that promote degradation and/or conversion of forest cover. Finally, the action seeks to stimulate the production of native timber within the precepts of legality and support the strengthening and regulation of extractivism in the state, seen as one of the main activities that attribute economic and social value to the standing forest.

LEVEL OF EFFORT AND TIMING OF IMPLEMENTATION:

· Expand the area under sustainable forest management, reaching 6 million hectares by 2030.

· By the year 2050, increase another 2.3 million hectares of areas under SFM.
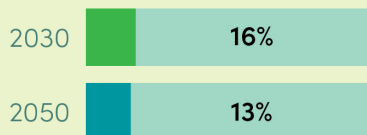
Impact on GHG emissions reduction

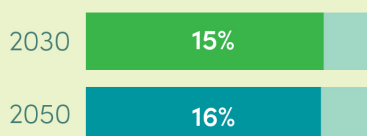Cumulative GHG emission reductions:
(2020-2050)

1,195 TgCO$_2$e

AFOLU-2: High mitigation potential of **38%** of emissions in the AFOLU sector (agriculture, forestry, and other land uses).

CONTRIBUTION TO TOTAL REDUCTIONS (%)

Year	%
2030	16%
2050	13%

REDUCTION FROM BAU (%)

Year	%
2030	15%
2050	16%

Macroeconomic impacts

POSITIVE | NULL | NEGATIVE

LOWER NET COSTS	CHANGE IN ENERGY AND RESOURCE CONSUMPTION	CHANGE IN ENERGY AND MATERIALS SOURCING	CHANGE IN LOCAL SUPPLY CHAINS	JOB CREATION	CHANGE IN SOURCES OF INVESTMENT AND INCOME
+	−	+	+	+	+

AFOLU-2: Sustainable forest management

Co-benefits

HABITAT AND BIODIVERSITY PROTECTION | REGULATION OF THE WATER CYCLE | EMPLOYMENT AND LOCAL ECONOMY | HEALTH (reduction of air pollution) | DECREASE IN RURAL EXODUS

Costs and savings

Small direct savings for the state compared to typical spending levels in the forestry, fisheries and aquaculture sectors. This estimate does not include an accounting for opportunity costs (i.e., annual revenue to the landowner under BAU conditions) and any other costs for the rest of society (e.g., government support costs).

LOW COSTS | SMALL SAVINGS
MODERATE COSTS | MODERATE SAVINGS
HIGH COSTS | LARGE SAVINGS

AFOLU–3: LAND TENURE REGULARISATION AND CONSOLIDATION OF LEGAL RIGHTS TO THE LAND

DESCRIPTION: The main objective of this action is to promote land tenure regularization and consolidation of legal rights of public lands and agrarian reform settlements, as well as the improvement of land management in the State of Mato Grosso. This action focuses on public, state and federal settlements and land, as well as the recognition of indigenous lands and quilombola territories and land of traditional communities. Thus, it is expected to contribute to the reduction of illegal deforestation and conflicts over land tenure, as well as strengthen family farming in the municipalities of Mato Grosso state. As a concomitant activity, a rural environmental registry (CAR), analysis and validation should be encouraged to ensure that there are no overlapping lands and to guarantee the environmental regularization of plots.

LEVEL OF EFFORT AND TIMING OF IMPLEMENTATION:
· By 2030, to regularize land ownership of 200.053 ha/year share of rural settlements in the Amazon, 147.800 ha/year share of rural settlements in the Cerrado, and 25.379 ha/year share of rural settlements in Pantanal; in addition to promoting the registration, analysis and validation of the rural environmental registry (CAR) of these shares in order to make their environmental regularisation effective.

Impact on GHG emissions reduction

Cumulative GHG emission reductions:
(2020-2050)

83 TgCO$_2$e

AFOLU-3: Low mitigation potential of **2,7%** of emissions in the AFOLU sector (Agriculture, forestry, and other land uses).

