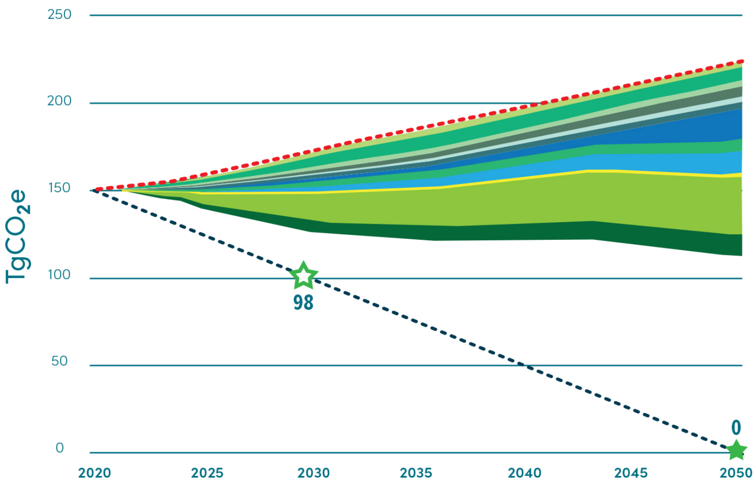
SÃO PAULO

Portfolio of actions: Climate Pathway Project

The Government of São Paulo, Brazil has completed a 2.5 year process to develop its decarbonisation pathway.
The pathway is based on São Paulo's net zero by 2050 goal.
As part of the process, the government prioritized the 12 mitigation actions shown below.

Projected GHG emission reductions from prioritised actions in São Paulo



**$TgCO_2e$ = Teragrams of carbon dioxide equivalent, 1 Tg = one million metric tons

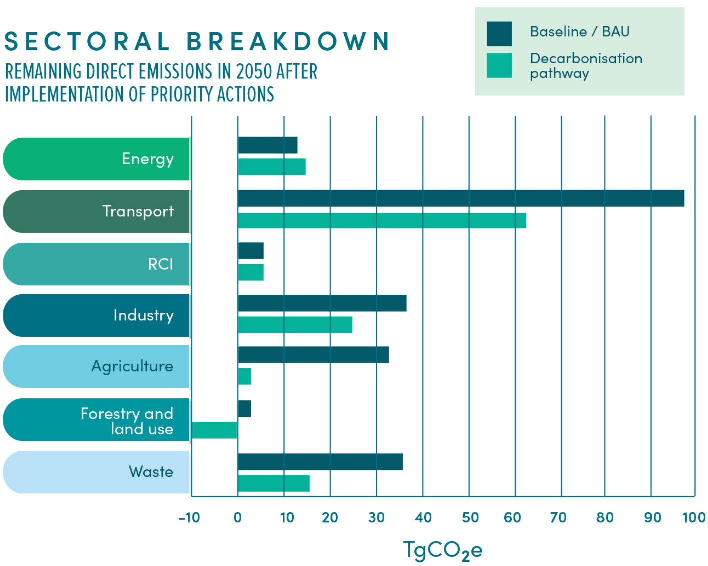
PRIORITY ACTIONS

- Centralised solar power generation
- Energy generation from biomass
- Fuel use efficiency in light industry
- Carbon capture and storage in iron and steel production
- Reduction of process emissions during cement production
- Smart urban planning
- Vehicle electrification
- Shift to public transport
- Climate-smart agriculture
- Restoration of the forest landscape
- Conservation of native vegetation
- Landfill methane energy use
- Baseline / BAU
- Decarbonisation targets
- 2030 target = 98 $TgCO_2e$
- 2050 target = 0 $TgCO_2e$

As shown in the graph, the priority actions would amount to a 50% reduction in BAU emissions by 2050.

