

COP26

# SÃO PAULO STATE CLIMATE ACTION PLAN

GUIDELINES AND STRATEGIC ACTIONS  
PAC NET ZERO 2050



  
**SÃO PAULO**  
GOVERNO DO ESTADO

| Secretaria de Infraestrutura e Meio Ambiente



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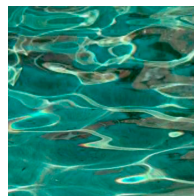
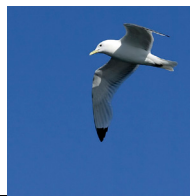
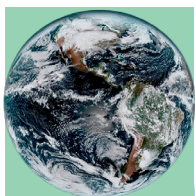
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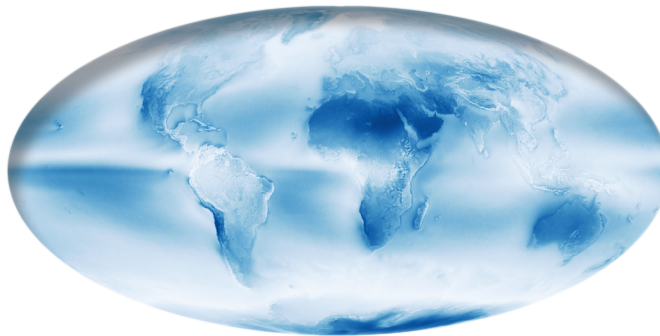
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SÃO PAULO STATE GOVERNMENT

# SÃO PAULO STATE CLIMATE ACTION PLAN · NET ZERO 2050 · GUIDELINES AND STRATEGIC ACTIONS



Rebuilding better, supporting green jobs and  
accelerating solutions to net zero emissions

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Secretaria de Infraestrutura e Meio Ambiente

São Paulo ■ Outubro de 2021





## FOREWORD

I am honored to present you the document “Strategic Guidelines and Actions for the Climate Action Plan of the State of São Paulo - Net Zero 2050 - PAC2050” at the 26th Conference of Parties to the United Nations Framework Convention on Climate Change (UNFCCC CoP 26), in Glasgow, United Kingdom, from 1 to 12 November 2021.

The guidelines in this document are the result of the firm determination of the government of the state of São Paulo to combat the effects of climate change and global warming in the territory of São Paulo. And thus, contribute to achieving the goals assumed by Brazil in the Paris Agreement.

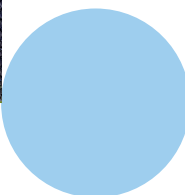
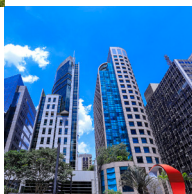
This year, we have joined the UN’s global campaigns - Race to Zero and Race to Resilience. Through this, we are in tune with the thriving movement of subnational and local governments, companies and society, towards a net zero carbon, resilient and sustainable economy.

We will do our part, seeking climate neutrality by 2050, combining bold policies towards a low carbon economy, and maintaining the leading role of the State of São Paulo in generating wealth, jobs, quality of life and health for its 45 million population.

All together, making the world a more just and sustainable living place.

JOÃO DORIA

Governor of São Paulo  
Brazil





Supported by a broad public consultation process carried out in August and September 2021, the document “Strategic Guidelines and Actions for the Climate Action Plan of the State of São Paulo - Net Zero 2050” organizes and makes public the aspirations of the State in its policies of climate in the next three decades. The report supports the participation of the State of São Paulo in the 26th Conference of the Parties of the United Nations Framework Convention on Climate Change (UNFCCC CoP 26), which takes place in Glasgow, United Kingdom, in November 2021 and is backed by in the history of climate actions in the State of São Paulo.

To establish the new decarbonization route, São Paulo will present, by July 2022, an ambitious Climate Action Plan. The so-called PAC2050 will organize the implementation of the State Policy on Climate Change (PEMC, Law 13.798, 09.11.2009), together with a series of decrees. One of them should be published in the first half of 2022 and will bring the necessary revision of the regulation (Decree 55.947, 24.06.2010) of the PEMC in its governance aspects, guaranteeing the participation of society and local authorities.

Another one - the State Decree n.65,881 (20.2021) - has already been published and formalized São Paulo’s adherence to the UN’s Race to Zero and Resilience campaigns, respectively in the lines of neutrality of greenhouse gas emissions until 2050 and increased capacity to adapt to impacts of global climate change. Such legal framework sets a long-term goal that fills a gap in the PEMC for the post-2020 period. It is worth remembering that the law recommends for the year 2020 a global reduction target of 20% of carbon dioxide emissions for the year 2005 (art 32 § 1º), whose fulfillment will be verified shortly after the publication of the data for the reference year. Decree 65.881/2021 continued this metric by establishing net zero emissions by 2050, an aspirational goal that should be pursued with the best efforts of governments and private initiative. That allows São Paulo to contribute to Brazil in achieving the goals established under the UN Paris Agreement (ratified by Federal Decree No. 9,073, 05.06.2017) and with the objectives of the National Policy on Climate Change (PNMC, Federal Law 12,187, 29.12.2009). Consistent with the Paris Agreement (arts. 2 and 4), climate neutrality (also called “net zero”) aims to balance, according to the best scientific evidence, global greenhouse gas emissions around net zero - that is, emissions and removals. Several jurisdictions around the world have announced their decarbonization targets aimed at stabilizing the global average temperature well below 2°C of pre-industrial levels.

Hence, PAC2050 will implement the PEMC law and related decrees. Object of this report, its guidelines represent a thematic roadmap for the preparation of the Plan, that was validated by a broad public consultation process carried out in August and September 2021. An online platform received the proposals, supported by a series of meetings with interested sectors and by consulting the State Council for the Environment – CONSEMA. More than 200 contributions from the most diverse sectors of society were registered, answered and mostly incorporated in this document.





The “Strategic Guidelines and Actions for the Climate Action Plan of the State of São Paulo - Net Zero 2050” are a thematic guide for the preparation of the Climate Action Plan - Net Zero 2050 in a simple and direct manner, in five Axes:

1. Accelerated Electrification
2. Advanced Fuels
3. Systemic Efficiency
4. Resilience and Nature Based Solutions
5. Green Finance and Innovation

In addition to the Axes, the Guidelines also point to demonstrable commitments in four phases:

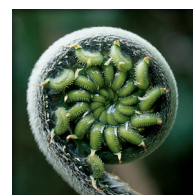
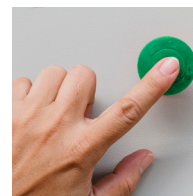
- 1st phase (2022-2025) - Definition of decarbonization routes and strengthening of ongoing actions;
- 2nd phase (2025-2030) - Actions with measurable and significant results;
- 3rd phase (2030-2040) - Measurement of the intermediate target, in line with the measurement period of the multilateral and national targets;
- 4th phase (2040 to 2050) - Acceleration of measures, expanding scale and guaranteeing results.

**Axis 1, Accelerated Electrification**, refers to the energy transformation brought about by the promise of abundant electrification from new renewable energy sources, associated with efficient storage systems (such as batteries and hydraulic potentials) and conversion (both for end uses such as lighting and motive power and for intermediate advanced fuels such as hydrogen). Although São Paulo’s energy matrix is mostly renewable, there is still significant potential for diversification and implementation of new energy sources and inputs, such as solar photovoltaics, biomethane from the sugar-energy sector, landfills and sewage treatment plants, and energy resulting from the economic and energy use of solid waste. Electrification based on renewable sources could be an opportunity for São Paulo to receive foreign investments and create an environment of innovation and endogenous development.

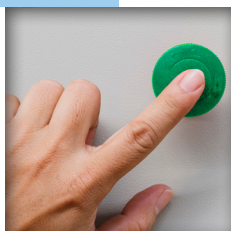
In order for this transformation to be achieved, the Plan must be prepared, already considering some of the following goals:

## 2022

- Publish the São Paulo Energy Plan with a 2050 horizon, with protagonist role in decarbonizing the State economy, considering distributed and shared generation, smart grids, energy storage, industrial and competitiveness policy, production of equipment, pilot projects, public-private green hydrogen hubs, new development centers, expansion of sugarcane and biogas,







programs and actions to promote municipalities and companies, education and training, fiscal and tax measures);

#### 2025

- Implementation by the private sector of the first large scale solar plants in the State; increase the share of biomass in the energy matrix;

#### 2030

- Ensure fourfold growth in the installed capacities of solar energy and biogas (sugarcane and wastes) and promote integration with other resources, meeting electrical end uses;

#### 2050

- Ensure a strong presence of solar and biomass sources in the electricity matrix in São Paulo (45 GW) and promote integration with other resources, meeting electrical end uses.