CONTRIBUTION TO TOTAL REDUCTIONS (%)

Year	%
2030	0%
2050	0%

REDUCTION FROM BAU (%)

Year	%
2030	0%
2050	0%

Macroeconomic impacts

POSITIVE · NULL · NEGATIVE

LOWER NET COSTS	CHANGE IN ENERGY AND RESOURCE CONSUMPTION	CHANGE IN ENERGY AND MATERIALS SOURCING	CHANGE IN LOCAL SUPPLY CHAINS	JOB CREATION	CHANGE IN SOURCES OF INVESTMENT AND INCOME
−	+	+	+	+	+

AFOLU-3: Land tenure regularisation and consolidation of legal rights to the land

Co-benefits

CONSERVATION OF NATURAL RESOURCES	REDUCTION OF ILLEGAL DEFORESTATION	REDUCTION OF LAND GRABBING	REDUCTION OF CONFLICTS OVER LAND TENURE	REDUCTION OF SOCIAL INEQUALITIES

Costs and savings

Moderate direct costs to the state compared to typical levels of spending in the forestry, fisheries and aquaculture sectors. The net costs of implementing this action will depend on the level of incentives and their use.

LOW COSTS · SMALL SAVINGS · MODERATE COSTS · MODERATE SAVINGS · HIGH COSTS · LARGE SAVINGS

AFOLU-4: CREATION AND EXPANSION OF BOUNDARIES AND IMPROVED MANAGEMENT OF PROTECTED AREAS UNDER THE STATE'S INFLUENCE

DESCRIPTION: The main objective of this action is to expand and maintain conservation units and indigenous lands in the state, in addition to supporting the fight against illegal deforestation in legally protected areas. At the same time, environmental regularization through the CAR (registration and validation) will be implemented as an instrument to control and combat deforestation of rural properties in the state. It is expected that enforcement, monitoring and accountability actions will be improved to effectively protect natural resources and prevent environmental crimes. With regard to the creation and expansion of protected areas, it is expected to encourage policies for the allocation of areas for the conservation and recognition of the territorial rights of indigenous peoples, quilombolas and traditional communities, seeking to ensure the maintenance of large extensions of preserved natural environments that provide ecological benefits and biological and sociocultural diversity in the state.

LEVEL OF EFFORT AND TIMING OF IMPLEMENTATION:

· Establish 560,000 ha of new protected areas in the state by 2030;

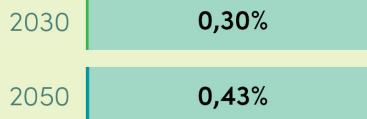· Establish 700,000 additional ha of new protected areas by 2050.

Impact on GHG emissions reduction

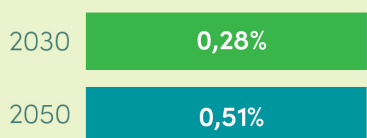Cumulative GHG emission reductions:
(2020-2050)

27 TgCO$_2$e

AFOLU-4: <u>Low mitigation potential</u> of **0,9%** of emissions in the AFOLU sector (agriculture, forestry, and other land uses).

CONTRIBUTION TO TOTAL REDUCTIONS (%)

2030	0,30%
2050	0,43%

REDUCTION FROM BAU (%)

2030	0,28%
2050	0,51%

Macroeconomic impacts

POSITIVE   NULL   NEGATIVE

LOWER NET COSTS	CHANGE IN ENERGY AND RESOURCE CONSUMPTION	CHANGE IN ENERGY AND MATERIALS SOURCING	CHANGE IN LOCAL SUPPLY CHAINS	JOB CREATION	CHANGE IN SOURCES OF INVESTMENT AND INCOME
−	+	+	+	+	+

AFOLU-4: Creation and expansion of boundaries and improved management of Protected Areas under the state's influence

Co-benefits

CONSERVATION OF NATURAL RESOURCES

REDUCTION OF ILLEGAL DEFORESTATION

REDUCTION OF LAND GRABBING

IMPROVED QUALITY OF LIFE OF INDIGENOUS PEOPLES

REDUCTION OF SOCIAL INEQUALITIES

Costs and savings

Low direct costs to the state compared to typical levels of spending in the forestry, fisheries and aquaculture sectors. The estimate was derived from an average cost of land protection.