SECTORAL BREAKDOWN

REMAINING DIRECT EMISSIONS IN 2050 AFTER IMPLEMENTATION OF PRIORITY ACTIONS



Expected impact of priority actions on GHG emissions

The implementation of these actions would add up to approximately **44 million** tonnes of avoided emissions by **2030**

And more than **108 million** tonnes of avoided emissions by **2050**

WITH THE SUPPORT OF — MAIN PARTNER — PARTNERS

NICFI Norway's International Climate and Forest Initiative · CLIMATE GROUP · GCF task force · WINROCK INTERNATIONAL · THE CENTER FOR CLIMATE STRATEGIES · libélula

Find the full report here: https://www.theclimategroup.org/climate-pathway-project

AFOLU-1: CONSERVATION OF NATIVE VEGETATION

DESCRIPTION: This action aims to promote the restoration of environmental liabilities and degraded areas destined for the restoration of native vegetation in the state, such as rural properties and agrarian reform settlements. As a result of the action, the gradual and continuous removal of atmospheric carbon is expected to form living biomass in the areas under restoration.

LEVEL OF EFFORT AND TIMING OF IMPLEMENTATION:

- By 2030, ecosystems which cover a total of 200,000 hectares will have been restored in the state, including 170,000 hectares of native vegetation in the Atlantic Forest Biome converted from pasture or other temporary crops, and 30,000 hectares of native vegetation in the Cerrado Biome converted from pasture or other temporary crops.

- By 2050, ecosystems which cover a total of 800,000 hectares will have been restored in the state, including a total of 680,000 hectares of native vegetation in the Atlantic Forest Biome converted from pasture or other temporary crops, and a total of 120,000 hectares of native vegetation in the Cerrado Biome converted from pasture or other temporary crops.

Impact on GHG emissions reduction

Cumulative GHG emission reductions:
(2020-2050)

181 TgCO_2e

AFOLU-1: Moderate mitigation potential of **17%** of emissions in the AFOLU sector (Agriculture, forestry, and other land uses).

CONTRIBUTION TO TOTAL REDUCTIONS (%)

2030	6,8%
2050	13%

REDUCTION FROM BAU (%)

2030	1,8%
2050	6,2%

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
–	Ø	Ø	+	+	+

AFOLU-1: Conservation of native vegetation

Co-benefits

REDUCTION OF SOIL EROSION

REGULATION OF WATER CYCLE

RECOVERY OF LANDSCAPE VALUE

EXTREME HEAT CONTROL

INCREASED HABITAT AND BIODIVERSITY

Costs and savings

Low direct costs to the state when compared to usual spending levels in the agriculture, livestock, forestry, and fisheries sectors. The net costs of implementing this action will depend on the type of restoration activities employed and the specific land uses under the BAU scenario.

AFOLU-2: CONSERVATION OF NATIVE VEGETATION IN THE STATE, WITH SOCIOECONOMIC INCENTIVES

DESCRIPTION: This action aims to implement complementary measures to the Forest Code and provide socioeconomic incentives for the conservation of native vegetation, which provides a host of beneficial environmental services. As a result of this action, it is expected that the state's forest assets will be maintained, as well as its carbon stocks. Additionally, the conservation of native vegetation in the state will promote soil conservation against erosion and landslides, along with maintaining and improving the quality of water resources.

LEVEL OF EFFORT AND TIMING OF IMPLEMENTATION:

- By 2030, a total of 330,000 additional hectares of native vegetation will be conserved in the state, including 250,000 hectares of Atlantic Forest, and 80,000 hectares in the Cerrado biome.
- By 2050, a total of 1 million additional hectares of native vegetation will be conserved in the state, including 750,000 hectares of Atlantic Forest, and 250,000 hectares in the Cerrado biome.

Impact on GHG emissions reduction

Cumulative GHG emission reductions: (2020-2050)

16 TgCO_2e

AFOLU-2: Low mitigation potential of **1,5%** of emissions in the AFOLU sector (Agriculture, forestry, and other land uses).

CONTRIBUTION TO TOTAL REDUCTIONS (%)

2030	0,8%
2050	1%

REDUCTION FROM BAU (%)

2030	0,2%
2050	0,5%

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
–	+	Ø	+	+	+

AFOLU-2: Conservation of native vegetation in the state, with socioeconomic incentives

Co-benefits

REDUCTION OF SOIL EROSION | REGULATION OF WATER CYCLE | PROTECTED SOURCE OF DIFFERENT RAW MATERIALS | EXTREME HEAT PREVENTION | INCREASED HABITAT AND BIODIVERSITY

Costs and savings

Low direct costs to the state compared to typical spending levels in the agriculture, livestock, forestry and fisheries sectors. Net costs of implementing this action will depend on the level of incentives and their use.