**Axis 2**, which deals with “Advanced Fuels”, seeks to accelerate the transition to a low carbon economy through the use of bioenergy (ethanol, biodiesel, biogas, biomethane and others), the development of green hydrogen and the boost to various next-generation fuels. Considering that a significant part of São Paulo’s emissions are in the energy processes that feed the transport of people and cargo sectors, the axis has its basis on the concept that advanced fuels represent the fastest, most effective and least investment path for that there is the capacity to significantly reduce the emission of greenhouse gases and local pollutants, without having to expand or rebuild the existing infrastructure, or even force the acceleration of fleet renewal. São Paulo is already starting from a relevant role as a biofuel’s producer, due to its thriving sugar-energy sector, but the moment requires diversification and continuous innovation. Thus, this Axis points to new ways of generating low carbon emission fuels, such as green hydrogen, HVO (hydrotreated vegetable oils) or HBO (hydrotreated biogenic oils), SPK (synthetic paraffinic kerosene), renewable diesel, exploitation waste energy, biogas, biomethane and the strengthening and expansion of biofuels. We note that to achieve success, this Axis has to work in an integrated and strategic way with air, road, rail and waterways, as well as rethinking the ways of planning and living in metropolises and cities, therefore, a partnership process is crucial. and integration with the local authorities. For this transformation to be achieved, the Plan must be prepared, already considering some of the following goals:

#### 2022

- Discuss within the Energy Plan a São Paulo strategy for advanced fuels;

#### 2025

- Work with industry to advance the steps necessary to enable the blending of biomethane and/or hydrogen in the gas distribution network; outline a



strategy for implementing the capture and sequestration of carbon emitted by major sources ( regulatory framework, environmental licensing of projects, impacts on land use and geological specificities for its storage); predict and promote the growing restriction until the complete replacement of cargo vehicles powered by internal combustion in large and medium-sized cities in the State by 2040;

### 2030

- Enable operational plant producing hydrogen on a pre-commercial scale; insert electricity obtained from biomethane into the grid; implement an operational industrial cluster capturing and storing CO<sub>2</sub>, mainly from thermoelectric plants and large natural gas projects;

### 2040

- Large-scale use of HVO to replace diesel in transport;

### 2050

- Commercialize hydrogen in the State.

**Axis 3, Systemic Efficiency**, aims to revolutionize the way in which energy and materials are consumed, in transport, buildings, industry and agriculture. Efficiency presupposes a lifecycle approach for products and services, in which the main impacts and waste are verified in continuous improvement processes. It covers technologies, behaviors and materials. Recent examples include changes in habits, such as those due to the recent pandemic and various supply crises. Efficiency does not imply restriction, but rather obtaining the same - or better - final services with less use of energy and materials. Considering the changes that we want to promote in the other Axes, we observe that they all start from the premises of the progressive reduction of losses and unwanted emissions in processes and products. Circular Economy, energy efficiency, transport, buildings and more efficient materials are themes that are part of this Axis. The public administration can and should use its purchasing power, contracting, regulating and encouraging us to have more efficient ways to build, move and consume energy. For this transformation to be achieved, the Plan must be prepared, already considering some of the following goals:

### 2022

- Detail the Strategies of the Transport and Civil Construction sectors combined with the Energy Plan; hire the first public electric fleets in the State; predict the expansion of electrical outlets on São Paulo roads; expand the network of cycle paths and walking; encourage the operation of new railway and subway lines; launch targets for fleet renewal and incentives for the promotion of electric micro-mobility;







## 2025

- Studies for work commuting along bicycle paths and walks related to changing rooms, showers, bicycle storage, among other structures; detailing integrated construction strategies with an emphasis on prefabricated and programmed assembly processes to significantly reduce travels; expansion of electric railway routes, with the reopening of lines and stations;

## 2030

- Deploy thousands of high-power charging stations; reduce energy consumption per household through efficiency and encourage the use of own energy generation through renewable sources;

## 2050

- Achieving full electrical integration, with supply from renewable sources, smart grids and electrification of end uses in buildings and transport.

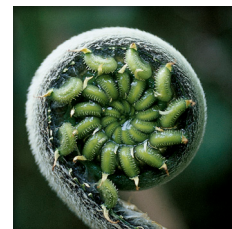
**Axis 4, Resilience and Nature Based Solutions**, encompasses, in a broad and integrated manner, all actions that increase the adaptability of human and natural systems to the impacts of climate change. It includes, among other things, security in supplies (water, energy, food and the production chain), the circular economy, the bioeconomy, modern and sustainable agriculture, the resilience of urban and rural infrastructure, the response of human health systems, the preventive approach against pollution and accidents, the preservation and restoration of natural, terrestrial and aquatic systems (marine and continental), favoring the protection and recovery of forests and other natural ecosystems and the increase and restoration of biodiversity. Adaptation actions are aimed at facing the adverse impacts of climate change and offer opportunities for strategies that integrate the so-called Ecosystem-Based Adaptation (EBA), which provide multiple economic, social and environmental benefits from conservation actions, restoration or improvement of vegetation cover, both in urban and rural areas, to combat habitat fragmentation, formation of biodiversity corridors, integrated and sustainable agricultural systems and practices, landscape preservation and water resources conservation. Innovative and improving agricultural practices (based on Low Carbon Agriculture), recovering soil and vegetated areas, promoting economic gains for those who recover, protect and produce sustainably, as well as planning the territory to face its vulnerabilities and maintain and make better use of its potential, with a special focus on facing existing problems that tend to assert themselves - such as water supply in large cities - or problems that tend to occur, as they arise from possible changes in rainfall and temperature regimes caused by climate changes.



For this transformation to be achieved, the Plan must be prepared, already considering some of the following goals:

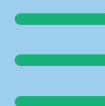
## 2022

- Start implementing the Environmental Regularization Program (PRA); define multifunctional forest hubs and agroforestry hubs; to consolidate the ZEE – Ecological-Economic Zoning and the ZEE-SP Network; use Nature Based Solutions to increase soil permeability, flood control and flood through partnerships with municipalities; prioritize the watershed protection areas, especially those that serve the large metropolitan regions of the State; technically qualify the municipalities to develop in consortium solutions, preferably their Climate Action Plans (emissions and resilience); use the network of State universities and technical schools in training and in the search for solutions; started on your characterization of new protected areas and long-term landscape restoration projects;



## 2025

- Invest in programs to defend against floods, landslides and coastal impacts, combating heat islands; ensure that the Environmental Regularization Program is in full implementation; implementation of at least 50,000 hectares of multifunctional forest hubs ; create instruments that value the recovery and maintenance of native vegetation, allowing the objectives of the Agro Legal Program (Decree No. 65,182, of 09/16/2020) and other programs to encourage environmental regularization to be achieved; increase the total number of areas restored through the management of multifunctional forests, agroforestry or forest-livestock systems that combine the production of wood, non-timber products and ecosystem services, and incentive programs; creation of the State Plan for the Preparation of Communities Exposed to Technological Risk of Chemical Origin, based on Technical Standard P4003 - CETESB and Creation of a State Commission for Prevention, Preparation and Response to Technological Accidents (Na-Tech); propose a Forest and Wetlands Restoration Plan; propose socio-educational actions to eliminate waste from rivers and seas; strengthen the educational actions of the State Civil Defense and Protection System aimed at increasing the resilience of populations living in risk areas, seeking their effective participation in the prevention, preparation and mitigation of risks through the formation of Community Centers for Civil Defense and Protection; invest, on an ongoing basis, in improving the issuance of early warnings through the technical-scientific development of the monitoring of risk areas;





### 2030

- Recover about 350 thousand hectares (about half of the State's permanent protection areas or APPs to be restored);

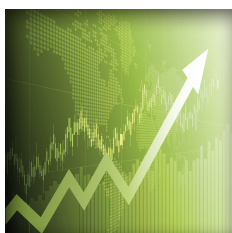
### 2040

- Reach 800 thousand hectares (all APPs restored, which is also equivalent to the goal of the Agro Legal program);

### 2050

- Achieve 1.5 million hectares in restoration and with management of multi-functional forests, agroforestry or forest-livestock systems that combine the production of wood, non-wood products and ecosystem services.