LOW COSTS   SMALL SAVINGS

MODERATE COSTS   MODERATE SAVINGS

HIGH COSTS   LARGE SAVINGS

AFOLU-5: COMMERCIAL REFORESTATIONS

DESCRIPTION: The main objective of this action is to promote the expansion of commercial reforestation for multiple uses in areas already degraded. It is expected that, through this action, reforestation programs for economic use are encouraged, generating greater knowledge about the silvicultural behaviour of native species to stimulate new reforestation initiatives and strengthen the forestry-based industry in Mato Grosso. Diversifying the economic matrix of the state reduces the pressure on native forest remnants for timber forest production of products from renewable sources such as pulp, paper, wood, laminated flooring, charcoal, biomass and its other by-products.

LEVEL OF EFFORT AND TIMING OF IMPLEMENTATION:

· To expand the area of planted forests in already open areas to 400.000 hectares with exotic species (eucalyptus and teak) and to 50.000 hectares with native species, until 2030.

· To expand the area of planted forests in areas already open to 400.000 additional hectares with exotic species (eucalyptus and teak) and to 150.000 hectares with native species by 2050.
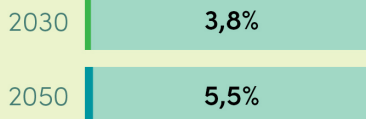
Impact on GHG emissions reduction
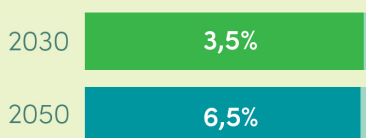
Cumulative GHG emission reductions:
(2020-2050)

344 TgCO$_2$e

AFOLU-5: Moderate mitigation potential of **11%** of emissions in the AFOLU sector (agriculture, forestry, and other land uses).

CONTRIBUTION TO TOTAL REDUCTIONS (%)

2030	**3,8%**
2050	**5,5%**

REDUCTION FROM BAU (%)

2030	**3,5%**
2050	**6,5%**

Macroeconomic impacts

POSITIVE   NULL   NEGATIVE

| LOWER NET COSTS	CHANGE IN ENERGY AND RESOURCE CONSUMPTION	CHANGE IN ENERGY AND MATERIALS SOURCING	CHANGE IN LOCAL SUPPLY CHAINS	JOB CREATION	CHANGE IN SOURCES OF INVESTMENT AND INCOME
+	−	+	+	+	+

AFOLU-5: Commercial reforestations

Co-benefits

CREATION OF ECOLOGICAL CORRIDORS	ENABLE POLLINATION	DECREASE IN RURAL EXODUS	SOIL RESTORATION	INCREASED EMPLOYMENT AND LOCAL ECONOMIC BENEFITS

Costs and savings

Large direct savings for the state compared to typical level of spending in the forestry, fisheries and aquaculture sectors. Net costs of implementing this action will depend on the specific costs and revenues for establishing plantations and the opportunity costs for other land uses not converted to forests (i.e. BAU revenue produced from the land targeted by this action).
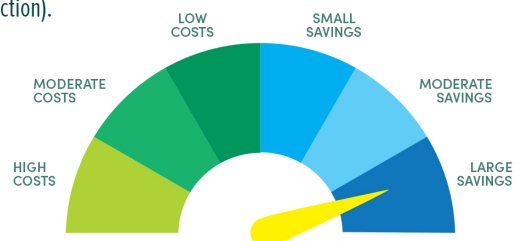
AFOLU-6: FOREST LANDSCAPE RESTORATION

DESCRIPTION: The aim of this action is to promote the restoration of the Legal Reserve (LR) and Areas of Permanent Preservation (PPA) and other degraded areas suitable for restoration of the forest landscape in the state, in rural properties and agrarian reform settlements. As a result of the action, the gradual and continuous removal of atmospheric carbon captured in the living biomass of areas undergoing restoration of native vegetation is expected. The restoration activities contemplated in this action include establishing and / or favouring the recovery of native vegetation in areas currently degraded and of low agricultural suitability. The goal is to restore natural and functional landscapes that can provide a series of environmental services, such as the removal of atmospheric carbon, water regulation, soil conservation and better maintenance of habitats for biodiversity. Additionally, this will encourage other benefits to the area such as a regulation of local microclimate and scenic beauty, and socio-economic benefits through the expansion of recreational areas and environmental education.