AFOLU-3: CLIMATE SMART AGRICULTURE (USE OF LOW CARBON EMISSION TECHNIQUES)

DESCRIPTION: This action aims to promote the implementation of integrated production systems, seeking to diversify crops, increase the income of producers and their organizations, improve the environmental conditions of rural properties, combined with the removal of carbon and reduction of GHG emissions and the conservation of soil and water resources. The action includes Integrated Crop-Livestock-Forestry Systems (ICLFS), expanding biological nitrogen fixation (BNF) in soy and sugarcane crops, and expanding the adoption of no-till farming systems in temporary crops and sugarcane.

LEVEL OF EFFORT AND TIMING OF IMPLEMENTATION:
- By 2030, a total of 1 million hectares of degraded pastures should be recovered through the implementation of integrated and sustainable production systems, such as Crop-Livestock-Forestry Systems (ICLFS) in the State of São Paulo;
- By 2030, promote biological nitrogen fixation in a total of 1 million hectares of soybean, sugarcane, corn and pasture crops in the State of São Paulo;
- By 2030, promote no-till farming systems in 50% of all temporary crops and sugarcane in the State of São Paulo;
- By 2050, a total of 1.9 million hectares of degraded pastures should be recovered through the implementation of integrated and sustainable production systems, such as Crop-Livestock-Forestry Systems (ICLFS), Integrated Crop-Livestock Systems (ICLS), and Integrated Livestock-Forest Systems (ILFS) in the State of São Paulo;
- By 2050, promote biological nitrogen fixation in a total of 2 million hectares of soybean, sugarcane and pasture crops in the State of São Paulo, where there is technological availability;
- By 2050, promote no-till farming systems in 100% of all temporary crops and sugarcane in the State of São Paulo.

Impact on GHG emissions reduction

Cumulative GHG emission reductions: (2020-2050)

567 TgCO$_2$e

AFOLU-3: Very high mitigation potential of **52%** of emissions in the AFOLU sector (agriculture, forestry, and other land uses).

CONTRIBUTION TO TOTAL REDUCTIONS (%)

2030	35%
2050	29%

REDUCTION FROM BAU (%)

2030	9%
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-3: Climate smart agriculture

Co-benefits

- REDUCTION OF SOIL EROSION
- REGULATION OF WATER CYCLE
- USE OF AGRICULTURAL AND AGRO-INDUSTRIAL WASTE
- GREATER RESILIENCE OF PRODUCTION SYSTEMS
- EFFLUENT AND WASTE TREATMENT FOR RURAL PROPERTIES

Costs and savings

Small direct savings for the state compared to typical spending levels in the agriculture and livestock sector (i.e., spending on materials and labor in industrial agriculture and livestock activities).

I-1: FUEL USE EFFICIENCY IN LIGHT INDUSTRY

DESCRIPTION: This action contemplates the application of technologies to increase the efficiency of fuel use in the light industry sector of the state. Light industry refers to sub-sectors that do not have high temperature processes, such as furnaces in cement, iron and steel, ceramics or glass factories. Notably, in São Paulo, this includes the food and beverage sub-sector.

LEVEL OF EFFORT AND TIMING OF IMPLEMENTATION:

- By 2030, implement fuel efficiency measures in light industry to reduce projected BAU fuel use by 20%.
- By 2050, implement fuel efficiency measures in light industry to reduce projected BAU fuel use by 35%.

Impact on GHG emissions reduction

Cumulative GHG emission reductions: (2020-2050)

83 $TgCO_2e$

I-1: Low mitigation potential of **9%** of emissions in the industrial sector.