**Axis 5, on Green Finance and Innovation,** deals with the means of implementing the Plan: financing, training, research, technological development and information exchange. We treat financing as a way to guide existing resources for research and investments for low carbon activities, safely and progressively eliminating carbon intensive investments, as well as the possible need for new resources for decarbonized activities that do not yet exist in the economy of São Paulo. Innovation will help reduce the cost of the transition to emission neutrality by 2050, foster the development of better products, create new business models and influence consumer behavior. The vision is for the State of São Paulo to be a leader in technologies to decarbonize economies across the country, contributing to the neutrality of emissions at the national level. Desenvolve SP (Development Agency), Investe SP (Investment Agency) and FAPESP (Research Agency) should collaborate to accelerate the technological transition, as well as the development of innovative low-carbon systems and processes in the priority areas outlined by this Plan. Studies to understand the carbon intensity of the São Paulo public budget, as well as strategies on how to decarbonize it, will certainly help São Paulo to have public investment oriented towards the PAC2050 goals. Actions to attract the desired investments in the previous 4 Axes will be crucial and should make use of tax, development, credit lines and public-private partnerships. The ICMS Ambiental (environmental value added tax) is an example already in progress, as it will inject resources into the budgets of municipalities with the greatest coverage of natural vegetation, ensuring the financing of economic activities that contribute to the conservation of forests and other public investments, for the local management of solid waste and for municipalities that have water supply and hydroelectric generation reservoirs, moving towards water and energy security. For this transformation to be achieved, the Plan must be prepared, already considering some of the following goals.



**2022**

- Start with the Secretariat of Projects, Budget and Management budget discussions in line with PAC2050; publish the priorities of the innovation portfolio; study the profile of existing State funds to receive PAC2050 climate projects; create funds for projects to be fully established in the next 5 years.

**2025**

- Creation of a climate innovation hub in public-private partnership; encourage the installation in buildings and large projects of distributed solar photovoltaic generation

**2050**

- Investment in climate research and development reaches 2% of São Paulo GDP.





# Directives and Strategic Plan





## TIMELINE

Approved by the Legislative Assembly of the State of São Paulo in November 2009, the PEMC (State Policy on Climate Change, Law 13,798, 09.Nov.2009) had until recently as the most highlighted provision a global reduction target of 20% of carbon dioxide emissions relating to the year 2005 to the year 2020 (art 32 p. 1). The compliance with the target will be verified soon after the publication of estimates of the State's emissions by the SEEG (Greenhouse Gas Emissions and Removal Estimates System, <https://bit.ly/3aYHAeo>), an initiative of the Climate Observatory validated under the cooperation of the State of São Paulo, in August 2021.


Though there is no express provision in the PEMC law for a mitigation target for the post-2020 period, the legal text establishes in its objectives and guidelines the alignment with science and with the multilateral agreements in which Brazil participates. After the PEMC, the National Policy on Climate Change (PNMC, Federal Law # 12,187, 29.Dec.2009) was published and the UN Paris Agreement ratified by Brazil by federal decree (# 9,073 05.Jun.2017).

The Paris Agreement foresees efforts to stabilize the global average temperature well below 2°C in relation to pre-industrial levels, promote resilience to climate change and make financial flows compatible with this trajectory" (art 2, 4). Under the Agreement (art 4), the so-called climate neutrality ("net zero") aims to balance, according to the best scientific evidence, global greenhouse gas emissions around net zero (ie, emissions and removals match up). Along these lines, several jurisdictions around the world have announced their goals, with different scopes and forms of implementation. More recently the UN launched, along lines of neutrality and adaptation, the campaigns Run for Zero and for Resilience; to which the State of São Paulo recently formalized its adherence by means of a decree (# 65,881, 20.Jul.2021). This defines a long-term goal that fills the gaps with PEMC: to zero the net emissions of greenhouse gases in the State by 2050.

As aforementioned, the São Paulo target for 2050 is aspirational, and responds to the global climatic emergency situation, what requires an alignment of commitments around common goals already foreseen in the Paris Agreement and the Climate Convention. This new target guides the necessary revision of the PEMC regulation (State Decree # 55,947, 24.Jun.2010), mainly in the governance aspects. This change is underway and should be published in the first half of 2022.

We show, on the next pages, the document which was submitted to a Public Consultation, between August and September 2021. It summarizes the main directives and strategic actions assumed by São Paulo State Government in line with the Climate Action Plan Net Zero 2050.





Cradle of industry and national climate policies, São Paulo intends to lead the execution of concrete actions to confront climate change. Although our greenhouse gas emissions - 3.4 tons of carbon dioxide equivalent annually per capita in 2019 - are relatively low compared to the country and the world, we recognize that the weight of our participation in the national economy induces us to go beyond. We intend to align ourselves with the efforts of major governments around the world to achieve neutrality in our greenhouse gas emissions by the year 2050. This challenge is based on an innovative transformation. All over the world, there is talk of the opportunities that a true green revolution offers to recover the economy and society from the impacts of the current pandemic. At the same time, the urgency of dealing with the challenges of climate change alerts us to a new way of thinking, assuming commitments that prevent greater losses, economic, human and environmental, in the not-so-distant future. It is possible to create jobs, invest in the economy and protect both environmental resources and society. The alternative to inaction is very expensive: impacts estimated at up to 10% of GDP in 2050.

The document “Guidelines and Strategic Actions” aims to contribute to the formulation of the Net Zero 2050 Climate Action Plan of the State of São Paulo, which aims to reach the Net Zero by the year 2050, that is, the neutrality of emissions of greenhouse gases (carbon dioxide or CO<sub>2</sub>, methane or CH<sub>4</sub>, nitrous oxide or N<sub>2</sub>O, sulfur hexafluoride or SF<sub>6</sub>, and the two families of gases composed of hydrofluorocarbons or HFCs and the perfluorocarbons or PFCs). It is in line with the guidelines of the State Policy on Climate Change - PEMC (Law 13,798/2009) and should be drawn up by July 2022, as provided for in the Decree of adhesion to the UNFCCC Race to Zero and Race to Resilience Campaigns, # 65,881, 20 July 2021.

It aims to signal strategies that have already been studied and proposed by different countries and local governments. It seeks to define the balance between government initiatives and incentives and the progressive and secure engagement of economic sectors, local governments and society in their commitments to mitigating emissions, socioeconomic resilience, innovation and competitiveness. The involvement of Brazilian businessmen and large international corporations with the commitments of the socio-environmental governance agenda stands out, whose trend is irreversible. Beyond aiming to meet the Sustainable Development Goals, it also seeks to present mitigation measures to be adopted around common goals consistent with those of the Paris Agreement - in particular to achieve climate neutrality by the year 2050 and ensure satisfactory levels of adaptation and resilience, both for



society and infrastructure and ecosystems and its relationship to the global climate system.

The Climate Action Plan can be represented by five axes, through which it is hoped to mobilize resources to create and support thousands of jobs, transforming São Paulo into a center for green technologies and finance. There is no hierarchy between the axes and there are several cross-cutting aspects to be considered - such as education and training, mitigation and adaptation measures at the same time, public health, prevention and control of pollution and water management. Thus, this representation is only intended to facilitate the general understanding of the Plan.

In this perspective, it is proposed a thematic roadmap for the elaboration of the Climate Action Plan - Net Zero 2050 in a simple and direct way, in five Axes:

1. Accelerated Electrification
2. Advanced Fuels
3. Systemic Efficiency
4. Resilience and Nature Based Solutions
5. Green Finance and Innovation

The public commitments must be shown, and they will be settled in four different phases, which can be juxtaposed:

- 1st phase (2021 and 2022), execution of measures and actions in progress, such as the disclosure of the Plan, the detailing of the current emissions panorama and the modeling of trajectories, the adequacy between goals and financial resources, signing of agreements and first regulatory milestones, plans, programs and projects with pre-defined goals, in articulation with the PEMC guidelines
- 2nd phase (from 2025), implementation of new measures and actions, as a result of the previous phase and in line with the revisions of national commitments;
- 3rd phase (as of 2030), completion of the benchmark for the decarbonization route adopted (in line with multilateral and national ones) and adoption of broader measures;
- 4th phase (2040 to 2050), acceleration of decarbonization measures considered successful, giving them pre-commercial and commercial scales, subdividing them into intermediate stages.

Total investment - public and private - should be growing, reaching something around 5% of the State's GDP in 2050. The public sector will take the initial steps to give credibility to the Climate Action Plan, the State Policy



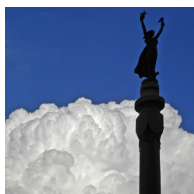
on Climate Change and the entire national legal framework aligned with the objectives of the UN Paris Agreement.

Associated metrics, such as interim targets and investment estimates, will be agreed and disclosed, after rounds of public consultations. The set of strategic actions now proposed aims to significantly reduce, within the proposed target milestones, the current 150 million tons of equivalent carbon dioxide emitted in the State of São Paulo, until net emissions zero in 2050.

In addition to mitigating emissions, it is essential to adapt and better protect our communities and infrastructure from the already visible effects of climate change, investing in water security, fighting droughts and forest fires, protecting against floods and landslides, with resilient infrastructure and based solutions in nature. Within a perspective of circular economy and incorporation of new technologies, losses should be minimized and material and energy inputs from solid waste and liquid effluents should be used.