LEVEL OF EFFORT AND TIMING OF IMPLEMENTATION:

· By 2030, a total of 1.2 million hectares of recomposing areas will have been recovered in the state, including 720.000 hectares of forest formations and 480.000 hectares of savannah formations converted from (degraded) pastureland, or other temporary crops.

· By 2050 a total of 2.4 M hectares of recomposing areas will have been recovered in the state, including 1.5 M hectares of forest and 900.000 hectares in the Cerrado converted from (degraded) pastureland, or other temporary crops.
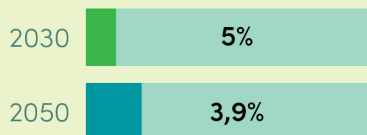
Impact on GHG emissions reduction
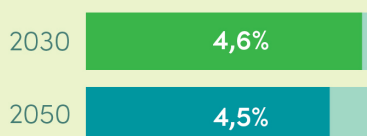
Cumulative GHG emission reductions:
(2020-2050)

388 TgCO$_2$e

AFOLU-6: Moderate mitigation potential of **12%** of emissions in the AFOLU sector (agriculture, forestry, and other land uses).

CONTRIBUTION TO TOTAL REDUCTIONS (%)

2030	5%
2050	3,9%

REDUCTION FROM BAU (%)

2030	4,6%
2050	4,5%

Macroeconomic impacts

POSITIVE   NULL   NEGATIVE

LOWER NET COSTS	CHANGE IN ENERGY AND RESOURCE CONSUMPTION	CHANGE IN ENERGY AND MATERIALS SOURCING	CHANGE IN LOCAL SUPPLY CHAINS	JOB CREATION	CHANGE IN SOURCES OF INVESTMENT AND INCOME
−	−	+	+	+	+

AFOLU-1: Maintenance of state forest assets, with socioeconomic incentives for conservation

Co-benefits

INCREASED HABITAT AND BIODIVERSITY	TOURISM PROMOTION	COMMUNITY BUILDING	INCREASE IN ENVIRONMENTAL SERVICES	RECOVERY OF LANDSCAPE VALUE

Costs and savings

Moderate direct costs to the state compared to typical levels of spending in the forestry, fisheries and aquaculture sectors. This estimate does not include the opportunity cost to the landowner (i.e. profit / ha under BAU conditions), as well as any profit the landowner would receive under the action scenario (e.g. possibly zero if the land is maintained in a conservation state or some current or future profit based on the harvest of forest products).

LOW COSTS   SMALL SAVINGS   MODERATE COSTS   MODERATE SAVINGS   HIGH COSTS   LARGE SAVINGS

AFOLU-7: REDUCTION OF THE RISK OF FOREST FIRES

DESCRIPTION: The main objective of this action is to reduce the occurrence of forest fires in the state of Mato Grosso through the effective implementation of the Action Plan for the Prevention and Control of Deforestation and Forest Fires in the state (PPCDIF/MT). This will strengthen efficient management of environmental resources and planning of actions to prevent and combat forest fires supported by enforcement and accountability for crimes related to illegal burning. The consequences of fires are enormous, ranging from impacts on biodiversity and environmental balance to economic losses. One of the greatest impacts occurs in the health of the local population with the increased frequency of respiratory diseases, especially in the current scenario of facing the Covid-19 pandemic. It is expected that, with this action, the occurrence and/or severity of areas affected by fires in MT and the damage caused by fire as described above are reduced.

LEVEL OF EFFORT AND TIMING OF IMPLEMENTATION:

· By 2030, the state's goal is to reduce 30% of hotspots resulting from forest fires compared to the amount observed in the reference period from 2010 to 2019.

· By 2050, the state's goal is to reduce 80% of hotspots resulting from forest fires compared to the amount observed in the reference period from 2010 to 2019.

Impact on GHG emissions reduction

Cumulative GHG emission reductions:
(2020-2050)

293 TgCO$_2$e

AFOLU-7: Low mitigation potential of **9,3%** of emissions in the AFOLU sector (agriculture, forestry, and other land uses).