CONTRIBUTION TO TOTAL REDUCTIONS (%)

2030	4,8%
2050	4,8%

REDUCTION FROM BAU (%)

2030	1,3%
2050	2,4%

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
−	Ø	Ø	−	+	+

I-1: Fuel use efficiency in light industry

Co-benefits

HEALTH (reduction of air pollution) · LOWER COSTS FOR CONSUMERS · REDUCTION OF OZONE PRECURSORS · LOWER DEMAND FOR FOSSIL FUELS · POTENTIAL FOR GREATER RESILIENCE AGAINST FUEL PRICE SPIKES

Costs and savings

Low direct costs to the state compared to typical spending levels in the processing industry (i.e., spending on materials and labour in the processing industries companies).

I-2: CARBON CAPTURE AND STORAGE IN IRON AND STEEL PRODUCTION

DESCRIPTION: This action deals with the application of carbon capture, utilisation and storage (CCUS) in the iron and steel sub-sector. In this action, CCUS is targeted to the state's basic oxygen furnace (BOF) processes.

LEVEL OF EFFORT AND TIMING OF IMPLEMENTATION:

· By 2030, implement carbon capture and storage technology in iron and steel production facilities to achieve an overall reduction in CO_2 emissions of 35%.

· By 2050, implement carbon capture and storage technology in iron and steel production facilities to achieve an overall reduction in CO_2 emissions of 90%.

Impact on GHG emissions reduction

Cumulative GHG emission reductions: (2020-2050)

72 $TgCO_2e$

I-2: Low mitigation potential of **7%** of emissions in the industrial sector.

CONTRIBUTION TO TOTAL REDUCTIONS (%)

2030	4,1%
2050	4,3%

REDUCTION FROM BAU (%)

2030	1,1%
2050	2,1%

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
–	–	Ø	+	+	+

I-2: Carbon capture and storage in iron and steel production

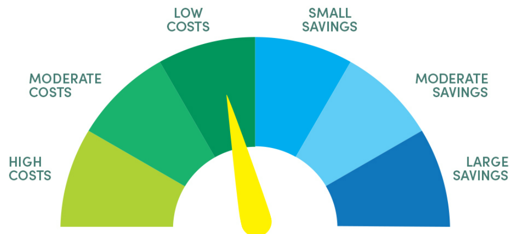
Co-benefits

LOCAL ECONOMIC BENEFITS AND INCREASED EMPLOYMENT

INVESTMENT ATTRACTION AND COMPETITIVENESS

Costs and savings

Low direct costs to the state compared to typical spending levels in the processing industry (i.e., spending on materials and labour by processing companies).



I-3: REDUCTION OF PROCESS EMISSIONS DURING CEMENT PRODUCTION

DESCRIPTION: This action aims to fully implement practices that can reduce GHG emissions from cement production. Specifically related to, materials that can be added to cement clinker to reduce the amount of clinker required per unit of finished cement. The less clinker required, the less the clinker kiln needs to operate. This reduces GHG emissions from calcination of limestone in the kiln as well as the amount of fuel needed to produce that clinker.

LEVEL OF EFFORT AND TIMING OF IMPLEMENTATION:

- By 2025, increase the use of additives during cement production to reduce the amount of clinker required per unit of finished cement by 10%.
- By 2035, increase the use of additives during cement production to reduce the amount of clinker required per unit of finished cement by 30%.

Impact on GHG emissions reduction

Cumulative GHG emission reductions: (2020-2050)

35 TgCO_2e

I-3: Low mitigation potential of **3,6%** of emissions in the industrial sector.

CONTRIBUTION TO TOTAL REDUCTIONS (%)

2030	1,9%
2050	1,7%

REDUCTION FROM BAU (%)

2030	0,9%
2050	0,8%

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
+	+	+	+	+	+

I-3: Reduction of process emissions during cement production

Co-benefits

LOCAL ECONOMIC BENEFITS AND EMPLOYMENT

LOWER COSTS FOR CONSUMERS

USE OF WASTE MATERIALS

LOWER DEMAND FOR FOSSIL FUELS

INVESTMENT ATTRACTION AND COMPETITIVENESS

Costs and savings

Small direct savings for the state compared to typical spending levels in the processing sector (i.e., spending on materials and labour by processing companies).