To conduct this process, a priority will be to establish effective governance, based on multi-level integration, adopting systemic approaches at the center of decision-making that consider everything from local knowledge and regional physiography to the internationally recognized and validated methods of measurement, reporting and verification (MRV).

Government action is not enough to prevent climate change, but the Plan signals and strengthens our capacity to mobilize other actors, such as governments, companies, investors, universities, third sector entities, members and organizations of civil society and each of the São Paulo citizens. The State Climate Action Plan seeks to contribute to the fulfillment of national commitments under the Paris Agreement - as well as other international instruments that may come to be signed by Brazil that deal with the topic - promoting progress towards climate neutrality and a future greener, more resilient and sustainable.



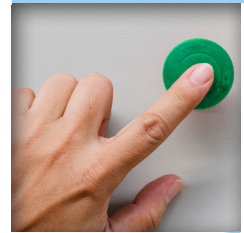


Axis 1 refers to the energy transformation brought about by the promise of abundant electrification from new renewable energy sources, associated with efficient storage systems (such as batteries and hydraulic potentials) and conversion (both for end uses such as lighting and motive power and for intermediate advanced fuels such as hydrogen).

World's energy matrix is changing rapidly. On the supply side, new renewable energy sources - mainly solar, wind and biomass - offer cleaner solutions than traditional fossil fuels. Many already show it is economically attractive, providing innovation and competitive opportunities to those who develop and export technologies. The intermittency of sources has been solved by integrated systems and other redundancy technologies in supply. On the demand side, transport and buildings are undergoing a real revolution, in which electricity and connectivity more efficiently offer end-use services such as mobility, room cooling, cooking, lighting and communication. Electricity moves through wires, with transmission and distribution networks more versatile and resilient than highways and pipelines. Energy storage and conversion technologies integrate smart grids, advanced fuels, batteries, multiple hydraulic potentials and other options such as demand-side and distribution management (Axis 3). Several inputs that are now considered waste may contribute to having a more sustainable matrix.

The State of São Paulo must naturally incorporate many of these changes, but the Climate Action Plan aims to accelerate the process, aligning it with climate objectives and also urgent needs to transform the economy. The work will provide guidelines in support of municipalities, seeking to reconcile the planning of buildings, land use and tax with a new reality based on clean and decentralized energy.

Electrification based on renewable sources is an opportunity for São Paulo to host external investments and create an innovation environment with endogenous development. São Paulo's electrical system will grow considerably until 2050, based on the growth in renewables. Currently, the State's installed capacity corresponds to 13% of the Brazilian electricity matrix (24 GW). São Paulo can expand this share to 15% in 2030 and 20% in 2050. The photovoltaic solar source will play a central role in this process given the immense potential in the state, its low and decreasing price, as well as its agility of implementation. Thus, despite still very little explored in the territory of São Paulo, solar potential can become a central source for our





growing economy. By 2050, the current photovoltaic capacity will be multiplied hundreds of times, both through centralized projects and by encouraging the installation of thousands of solar roofs, in order to generate more energy. This is possible addressing the intermittence of this source through redundant generation systems, integration and adequate storage systems.

As demand for electricity grows, bioenergy provides a reliable, low-carbon source. Based on São Paulo's considerable experience with sugarcane bagasse, an attempt will be made to expand large-scale generation, within a vision of the future with jobs and the use of new technologies associated with the reform of ethanol and biomethane, as well as several advanced fuels. To support this expanding industry, it is intended to mobilize investments in new energy technologies, in order to generate significant electricity from renewable and less polluting sources by 2030.

Although São Paulo's energy matrix is mostly clean, with a 60% share of renewable energy in total, there is still significant potential for diversification and implementation of new energy sources and inputs, such as photovoltaic solar energy, biomethane from the sugarcane sector, from landfills and sewage treatment plants, and the energy resulting from the economic and energetic use of solid waste. The latter in particular will occur as a result of local and regional opportunities, to be observed in the Solid Waste Plans and environmental licensing requisites, to responsibly add energy to the grid and respect the directions of the National Solid Wastes Policy.

In this line, energy efficiency actions are essential, whether to stimulate productivity gains and optimize the use of existing infrastructure, or to postpone investments and works necessary to meet the growing demand. In the area of efficiency, combined actions are being developed to modernize lighting and air conditioning systems in public buildings, from the replacement of light bulbs with LEDs and the replacement of air conditioning systems, associated with the adjustment of demand and self-generation contracts for consumption compensation.

Accelerated electrification addresses several technologies and economic sectors, requiring a transformative framework that at the same time includes important items such as bioenergy, life cycle and supply chain concepts. In connection with Axis 2, electrification allows the introduction of new technologies such as hydrogen fuel cells for heavy road-rail transport. Policies derived from electrification include emission-free zones in large urban centers and master plans for the implementation of recharge infrastructure in cities and on the state road network.

Throughout the elaboration and implementation of the Plan, stages, goals and stimuli for the gradual adoption of technologies may be dis-

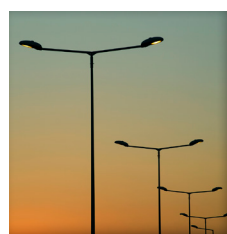
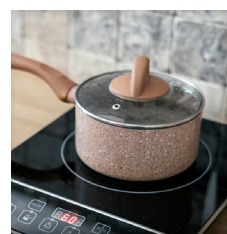
cussed, paying attention to structuring elements both from the point of view of the industry and the users. For the industry to develop, the implementation of Gigafactories in the State of São Paulo should be encouraged, including batteries and electronic components of important strategic value for the light and heavy electric vehicle chain. Completing the life cycle, the structuring of businesses focused on these elements should be encouraged, such as fleet renewal. There are broad challenges built into the accelerated electrification proposal. These include, among others:

- The reality of energy supply, the intermittency of renewable sources and storage/integration solutions;
- Possible use of wind power potential, still considered limited, in São Paulo;
- Supply of electronic components and inputs such as rare earths, battery disposal and the recycling of toxic materials;
- Economic and energetic use of solid waste, its impacts and costs, its alternatives (recycling, composting, biodigestion and others);
- A broad discussion on the role of natural gas. São Paulo is a producer state of this transition fuel (from the heaviest fossil fuels to a renewable energy matrix), which is important for the security of energy supply. The climate equation is not a simple solution and it presents options such as switching from other fuels (petroleum coke, diesel, gasoline, liquefied petroleum gas), capture, sequestration and geological storage of emitted CO<sub>2</sub>, reduction of fugitive methane losses, efficiency energy, insertion of biomethane and hydrogen in gas networks, offsets and carbon pricing; and
- How to improve the scalability of renewable energy sources and other systems based on accelerated electrification.

The initiatives of the Government of the State of São Paulo underway in the areas of energy efficiency and energy generation from renewable sources demonstrate both São Paulo's commitment and commitment to the climate change mitigation agenda. This is the case, for example, of solar generation in available public areas. In addition, there are several centralized energy generation projects replacing other more polluting sources, to provide energy security and local supply, both for electric vehicles and for the growth of the productive sector and system connectivity, driving the change in the final uses of the energy.

The advancement of renewable electricity and electrical energy storage systems can generate:

- Support for the creation and maintenance of tens of thousands of jobs and billions of reais in private investments in this decade;
- Mitigation of São Paulo's greenhouse gas emissions in the transport, residential, commercial, public and industrial sectors;





- Clean electricity and enough to power all homes in the State.
- Key role for the accentuated decarbonization of the state energy system as a whole;
- Highly qualified and green jobs created and sustained throughout São Paulo;
- Important role in transport and air quality;
- Private investment in advanced and competitive technologies, with returns to the entire economy; and
- Leadership in the national low carbon agenda, helping the country to achieve the Paris Agreement objectives.



## TARGET MILESTONES

### 2022

- Publish the São Paulo Energy Plan with a 2050 horizon, with protagonist role in decarbonizing the State economy, considering distributed and shared generation, smart grids, energy storage, industrial and competitiveness policy, production of equipment, pilot projects, public-private green hydrogen hubs, new development centers, expansion of sugarcane and biogas, programs and actions to promote municipalities and companies, education and training, fiscal and tax measures);

### 2025

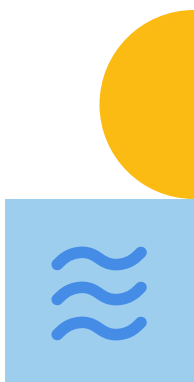
- Implementation by the private sector of the first large scale solar plants in the State; increase the share of biomass in the energy matrix;

### 2030

- Ensure fourfold growth in the installed capacities of solar energy and biogas (sugarcane and wastes) and promote integration with other resources, meeting electrical end uses;

### 2050

- Ensure a strong presence of solar and biomass sources in the electricity matrix in São Paulo (45 GW) and promote integration with other resources, meeting electrical end uses.