CONTRIBUTION TO TOTAL REDUCTIONS (%)

Year	%
2030	2%
2050	3,3%

REDUCTION FROM BAU (%)

Year	%
2030	1,9%
2050	3,9%

Macroeconomic impacts

POSITIVE · NULL · NEGATIVE

LOWER NET COSTS	CHANGE IN ENERGY AND RESOURCE CONSUMPTION	CHANGE IN ENERGY AND MATERIALS SOURCING	CHANGE IN LOCAL SUPPLY CHAINS	JOB CREATION	CHANGE IN SOURCES OF INVESTMENT AND INCOME
−	+	+	+	+	+

AFOLU-7: Reduction of the risk of forest fires

Co-benefits

REDUCTION OF ECONOMIC LOSSES	RECOVERY OF LANDSCAPE VALUE	HEALTH (reduction of air pollution)	PROTECTED SOURCE OF DIFFERENT RAW MATERIALS	PROTECTION OF ENVIRONMENTAL SERVICES

Costs and savings

Low direct costs to the state compared to typical spending levels in the forestry, fisheries and aquaculture sectors. This estimate does not include potential savings from avoided economic losses due to fire.
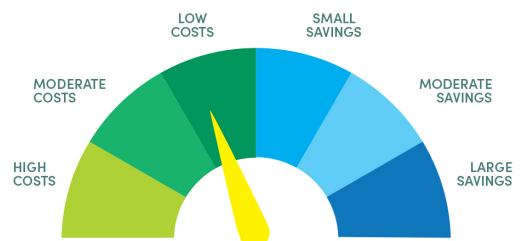
LOW COSTS · SMALL SAVINGS · MODERATE COSTS · MODERATE SAVINGS · HIGH COSTS · LARGE SAVINGS

AFOLU–8: INCREASE PRODUCTIVITY OF FARMING ACTIVITIES IN OPEN AREAS BY APPLYING BEST AGRICULTURAL PRACTICES

DESCRIPTION: This action aims to promote efforts to increase productivity and efficiency of agricultural systems, through the adoption of best agricultural practices (BAP). By reducing the expansion of agricultural production into forested areas, this action will reduce deforestation and associated emissions. Best agricultural practices can also increase soil carbon levels, reduce the commercial use of fertilizers, and potentially reduce the energy requirements for growing crops. One of the key practices to be encouraged is the adoption of no-till farming on farms with annual crops. This action includes efforts to reduce soil erosion and promote the accumulation of organic matter in soils, by keeping the residues of crops already harvested over the cultivated area.

LEVEL OF EFFORT AND TIMING OF IMPLEMENTATION:
· By 2030, implement no-till methods on 5 million hectares of annual cropland above BAU levels; implement biological nitrogen fixation (BNF) in 50% of maize, sugarcane and soybean production.
· By 2050, implement no-till methods on 10 million hectares of annual cropland above BAU levels; implement biological nitrogen fixation (BNF) in 100% of maize, sugarcane and soybean production.
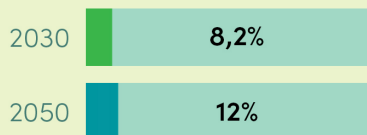
Impact on GHG emissions reduction

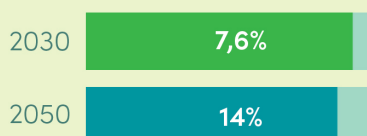Cumulative GHG emission reductions:
(2020-2050)

776 TgCO$_2$e

AFOLU-8: Moderate mitigation potential of **19%** of emissions in the AFOLU sector (agriculture, forestry, and other land uses).