T-1: SMART URBAN PLANNING

DESCRIPTION: This action includes smart urban planning as a development approach that encourages a mix of building types and uses, diverse housing and transportation options, development in existing neighbourhoods, and community involvement. Denser development is one common aspect of smart urban planning as it supports shorter travel distances and the greater use of non-motorized modes of transport.

LEVEL OF EFFORT AND TIMING OF IMPLEMENTATION:

· By 2030, all necessary mechanisms will be in place to support smart urban planning that covers 60% of São Paulo State population.

· By 2050, all necessary mechanisms will be in place to support smart urban planning that covers 90% of the population of São Paulo State.

Impact on GHG emissions reduction

Cumulative GHG emission reductions: (2020-2050)

71 $TgCO_2e$

T-1: Low mitigation potential of **3,2%** of emissions in the transport sector.

CONTRIBUTION TO TOTAL REDUCTIONS (%)

2030	4,2%
2050	4,1%

REDUCTION FROM BAU (%)

2030	1,1%
2050	2,0%

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
+	+	Ø	+	+	+

T-1: Smart urban planning

Co-benefits

HEALTH (reduction of air pollution)

MORE EFFICIENT FREIGHT TRANSPORT

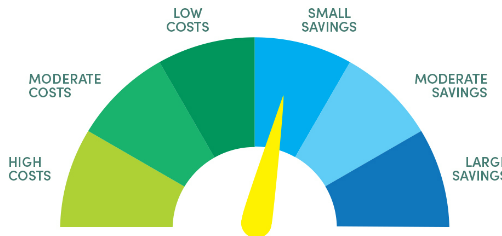
REDUCED TRAVEL TIMES

LOWER DEMAND FOR FOSSIL FUELS

PHYSICAL AND MENTAL HEALTH

Costs and savings

Small direct savings for the state compared to typical spending levels in the institutional (government) sector, which includes the transportation, storage, and mail sub-sectors.



T-2: VEHICLE ELECTRIFICATION

DESCRIPTION: This action promotes vehicle electrification which eliminates vehicle exhaust emissions (mainly CO_2) by reducing the vehicle fleet using traditional internal combustion engines that burn fossil fuels (petrol and diesel). Electrified powertrains require less than a third as much energy as internal combustion engines. An inspection and maintenance program for all categories of vehicles is also to be implemented in the São Paulo metropolitan region and will cover vehicles older than 3 years. The programme will support the renewal of the vehicle fleet with new vehicles (including electrified vehicles, when available). By itself, the program should also reduce fuel consumption across the metropolitan fleet by about 5%.

LEVEL OF EFFORT AND TIMING OF IMPLEMENTATION:

- By 2030, all necessary mechanisms will be implemented to support vehicle electrification in all municipalities for which electric and hybrid vehicles will represent 50% of new vehicle sales. The action will focus first on light duty vehicles and will include heavy duty vehicles after 5 years.
- By 2040, all necessary mechanisms will be in place to support vehicle electrification in all municipalities so that electric and hybrid vehicles represent 100% of new vehicle sales.
- By 2024, a vehicle inspection and maintenance program will be in place to cover all vehicles older than 3 years in the São Paulo metropolitan region.

Impact on GHG emissions reduction

Cumulative GHG emission reductions: (2020-2050)

142 $TgCO_2e$

T-2: Low mitigation potential of **6,3%** of emissions in the transport sector.

CONTRIBUTION TO TOTAL REDUCTIONS (%)

2030	4,6%
2050	16%

REDUCTION FROM BAU (%)

2030	1,2%
2050	8%

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
+	+	Ø	−	Ø	+

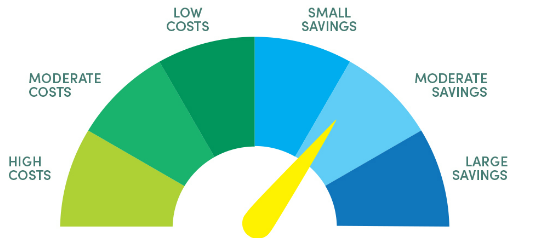
T-2: Vehicle electrification

Co-benefits

- HEALTH (reduction of air pollution)
- REDUCTION OF NOISE POLLUTION
- INVESTMENT ATTRACTION AND COMPETITIVENESS
- LOWER DEMAND FOR FOSSIL FUELS
- REDUCTION OF OZONE PRECURSORS

Costs and savings

Moderate direct savings for the state compared to typical spending levels for the transport, storage, and communications sub-sectors. The costs to implement the vehicle inspection and maintenance program were not included in this evaluation.