Advanced fuels represent the fastest, most effective and lowest total investment that is capable of significantly reducing the emission of greenhouse gases and local pollutants, without having to expand or rebuild infrastructure or force the acceleration of a fleet renewal.

Axis 2 seeks to accelerate the transition to a low-carbon economy through the use of bioenergy (ethanol, biodiesel, biomethane and others), the development of green hydrogen and the impulse to various next-generation fuels. The main climate policies in the developed world point to an energy integration, alongside major efforts to replace fossil fuels - especially the most polluting ones. In addition to electricity from renewable sources, an extremely important vector for a future of zero net emissions is the so-called green hydrogen. This is generated by the electrolysis of water, using electricity generated by sources such as solar, hydraulic and biomass. Hydrogen is a highly versatile fuel that can replace natural gas as well as store electricity and energy.

Hydrogen is also used in the production process, together with vegetable oils or from other organic materials, including sludge from sewage treatment plants, to form the so-called HVO (hydrotreated vegetable oils) or HBO (hydrotreated biogenic oils). There is also SPK (synthetic paraffinic kerosene), produced from some plants and algae. These biofuels successfully replace diesel used in road transport of heavy loads and aviation kerosene used in air transport.

In aviation, the State of São Paulo can benefit from lower emission air transport, favoring lower emission and noise aircraft, as well as the future use of air vehicles of urban mobility. By taking immediate measures to boost the absorption of sustainable fuels, investments in R&D to develop low-carbon aircraft and actions to develop at airports an infrastructure that offers sustainable fuels and low-carbon electricity, São Paulo will be the national leader in reducing energy consumption and emissions in the Brazilian air sector and probably from Latin America. Internationally, efforts to align State goals with the CORSIA of ICAO, the United Nations Organization for International Civil Aviation, must continue.

In land transport, zero-emission vehicles (such as cars, trucks, buses and motorcycles) can be the main manifestation of our ability to simultaneously create jobs, strengthen national industry, reduce emissions and keep moving on. The transition can be accelerated through fiscal and tax mechanisms levied on the sale of new gasoline and diesel models, anticipating the deadlines expected by the automakers. The privileged sale of ethanol vehicles and various forms of green diesel, as well as direct (plug-in) and



hybrid electric technologies, make it possible to drive with less or even zero pollution coming out of the tailpipe in critical urban areas. Targeted financing mechanisms can demonstrate a commitment to domestically manufacturing low-carbon vehicles, bringing jobs and investments back to the State. In addition to production, contributing to the renewal of the fleet, a policy of monitoring and controlling vehicular emissions - especially in metropolitan areas - is also necessary so that we progressively have less and less mobility based on fossil fuels and with energy inefficiency causing, at the same time that greenhouse gas emissions are reduced, an improvement in the quality of the air we breathe.

Rethinking mobility in a decarbonized way is not a task restricted to technological options, but also a commitment that we must assume in the planning and actions of metropolitan regions and municipalities, so that rail transport is expanded, transitions to biofuels for bus fleets are made and that cities have more and more the opportunity to travel on foot and by bicycle, generating healthy cities and contributing to the fight against climate change.

Navigation is also looking for solutions to the climate crisis. Working for the development of maritime technology, identifying benchmarking solutions with international partners needs to become a permanent agenda. Like other national and international ports, one measure in this regard is to encourage the use of ships with lower pollutant emissions in the ports of the State of São Paulo. This can be done by reducing mooring fees, encouraging the use of biofuels in the marine sector and in port operations, investments in R&D to develop sustainable vessel and port equipment projects, and consideration for a more modern and resilient infrastructure in ports, able to withstand the impacts predicted in the sea level rise scenarios.

In several countries, hydrogen has been considered one of the main pillars of decarbonization and hundreds of large-scale projects have been announced around the world, with considerable investments. The decarbonization goals combined with the new applications of green hydrogen, such as the aviation, maritime, heavy transport, residential and commercial sectors, have increased the projections that can favor the socioeconomic and environmental development of regions such as Latin America & the Caribbean, the Africa and Australia, changing the current geoenergetic scenario.

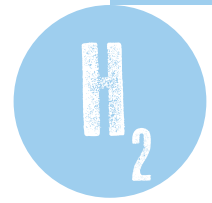
Among Brazil's greatest assets are the countless sources of hydrogen production, mostly renewable: sun, wind, water, biomass, geothermal energy, ocean energy, natural hydrogen, biofuels and even various types of waste. In addition, the country has important factors that contribute to its competitiveness, such as the renewable electricity matrix, the free electric-





ity market, abundance of resources and sources, incentives and policies for renewable energy and biofuels. In addition, the daily solar and wind complementarity are ideal conditions for reducing maintenance costs and increasing efficiency in the operation of electrolyzers. Hydrogen production can also be done through biomass (gasification process), ethanol and biogas (reform processes), opening new business opportunities for these sectors. The gasification process also allows the production of hydrogen from plastic waste, promoting a circular economy.

The growing demand for hydrogen is due to new applications such as in the maritime, aviation, residential and commercial sectors, heavy transport and industrial sectors called “difficult to shoot down”. Aluminum, chemical, petrochemical, cement, iron, steel and paper industries need a large amount of energy to operate equipment such as boilers, generators and furnaces. In these, green hydrogen can be produced in the plant itself and used in production processes, replacing fossil feedstocks and reducing CO<sub>2</sub> on a large scale. In mining, the focus of the use of green hydrogen is on fueling large vehicles and reducing costs in relation to diesel consumption and transport. Furthermore, through processes called “Power to X”, green hydrogen can also be used for the production of synthetic fuels. Synthesis gas and captured CO<sub>2</sub> undergo a series of processes and are subsequently refined into fuels such as synthetic diesel, synthetic gasoline, aviation kerosene and methanol. The Haber-Bosch process produces ammonia, a compound of nitrogen and hydrogen, used to produce nitrogen fertilizers. Traditional ammonia production uses natural gas or coal to produce hydrogen as well as to generate energy. As a result, traditional ammonia production is one of the most carbon-emitting industries in the world. In Brazil, the fertilizer sector imports 80% of ammonia and its derivatives, causing a historic deficit in the trade balance. The green hydrogen sector reopens the doors for the production of national green ammonia. Green ammonia, as well as LOHC (Liquid Organic Carriers), liquid hydrogen and methanol, are being considered as “H<sub>2</sub> Carriers” to scale up the transport of hydrogen by sea. Ammonia and methanol are also being considered for blending or replacing oil in heavy vessels and pure hydrogen as fuel for short-sea ships. In the aviation sector, E-kerosene will be used for blending or replacing fossil fuels, reducing emissions by up to 50%. After 20 years of development, automakers came to the conclusion that the larger the size, the greater the advantage for fuel cell vehicles in autonomy (same as a conventional vehicle), refueling time (from 3 to 5 minutes) and cost. Thus, the heavy vehicle sector has received greater investments and hydrogen stored in liquefied form is being used to gain space and autonomy. Light vehicles have compressed hydrogen tanks.



An encouragement to the use of alternative fuels to fossil fuels in industrial processes is justified. The cement industry, the second-largest industrial emitter in Brazil and in the world, sees a high potential in the use of these energy sources to reduce greenhouse gases, through the co-processing activity, energetically reusing industrial, urban and agricultural waste to replace fuel non-renewable and more carbon-intensive fossils, such as petroleum coke. The expansion of these alternative energy sources in the cement production process is a global reality, and an even bigger and growing trend.

The so-called renewable diesel is compatible with existing equipment and with all current storage and distribution infrastructure. Achieving these goals will, however, require access to inputs (oils and fats) in adequate amounts and costs, thus referring the issue to Axes 3, 4 and 5 of this plan. This integrated strategy is, therefore, essential to reduce emissions from the most polluting segments of transport. Biodiesel is also on the list of advanced fuels, already replacing mineral diesel oil through mandatory blends that reduce greenhouse gas emissions, in addition to improving air quality and encouraging the addition of value to vegetable oils and animal fats. The expansion of biodiesel and HVO must be accompanied by the expansion in the production of oilseeds - inside and outside the State - in the recovery of degraded pastures and in other environmentally and economically attractive areas.

Second-generation biofuels for heavy transport, urban buses and aviation have mature technologies; however, enabling regulation and inducing business models to support these projects is a key factor, as well as the local production of the necessary biomass.

There are several possible conversions of waste to fuel, with different potentials, scales and impacts. The discussion within the PAC2050 does not intend to cover all aspects, but points out their transversalities and risks. This is the case of incineration, pyrolysis, biodigestion and other uses of waste.