CONTRIBUTION TO TOTAL REDUCTIONS (%)

2030	8,2%
2050	12%

REDUCTION FROM BAU (%)

2030	7,6%
2050	14%

Macroeconomic impacts

POSITIVE · NULL · NEGATIVE

LOWER NET COSTS	CHANGE IN ENERGY AND RESOURCE CONSUMPTION	CHANGE IN ENERGY AND MATERIALS SOURCING	CHANGE IN LOCAL SUPPLY CHAINS	JOB CREATION	CHANGE IN SOURCES OF INVESTMENT AND INCOME
+	+	+	+	+	+

AFOLU–8: Increase productivity of farming activities in open areas by applying best agricultural practices (BAP)

Co-benefits

INCREASED FARM INCOME	REGULATION OF WATER CYCLE	REDUCED DEFORESTATION	SOIL RESTORATION	MORE SUSTAINABLE FOOD PRODUCTION

Costs and savings

Large direct savings for the state compared to typical levels of spending in the agriculture and livestock sector (i.e. spending on materials and labour in agriculture and livestock). The agricultural management practices in this action require an initial investment to be implemented, but these costs should be offset by the savings in labour for cultivation, inputs such as fertilizer, and revenue from increased productivity.

LOW COSTS · SMALL SAVINGS · MODERATE COSTS · MODERATE SAVINGS · HIGH COSTS · LARGE SAVINGS
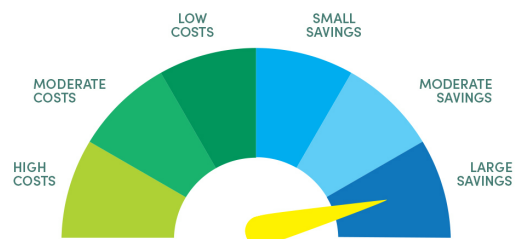
AFOLU-9: PROTECTION OF SECONDARY VEGETATION IN AREAS SUBJECT TO LEGAL DEFORESTATION

DESCRIPTION: The objective of this action is to maintain and allow the natural regeneration of secondary forests in abandoned, previously deforested areas, and implement mechanisms to avoid their cyclical suppression. They play an important role in carbon removal and are in vulnerable conditions due to the high rates of deforestation and fires in these forests. It is expected that the maintenance of these areas in regeneration become an important and low-cost tool to contribute as natural sinks and scale up forest restoration, which has been so widespread in recent years.

LEVEL OF EFFORT AND TIMING OF IMPLEMENTATION:

· Enable the recovery of 3 million ha of secondary forests in the process of natural regeneration since 2011, by the year 2030.

· Enable the recovery of an additional 3 million ha of secondary forests between 2031 and 2050.
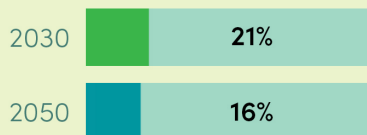
Impact on GHG emissions reduction

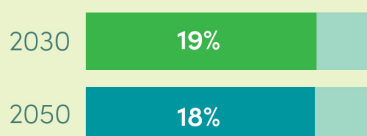Cumulative GHG emission reductions:
(2020-2050)

1,576 TgCO$_2$e

AFOLU-9: Very high mitigation potential of **50%** of emissions in the AFOLU sector (Agriculture, forestry, and other land uses).

CONTRIBUTION TO TOTAL REDUCTIONS (%)

2030	21%
2050	16%

REDUCTION FROM BAU (%)

2030	19%
2050	18%

Macroeconomic impacts

POSITIVE　NULL　NEGATIVE

LOWER NET COSTS	CHANGE IN ENERGY AND RESOURCE CONSUMPTION	CHANGE IN ENERGY AND MATERIALS SOURCING	CHANGE IN LOCAL SUPPLY CHAINS	JOB CREATION	CHANGE IN SOURCES OF INVESTMENT AND INCOME
−	+	+	+	+	+

AFOLU-9: Protection of secondary vegetation in areas subject to legal deforestation

Co-benefits

INCREASED HABITAT AND BIODIVERSITY	REGULATION OF THE WATER CYCLE	COMMUNITY BUILDING	SOIL RESTORATION	PROTECTED SOURCE OF DIFFERENT RAW MATERIALS

Costs and savings

Low direct costs to the state compared to typical level of spending in the forestry, fisheries and aquaculture sectors. This estimate is based on the average cost of land protection.