T-3: SHIFT TO PUBLIC TRANSPORT

DESCRIPTION: This action addresses the measures necessary to shift passengers from road vehicles to alternative, energy-efficient forms of transport. This may include public transport modes such as bus (including rapid transit bus), light rail, metro and other modes. These types of transport modes provide more efficient transport services than road vehicles. The reduction in energy use for each passenger-kilometer traveled will result in lower GHG emissions (primarily carbon dioxide). Action T-1 (Smart Urban Planning) also supports this action.

LEVEL OF EFFORT AND TIMING OF IMPLEMENTATION:

· By 2030, implement all necessary mechanisms to support a 15% shift of passengers from road vehicles to more efficient transport modes.

· By 2050, implement all necessary mechanisms to support a 30% shift of passengers from road vehicles to more efficient transport modes.

Impact on GHG emissions reduction

Cumulative GHG emission reductions: (2020-2050)

94 $TgCO_2e$

T-3: Low mitigation potential of **4,2%** of emissions in the transport sector.

CONTRIBUTION TO TOTAL REDUCTIONS (%)

2030	4,8%
2050	5,8%

REDUCTION FROM BAU (%)

2030	1,3%
2050	2,9%

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
−	+	Ø	+	+	+

T-3: Shift to public transport

Co-benefits

- HEALTH (reduction of air pollution)
- REDUCTION OF NOISE POLLUTION
- LOWER COSTS FOR PASSENGERS
- LOWER DEMAND FOR FOSSIL FUELS
- LESS TRAFFIC

Costs and savings

Low direct costs to the state compared to typical spending levels in the transportation, storage, and communications sub-sector.

E-1: CENTRALISED SOLAR POWER GENERATION

DESCRIPTION: This action aims to reduce greenhouse gas (GHG) emissions (mainly CO2) from the energy supply in the State of São Paulo through the construction of new centralized solar plants connected to the national grid.

LEVEL OF EFFORT AND TIMING OF IMPLEMENTATION:

· By 2030, deploy sufficient solar capacity on the electrical grid to reduce the carbon intensity of grid-based energy by 25% of BAU levels.

· By 2050, deploy sufficient solar capacity on the electrical grid to reduce the carbon intensity of grid-based energy by 50% of BAU levels.

Impact on GHG emissions reduction

Cumulative GHG emission reductions: (2020-2050)

81 $TgCO_2e$

E-1: High mitigation potential of **26%** of emissions in the energy supply sector.

CONTRIBUTION TO TOTAL REDUCTIONS (%)

2030	6,1%
2050	2,4%

REDUCTION FROM BAU (%)

2030	1,6%
2050	1,2%

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
+	Ø	+	–	+	+

E-1: Centralised solar power generation

Co-benefits

HEALTH (reduction of air pollution)

LOWER COSTS (electric utilities)

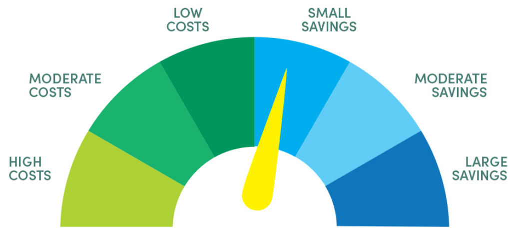
LOCAL ECONOMIC BENEFITS AND INCREASED EMPLOYMENT

LOWER DEMAND FOR FOSSIL FUELS

ENERGY SECURITY (drop in imports)

Costs and savings

Small direct savings for the state due to lower energy supply costs for state residents and businesses compared to the BAU scenario.