Recognizing the importance of the sugar-energy chain in the biological recovery of CO<sub>2</sub>, it should be better studied and perhaps explored the potential to increase negative net emissions in the State of São Paulo, which would contribute to the industrial sectors that face greater difficulties in promoting their mitigation. The so-called biological capture and carbon sequestration (BECCS), by which CO<sub>2</sub> emissions from sugar and alcohol plants could be captured, treated and stored in geological deposits, is still very incipient. Widely widespread in climate modeling, so far this technology has not emerged on a pre-commercial development scale. The development of second-generation ethanol, to produce energy from lignocellulosic inputs,



such as wood and residues, may also be encouraged to expand the production of biofuels, considering issues of cost and efficiency.

In addition, biomethane produced from sugarcane vinasse and other organic waste - from agriculture, industry and sanitation - offers a promising renewable option to natural gas of fossil origin, with its most efficient use being that aimed at the production of electricity where it is generated. There are already projects in progress, and should be expanded throughout the State of São Paulo, where biogas and biomethane have one of the greatest production potentials in the country, due to the amount of waste generated by its large population and because it concentrates a large part of the sugar and alcohol industry. In the vision of product efficiency generated from biogas/biomethane, the financial potential component must be added. In terms of opportunity costs, biogas can be a source of renewable electricity generation, less attractive than renewable competitors such as solar and wind, but quite favorable compared to diesel. Under this vision, the aim is to diversify and create an environment in which biomethane will be substituted for diesel, promoting the São Paulo industry. Biomethane can be traded in the same way as natural gas through pipelines or compressed into cylinders. Working with the industry, it is intended to establish goals for the participation of biomethane in the distributed gas network. Infrastructure investments will be needed to install rapid loading points and biomethane filling stations for heavy vehicles in the main arteries of the long-distance road network, as well as in residential and commercial areas to make loading as easy as refueling an ordinary car.

The electrolysis of water for the production of hydrogen, storage and fuel conversion technologies may provide security in the energy supply, due to the intermittency of renewable sources. Working with the industry, the intention is to have at least one hydrogen plant and another one for advanced batteries in operation by 2030. In an analogous production process, E-Methanol as a fuel can also be taken into account in the axis of advanced fuels. Plants of green hydrogen (produced from renewable sources) could consider having their own power generation plants, following international models. Industrial centers linked to technological hubs will be able to unite renewable energy, advanced biofuels (such as hydrotreated vegetable oils - HVO), and even carbon capture and sequestration, in line with what is most modern in the world in this area.

PAC2050 proposes to implement a technological nucleus, probably with the industries of the ABC and Cubatão regions, by the mid-2030s, where the so-called gray hydrogen can be produced from natural gas, together with a pilot project to capture and geological carbon sequestration, storing the





CO<sub>2</sub> produced in these conversions and preventing it from escaping into the atmosphere.

Some short-term measures can accelerate the technological transition in mobility. One of them is the vehicle technical inspection as an essential and transitional public policy to manage and accelerate the renewal of the current vehicle fleet, benefiting the environment, safety and health of the population in general. Another is a fleet renewal program under the aforementioned plan, starting with heavy vehicles and gradually covering the other vehicles in the existing fleet, ensuring that vehicles in circulation are replaced as they age. These are important aspects needed to define a policy for new vehicles that are environmentally friendly to greenhouse gas emissions but above all local pollutants such as hydrocarbons (HC), nitrogen oxides (NO<sub>x</sub>), and particulate matter, as well as noise.

Thus, promoting the development of advanced and low-carbon fuels can generate:

- Support for thousands of skilled jobs;
- More than ten billion reais in private investment by 2030;
- Mitigation of greenhouse gases, verifiable in the medium and long term, with considerable potential associated with biofuels;
- Synergies with the aeronautical industry, with high added value for the economy;
- Pre-commercial production of hydrogen by 2030, in partnership with the industry;
- Addition of biomethane and/or green hydrogen to the natural gas grid by 2030.



## TARGET MILESTONES:

### 2022

- Discuss within the Energy Plan a São Paulo strategy for advanced fuels;

### 2025

- Work with industry to advance the steps necessary to enable the blending of biomethane and/or hydrogen in the gas distribution network; outline a strategy for implementing the capture and sequestration of carbon emitted by major sources ( regulatory framework, environmental licensing of projects, impacts on land use and geological specificities for its storage); predict and promote the growing restriction until the complete replacement of cargo vehicles powered by internal combustion in large and medium-sized cities in the State by 2040;

### 2030



- Enable operational plant producing hydrogen on a pre-commercial scale; insert electricity obtained from biomethane into the grid; implement an operational industrial cluster capturing and storing CO<sub>2</sub>, mainly from thermoelectric plants and large natural gas projects;

#### 2040

- Large-scale use of HVO to replace diesel in transport;

#### 2050

- Commercialize hydrogen in the State.





Efficiency presupposes a lifecycle approach for products and services, in which the main impacts and waste are verified in continuous improvement processes. Axis 3 aims to revolutionize the way energy and materials are consumed in transport, buildings and industry.

For instance, the production and consumption chain for packaging, food and construction is a critical sector in terms of action needs in terms of systemic efficiency. The so-called sustainable construction has multiple dimensions, covering the entire life cycle of materials and energy, planning and territorial use, use and operation of buildings and other infrastructure, behaviors and lifestyles. The big challenge is to modify these practices on a large scale.

Measures to generate more and cleaner energy complement each other, with its efficient end use. This is essential, not only to reduce the environmental impacts of emissions, but also to minimize the risk of blackouts and water crises. A more resilient system provides reliable and ultimately cheaper power.

Efficiency is a systemic concept and therefore it should be adopted both as a principle and as verification metrics. It encompasses technologies, behaviors and materials. Recent examples include changes in habits, such as those due to the recent pandemic and various supply crises. Efficiency does not imply restriction, but rather obtaining the same - or better - final services with less use of energy and materials. The revolutions in light bulbs, mobile telephony and teleconferences (“home office”) have already demonstrated this - and new revolutions are to come, mainly in electrified and dematerialized transport, including active mobility.

Circular economy combines efficiency with the life cycle of products, combining economic development and the best use of natural resources. Its implementation also proposes an optimization in the manufacture of products, reducing dependence on virgin raw materials and prioritizing more durable, recyclable and renewable inputs. In addition to promoting the best use of natural resources and reducing the impact on waste generation, it has the potential to generate new business opportunities in maintenance, reuse, remanufacturing, recycling, renewables and energy recovery. The State must, therefore, enable the reuse of co-products and residues from production processes, especially with regard to creation, as a precursor of the necessary regulations for this.

Mobility offers many opportunities for efficiency. These include technologies (electric, for example), dematerialization (smaller and lighter vehicles, reaching micromobility), modals (collective transport, on rails) and habits (non-motorized and avoided trips) and centralities (land use planning and activities that minimize displacement).

Efficiency can involve several analyses, such as life cycle, concentrated impacts, cost-benefit, synergies and antagonisms. These often hamper deci-





sion-making, something that can be counterbalanced by careful observation and rational incorporation of international and local best practices (benchmarks) - including traditional knowledge. The feasibility of each is a dynamic aspect, not always captured by studies that project current conditions into the future.

Several countries are enforcing regulations that induce efficiency by controlling the emission of greenhouse gases from vehicles. Examples include progressive targets for the use of electric vehicles in public fleets, emission standards for new models, and traffic restrictions for polluting vehicles. The first leads at the end of about two decades to the impossibility of producing vehicles based on fossil fuels, through technology-neutral approaches. The second establishes emission-free zones in city centers, with transit permits granted through reversible fees on infrastructure and other low-carbon policies. Will be fostered the adoption of ultra-low emission buses – or even zero emission, as well as bike routes in cities throughout the State. In addition to improving air quality, these measures bring immense benefits to physical and mental health. It is also necessary to seek investments in improvements and renovations of the transport infrastructure and in remote activities such as teleworking and distance learning. Will be promoted and encouraged, within the scope of private companies, and effectively implement within the scope of public administration the telework regime, hybrid or full, for all functions that do not require the physical presence of the server to perform their activities, contributing to a significant reduction in gas emissions directly and indirectly.

New electrified metro-railroad lines must be planned, as well as new bus lanes and corridors, forming an integrated transport network in order to contribute to bringing homes, employment and leisure centers closer together. When possible, the creation of new hubs of opportunities should be encouraged, thus avoiding the need for displacement.

Transport hubs to improve interstate and intercity connections should be prioritized. The systems must include solutions that encourage use by citizens, with intelligent demand management systems, integrated ticketing between operators and modes, humanized stations and terminals, urban landscaping and living spaces, bicycle paths, sidewalks and equipment that allow people to walk and cycle. Promote, in addition to micro-mobility, with complementary services to transport services, the use of shared electric mobility, providing for supply infrastructure.

In smaller cities, improvements to the urban and intercity bus system, including in rural areas, should be achieved, in addition to restoring, where feasible, rail links to give people the option of not driving.