LOW COSTS · SMALL SAVINGS · MODERATE COSTS · MODERATE SAVINGS · HIGH COSTS · LARGE SAVINGS

AFOLU-10: REHABILITATION OF DEGRADED PASTURES

DESCRIPTION: This action aims to promote the recovery of degraded pasture areas with low productivity for intensified and sustainable production systems to increase carbon removal and productivity, avoiding the opening of new areas. As a result of this action, due to the gradual and continuous removal of atmospheric carbon captured in the biomass from forage plants which are in the process of recovery, a reform of pastures is expected, all of which is aided through carbon remaining in the ground and a reduction of deforestation.

Pasture degradation results from various factors; the evolutionary process of loss of vigour, productivity, natural recovery capacity of pastures to sustain the levels of production and quality required by the animals. Furthermore, the need to overcome the harmful effects of pests, prolonged droughts, diseases and invasive plants, culminating with the advanced degradation of natural resources due to inadequate management.

The activities contemplated in this action are aimed at the recovery, renewal or reform of pastures with low biomass production and stocking rate, which will greatly depend on the degree of degradation they are at. The purpose is to apply technology to restore the productive capacity of the systems so that they are able to produce the same amount of meat with a smaller number of cattle, freeing up the area for the production of other crops and/or reforest native vegetation, in addition to providing carbon removal through the soil by improving the quality of the pasture. Furthermore, the socio-economic benefits generated by the intensification of livestock farming through the production of more meat per hectare, combined with a reduction in the time it takes to slaughter the animals, improves the economic condition of the state's livestock farmers.

Ultimately, it is expected that with the increase in productivity and profitability of livestock activities in areas that are already open, there will be a reduction in the need for new deforestation to expand the productive capacity of these systems.

LEVEL OF EFFORT AND TIMING OF IMPLEMENTATION:

· By 2030, a total of 2.5 million hectares of degraded pastures shall be recovered.

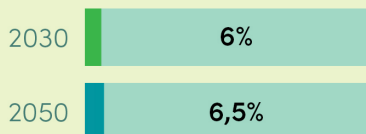· By 2050, an additional 2.5 million hectares of degraded pastureland shall be restored.

Impact on GHG emissions reduction

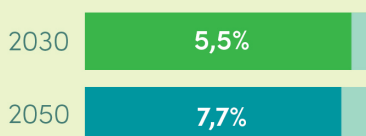Cumulative GHG emission reductions:
(2020-2050)

486 TgCO$_2$e

AFOLU-10: Moderate mitigation potential of **12%** of emissions in the AFOLU sector (Agriculture, forestry, and other land uses).

CONTRIBUTION TO TOTAL REDUCTIONS (%)

2030	6%
2050	6,5%

REDUCTION FROM BAU (%)

2030	5,5%
2050	7,7%

Macroeconomic impacts

POSITIVE · NULL · NEGATIVE

LOWER NET COSTS	CHANGE IN ENERGY AND RESOURCE CONSUMPTION	CHANGE IN ENERGY AND MATERIALS SOURCING	CHANGE IN LOCAL SUPPLY CHAINS	JOB CREATION	CHANGE IN SOURCES OF INVESTMENT AND INCOME
+	+	+	+	+	+

AFOLU-1: Maintenance of state forest assets, with socioeconomic incentives for conservation

Co-benefits

INCREASED AGRICULTURAL YIELDS	RECOVERY OF LANDSCAPE VALUE	DECREASE IN RURAL EXODUS	SOIL RESTORATION	IMPROVED QUALITY OF LIFE FOR THE FARM ANIMAL

Costs and savings

Small direct savings for the state, if compared to typical spending levels in the agricultural production sector. This estimate is based on estimates of the net present value (NPV) of ranching intensification in the Amazon biome.