E-2: ENERGY GENERATION FROM BIOMASS

DESCRIPTION: This action aims to reduce greenhouse gas (GHG) emissions (mainly CO_2) by using the biomass resources available in the state to generate electricity. The following biomass feedstocks are considered available for this purpose: municipal solid waste, sugarcane bagasse, other crop residues (corn stubble, wood pellets, orange peel, other food processing residues and rice husk).

LEVEL OF EFFORT AND TIMING OF IMPLEMENTATION:

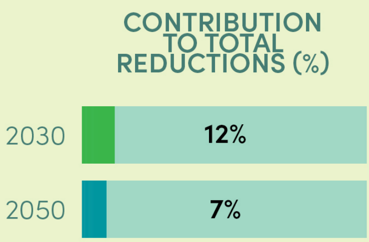
- By 2030, allocate 10% of available biomass feedstock to be converted into electricity.
- By 2050, allocate 25% of available biomass feedstock to be converted into electricity.

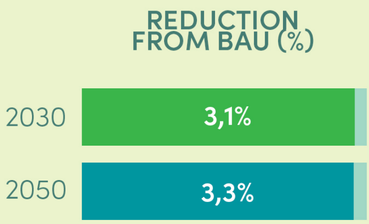
Impact on GHG emissions reduction

Cumulative GHG emission reductions: (2020-2050)

175 $TgCO_2e$

E-2: Very high mitigation potential of **56%** of emissions in the energy supply sector.





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
−	Ø	+	+	+	+

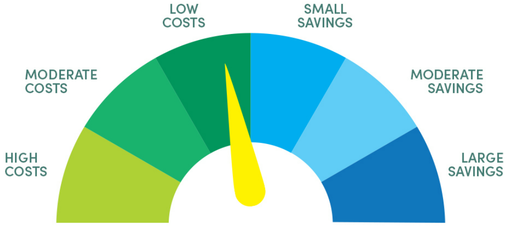
E-2: Energy generation from biomass

Co-benefits

INVESTMENT ATTRACTION AND COMPETITIVENESS | USE OF AGRICULTURAL WASTE MATERIALS | LOCAL ECONOMIC BENEFITS AND INCREASED EMPLOYMENT | LOWER DEMAND FOR FOSSIL FUELS | ENERGY SECURITY (drop in imports)

Costs and savings

Low direct costs to the state due to lower energy supply costs for state residents and businesses compared to the BAU scenario.



W-1: HARNESSING LANDFILL METHANE FOR ENERGY USE

DESCRIPTION: This action aims to implement landfill gas collection, reducing associated landfill methane emissions and using landfill gas as an alternative fuel source by converting it to energy. These projects can be installed at municipal or industrial landfills.

LEVEL OF EFFORT AND TIMING OF IMPLEMENTATION:

- By 2030, install landfill gas-to-energy projects with a capacity of 100 MW.
- By 2050 install landfill gas-to-energy projects with a capacity of 200 MW.

Impact on GHG emissions reduction

Cumulative GHG emission reductions: (2020-2050)

227 TgCO_2e

W-1: High mitigation potential of **26%** of emissions in the waste sector.

CONTRIBUTION TO TOTAL REDUCTIONS (%) / CONTRIBUIÇÃO PARA REDUÇÕES TOTAIS (%)

2030	15%
2050	12%

REDUCTION FROM BAU (%) / REDUÇÃO EM LINHA DE BASE (%)

2030	3,9%
2050	5,7%

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
+	Ø	+	–	+	+

W-1: Harnessing landfill methane for energy use

Co-benefits

- HEALTH (reduction of air pollution)
- REDUCTION OF OZONE PRECURSORS
- LOCAL ECONOMIC BENEFITS AND INCREASED EMPLOYMENT
- LOWER DEMAND FOR FOSSIL FUELS
- ENERGY SECURITY (drop in imports)

Costs and savings

Small direct savings for the state. Actual costs for such projects will depend on the technical aspects of local landfills, fuel and electricity costs, as well as whether carbon credits can be obtained and the current price for such credits.