Our homes, workplaces, schools and hospitals should be placed at the center of São Paulo's green economic recovery policy, supporting thousands of



jobs and building new supply chains and factories in the State of São Paulo. Making buildings more efficient and switching from fossil fuels (petroleum and natural gas, kerosene and diesel) to electricity will help provide safety, comfort and savings in household budgets.

Sustainable solutions should be promoted in the design and projects of buildings and products, with passive solutions for ventilation, lighting and energy capture. Making buildings more efficient and moving from fossil fuels to biofuels and electricity will help provide safety, comfort and savings on household budgets. Electricity is a cleaner and more versatile energy than those of predominant use, and their access by the most vulnerable should be planned.

For public buildings, new or renovated (retrofit), it will be necessary to mark the paths, by proposing standards with high levels of energy efficiency and low carbon energy, including encouraging environmental and energy quality certifications. Efforts will be made to reduce energy consumption in schools, hospitals and other State facilities. Investments must be made to further boost this market, extending financing and incentives to improve private buildings.

The most vulnerable strata of the population must have access to electricity - an energy that is cleaner and more versatile than those in predominant use. Transforming the lives of more people living in the periphery and rural areas with improvements to their homes is a central objective of this policy.

To keep up with consumer habits, new equipment energy efficiency standards should be proposed, helping families and businesses to reduce their expenses with this essential service. Promoting local manufacturing of efficient air conditioners, lighting systems, electric induction cookers, heat pumps, modern facilities and materials expands diverse supply chains.

The progressive replacement of appliances and equipment, as well as the renovation of facilities and construction under more sustainable criteria, open new jobs and stimulate the entire economy.

Accelerating efficiency and decarbonization in our way of life can lead to:

- Investments and support for thousands of new jobs;
- Greater competitiveness of the São Paulo industry, with return on investment;
- Mitigation of greenhouse gas emissions throughout the life cycle of buildings and transport;
- Greater equity in access to quality energy for the most vulnerable populations;
- Financial and regulatory incentives to improve the energy efficiency of homes, commerce and services;



- Incentives for the industrial and commercial sector to implement programs to reduce solid waste generation or the implementation of “zero waste”, through the practices of reduction, reuse, recycling and environmentally correct disposal of waste generated in their activities; and/or the energy reuse of industrial waste generated;
- Zero and ultra-low emission vehicle traffic on the roads of the State of São Paulo, supported by selective incentives;
- Adoption of ISO 50001: 2018 - Energy management system, as a public policy;
- Implementation of more than hundreds of kilometers of safe and direct cycling and walking networks, with network plans being developed and being built in every city in the State;
- Circulation of thousands of near-zero or zero emission buses on São Paulo’s roads;
- Encouraging the use of reforested wood in civil construction;
- Expansion of electric railway routes, with the reopening of lines and stations;
- Rationalize the waste and water use policy based on efficiency and social and environmental protection targets.

## TARGET MILESTONES

### 2022

- Detail the Strategies of the Transport and Civil Construction sectors combined with the Energy Plan; hire the first public electric fleets in the State; predict the expansion of electrical outlets on São Paulo roads; expand the network of cycle paths and walking; encourage the operation of new railway and subway lines; launch targets for fleet renewal and incentives for the promotion of electric micro-mobility;

### 2025

- Studies for work commuting along bicycle paths and walks related to changing rooms, showers, bicycle storage, among other structures; detailing integrated construction strategies with an emphasis on prefabricated and programmed assembly processes to significantly reduce travels; expansion of electric railway routes, with the reopening of lines and stations;

### 2030

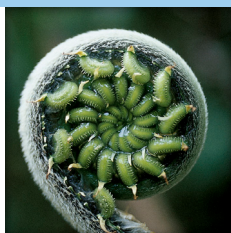
- Deploy thousands of high-power charging stations; reduce energy consumption per household through efficiency and encourage the use of own energy generation through renewable sources ;

### 2050

- achieving full electrical integration, with supply from renewable sources, smart grids and electrification of end uses in buildings and transport.







Axis 4 encompasses, in a broad and integrated manner, all actions that increase the adaptability of human and natural systems to the impacts of climate change. It includes, among other things, security in supplies (water, energy, food and the production chain), circular economy, bioeconomy, modern and sustainable agriculture, infrastructural resilience (urban and rural), the response of health systems human resources, the preventive approach against pollution and accidents, the preservation and restoration of natural, terrestrial and aquatic systems (marine and continental), favoring the protection and recovery of forests and other forms of native vegetation and the increase and restoration of biodiversity.

The climate resilient territory is characterized by low environmental and social vulnerability, continuous attention and prevention to risks and impacts, and the readiness to act in response to situations of disaster, calamity and stress caused by extreme weather, as well as rapid recovery and efficient in its effects. Better adapting and protecting communities, infrastructure and ecosystems from the already identifiable effects of climate change, investing, for example, in defenses against floods and landslides through resilient infrastructure and nature-based solutions is one of the strategic goals of this Plan and an opportunity to generate jobs through the green resumption of the economy and the active participation of society.

Climate change impacts ecosystem services causing, among others, the loss of agricultural productivity, increased vulnerability to social and environmental disasters, loss of native vegetation cover and biodiversity, decreased water availability, increased biological invasions, the spread of diseases and your vectors. The resilience to extreme events of floods, landslides and rising sea levels comes from the commitments made by the State to the Sendai Framework (2015-2030) and the Sustainable Development Goals (SDG 2030).

Adaptation actions are aimed at facing the adverse impacts of climate change. Some examples are the preparation of risk assessments, the improvement of agricultural practices in regions with a higher incidence of drought, the reinforcement of water security, the various strategies to fight forest fires, sea level rise, and the development of early warning systems.

Adaptation offers opportunities. Strategies that integrate the so-called Ecosystem-Based Adaptation provide multiple economic, social and environmental benefits from actions for the conservation, recovery or improve-



ment of vegetation cover, both in urban and rural areas, to combat habitat fragmentation, formation of biodiversity corridors, integrated and sustainable agricultural systems and practices, landscape preservation and water resources conservation. Recognized as services, subject to remuneration or remuneration, they are essential as a preventive strategy and adaptive response to the impacts of climate change. Still, the natural environment plays a vital role in health and well-being, is the most important and effective means to capture and sequester carbon in the long term and a promising scenario for the promotion and creation of green jobs, understood as those promoting the sustainable economy recommended by the PAC2050.

The sectors of agriculture, forests and other land uses have great potential for reducing emissions in its production process, as well as sequestering carbon in biomass and soil. The actions selected to compose this Plan will contribute to climate mitigation and adaptation, also resulting in increased supply of ecosystem services and biodiversity conservation, creation of work and income opportunities and increased productivity in the countryside, including vulnerable populations. The territory of São Paulo presents very different conditions in relation to the use of soil, water, as well as the coverage of native vegetation, which determines that restoration actions are also diverse, complementary and integrated. Models of agroforestry systems (SAFs) and mosaics of landscape uses incorporating native and exotic species for productive purposes make it possible to explore ecosystem services integrated with agricultural production on the property.

One of the greatest priorities of this Plan is the institution of a system unifying the restoration and protection actions of natural vegetation in São Paulo. In this sense, the Environmental Regularization Program (PRA) will give priority to the restoration and compensation of Legal Reserve areas within the State itself. Goals and priorities for action, participatory and transparent mechanisms for monitoring and control should be set. This will serve to ensure synergy and efficiency to the actions implemented by the government, civil society and the productive sector.

Climate Adaptation represents a collective and multi-sector effort that can be improved and better organized. For that, this Plan proposes that the Ecological and Economic Zoning (ZEE) establish institutional articulations for the integration of updated information and shared territorial management in an innovative way. An instrument that cuts across all the axes of PAC2050, the ZEE will establish guidelines for land use planning and management, considering the potential and environmental and socioeconomic vulnerabilities of the different regions of the State. Thus, it will support the formulation of public policies, guiding public and private investments and



subsidizing the adoption of mitigation measures and adaptation to climate change.

In addition to adaptation, this axis presents several mitigation actions, here classified into lines of action with a scientific basis, aiming to guide and optimize the adoption of different management and investment instruments. The preservation line will aim to prevent deforestation and degradation of existing natural vegetation, thereby mitigating greenhouse gas emissions. To this end, the State will maintain its efforts and investments in environmental inspection and in the fight against forest fires, with the continuous adoption of new technologies and tools for monitoring - remote and in person - of the remnants of natural vegetation. Coordinated field operations, integrating different agencies, will bring greater efficiency and agility to inspection actions.