LOW COSTS · SMALL SAVINGS · MODERATE COSTS · MODERATE SAVINGS · HIGH COSTS · LARGE SAVINGS

AFOLU-11: CROP-LIVESTOCK-FORESTRY INTEGRATION

DESCRIPTION: This action aims to promote the implementation of integrated systems as an alternative to monoculture, with a view to crop diversification and improved soil conditions combined with carbon removal and the reduction of GHG emissions. The integration systems involve the production of grains, fibres, wood, energy, milk or meat in the same area, in rotation, intercropping and/or succession. The system works basically by planting annual crops (rice, beans, corn, soybeans or sorghum) and trees during the summer, associated with forage species (brachiaria or panicum). There are several possibilities of combining agricultural, livestock and forest components, considering space and time available, resulting in different integrated systems, such as crop-livestock-forest (ILPF), crop-livestock (ILP), silvopastural (IPF) or agroforestry (SAF, which would be equivalent to ILF). ILPF is one of the technologies that make up the Low Carbon Emission Agriculture Plan (Plano ABC), created by the Brazilian government to reduce greenhouse gas emissions in agriculture.

LEVEL OF EFFORT AND TIMING OF IMPLEMENTATION:

· By 2030, 2 million hectares of degraded pastures and temporary crops should be transformed into integrated systems as a result of this action.

· By 2050, an additional 3 million hectares of degraded pasture and temporary crops must be transformed into integrated systems.
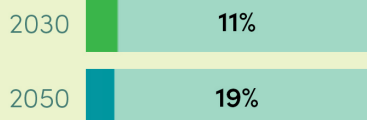
Impact on GHG emissions reduction

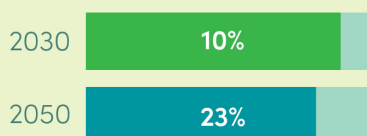Cumulative GHG emission reductions :
(2020-2050)

112 TgCO$_2$e

AFOLU-11: Moderate mitigation potential of **27%** of emissions in the AFOLU sector (Agriculture, forestry, and other land uses).

CONTRIBUTION TO TOTAL REDUCTIONS (%)

2030	11%
2050	19%

REDUCTION FROM BAU (%)

2030	10%
2050	23%

Macroeconomic impacts

POSITIVE NULL NEGATIVE

LOWER NET COSTS	CHANGE IN ENERGY AND RESOURCE CONSUMPTION	CHANGE IN ENERGY AND MATERIALS SOURCING	CHANGE IN LOCAL SUPPLY CHAINS	JOB CREATION	CHANGE IN SOURCES OF INVESTMENT AND INCOME
+	−	+	+	+	+

AFOLU-11: Crop-livestock-Forestry Integration

Co-benefits

INCREASED FARM RESILIENCE	INCREASED AGRICULTURAL YIELDS	STABILIZATION OF MICROCLIMATES	SOIL RESTORATION	IMPROVED QUALITY OF LIFE FOR THE FARM ANIMAL

Costs and savings

Small direct savings for the state compared to typical expenditure levels in the agricultural production sector. This estimate is based on the net present value (NPV) of this type of system in Brazil to develop a conservative estimate of the farmer's incremental profit

LOW COSTS · SMALL SAVINGS · MODERATE COSTS · MODERATE SAVINGS · HIGH COSTS · LARGE SAVINGS

AFOLU-12: PRODUCTION AND CONSUMPTION OF BIOFUELS

DESCRIPTION: This action aims at stimulating a more efficient production of liquid biofuels (ethanol and biodiesel) from agricultural products and to target higher levels of consumption in the state. In the case of ethanol, the main raw materials for its production are sugar cane and corn, and for biodiesel, soy is the main vegetable oil raw material for its production.

Significant benefits can be achieved by implementing biofuel production and consumption activities. Although the state enjoys the economic gains from exported production, no reduction in GHG emissions can be attributed to the state for exported production because the fossil fuel displacement will occur in another state's jurisdiction.

IMPORTANT CONSIDERATIONS:
Among alternative options for the state, it is recommended to consider the following technologies in the future to optimize the production and consumption of biofuels in the state:

· Biofuel consumption: use of sugarcane bagasse to produce electricity.

· Production of biodiesel: production of beef tallow (e.g., after 2030).

Co-benefits

EMPLOYMENT AND LOCAL ECONOMY

USE OF AGRICULTURAL WASTE MATERIALS

LOWER DEMAND FOR FOSSIL FUELS

INVESTMENT ATTRACTION AND COMPETITIVENESS