It is intended to promote incentives for economic activities that support and depend on the maintenance and management of forests - such as ecological tourism programs in regions with higher percentages of forest cover, as in the North Coast regions (87%), Baixada Santista (79%), Ribeira do Iguape (78%), Serra da Mantiqueira (57%), Alto Tietê (36%) and Paraíba do Sul (27%). The expected effects are the creation of job and income opportunities through the movement of the local economy, increasing the attraction of public and private investments, as well as the expansion of knowledge about the natural areas of the State of São Paulo and their importance.

Expansion of conservation units should increase the percentage of protected areas and improve the effectiveness of their management, preserving the rich biodiversity existing in the Atlantic Forest and Cerrado biomes, while contributing to increasing the State's water security. Special attention will be given to the preservation and restoration of mangroves, floodplains, marine life nurseries and natural buffer zones in the event of extreme events such as storm surges and surf, whose intensities and frequencies are expected to increase as a result of climate change.

Implementation of the Environmental Regularization Program (Federal Law 12,651/2012) will be the main vector of the restoration line in São Paulo, whose goal is to reach hundreds of thousands of additional hectares of native forests by 2040, prioritizing Legal Reserve compensation within the State. The restoration of riparian forests is important for protecting water bodies, for maintaining habitats, as well as for agricultural activities close to riverbanks.

These include the most important areas for the generation of biodiversity ecosystem services, such as reservoirs, lakes, springs and riverbanks. The



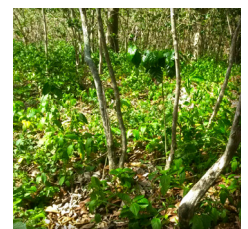
State will also act as a supporter for the restoration of native vegetation, providing platforms to facilitate and reduce the costs of complying with legal obligations and voluntary initiatives.

Low-cost restoration techniques, such as full-area direct seeding and assisted regeneration, will be encouraged. The government will also support the structuring of the ecological restoration chain, considering the local water availability, with the development of scientific research and the diffusion of technologies.

The incentive to restoration for economic purposes will focus on the conversion of pastures of low agricultural aptitude to multifunctional forests, agroforestry and forest-livestock systems, reinserting underutilized land in the productive system of forestry and agricultural goods, in addition to environmental services. Deforested in the past and abandoned or underutilized for not being able to meet the biophysical requirements of the intensive production technologies currently adopted, degraded pastures in areas of low agricultural suitability currently generate social, economic and environmental problems.

Changes in land use through plant recomposing and restoration, in addition to sequestering carbon and generating products – forest and non-forest – will have a relevant impact on the conservation of water resources. In this sense, special attention will be given to the recharge areas of aquifers and springs.

The implantation of productive forests will take place through hubs or local arrangements, and will be accompanied by the structuring of chains of native species, with the development of new products and markets. The action will strengthen the increase in income in regions that today constitute pockets of poverty, settling the young population in the countryside and creating new alternatives and qualified jobs for rural producers. Production of high-value native wood, obtained in a sustainable and traceable way, will also contribute to reducing the pressure on deforestation in the Amazon and other regions that supply the São Paulo market. The production of fruits, nuts, oils and other food products will also contribute to food and nutritional security. The production of natural rubber and vegetable oils for biofuels will contribute to the replacement of fossil fuels and materials derived from them, an important mitigating measure. These are some of the co-benefits of productive restoration actions. The Forest Inventory - which periodically documents the coverage with native vegetation in the State - will represent the main instrument for monitoring and measuring the effectiveness of policies, plans and programs aimed at the conservation and restoration of this important natural heritage.



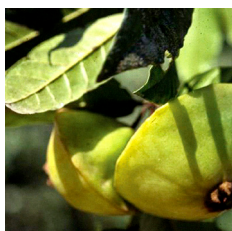
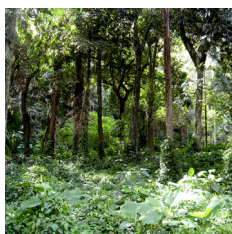
Implementation of restoration actions will enable the vegetation cover in the territory of São Paulo, currently at 23%, to be expanded to around 30 % in 2050. By the year 2050, 114 municipalities that today have less than 10% of native vegetation should pass to the condition of non-degraded. In that same year, another 235 municipalities (with 10 to 30% of native vegetation) should have their coverage increased to be considered suitable for forest phyto-physiognomies, that is, with a balance in the landscape between their aspects of conservation and economic use.

By expanding the adoption of mitigating measures, the State will also encourage the adoption of systems, practices and processes for low carbon agriculture (ABC), aiming to reduce emissions from agriculture and take advantage of the immense potential for carbon removal that the sector offers. Productivity gains will be encouraged for farmers to invest in modern technologies to make their businesses more efficient and more profitable, while reducing their emissions and protecting ecosystems.

Livestock, a major emitter of methane and nitrous oxide, is expected to be the subject of more research, with genetic development, management and nutrition, with lower greenhouse gas emissions, adding value to production and allowing populations to remain in the countryside. Other research will be applied to the production and consumption of meat, with educational campaigns and encouragement to the production of food alternatives.

The actions identified for the sector are also capable of contributing to the conservation of water and biodiversity, as well as to the qualification of rural producers and income generation in the countryside, which reinforces its strategic importance. The State government intends to continue and expand the ABC Plan - Low Carbon Agriculture, which establishes several bases and guidelines for action, such as: increasing the area of recovered pastures; crop-livestock-forest integration (ILPF); agroforestry systems (SAF) with soil and water resources conservation; no-tillage (SPD) and reduced cultivation systems; biological nitrogen fixation (FBN); planted forests (production or preservation); and treatment of animal waste and agro-industrial residues to generate biogas and organic compost. The actions in support of Low Carbon Agriculture and restoration should take into account the different profiles of farmers and pay special attention to the peculiarities and weaknesses of family farmers.

With regard to the conservation of water resources, the implementation of State programs for solid waste and sanitation is highly relevant in order to improve its final disposal and reduce effluent treatment costs, ensuring that uncontaminated water is available for irrigation and water recharge. Surface and groundwater.



Climate adaptation is expected to create new services and jobs. Investing in defense against floods, landslides and sea advances in the coastal zone will protect infrastructure, homes, businesses and communities from climate risks, while preserving the natural environment and helping to adapt to new realities.

There should be continuous investment in improving the issuance of early warnings through technical-scientific development, monitoring of risk areas, as well as in the promotion and institutional strengthening of Civil Defense and Protection actions, especially at the Municipal level. Educational actions aimed at increasing the resilience of populations living in risk areas will be intensified, seeking their effective participation in adaptive prevention and risk mitigation.

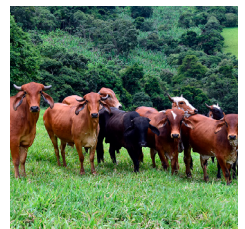
Investments will be made in a 5-year program for climate resilience, including innovative approaches to working with the power of nature to not only reduce the risk of impacts, but deliver benefits to the environment, nature and communities. For coastal municipalities, a meta-oceanographic monitoring program should be adopted, standardized and comparable among municipalities, proposing the re-naturalizing of beach environments to better mitigate the effects of climate change.

The scope of our policies should be expanded beyond the borders of the State of São Paulo. The induction of conscientious consumption measures, certification of products (timber and non-timber), and the adoption of sustainable public procurement programs, which already exist, are measures that should be increased, in order to significantly contribute to the protection of Amazon and other Brazilian biomes. Adaptation and compliance models that facilitate access to foreign markets should be promoted. Actions will be undertaken in a gradual but accelerated manner, so that the wood, meat and soy consumed in São Paulo have all their chains certified.

In the line of zero net emissions, mechanisms for offsetting greenhouse gas emissions generated in São Paulo will also be favored with carbon credits, obtained from deforestation and degradation avoided in other territories.

Resilience measures and nature-based solutions for mitigation and adaptation can bring:

- Thousands of jobs in the countryside, in construction, in forests and in defense against disasters;
- Considerable investments for responses against climate impacts;
- Benefits for the protection of our landscapes with improvements in climate and biodiversity;
- Reinsertion of thousands of hectares into productive systems, generating agroforestry products and ecosystem services;





- Noble wood and sustainable non-wood products, with the structuring of new production chains, products and markets in regions of greater social and economic vulnerability, encouraging small producers to plant and carry out a first processing of their forests with a view to their use in industrialized civil construction, increasing the added value of your products;
- Expansion of the coverage of native vegetation, improving the situation of several municipalities in the State;
- Benefits for human health and well-being, through daily and unstructured contact with “close nature”;
- Benefits for physical and mental health and for the integral development of children and adolescents, developing bonds with nature and its preservation;
- Sensitization of specific actors such as traditional populations and family farmers to the effects of climate change;
- Integrated and participatory governance;
- Creating jobs and boosting the economy;
- Ensuring the competitiveness of agroforestry products, especially for export;
- Gastronomy as an internal market to be encouraged with quality products;
- Creation of ecological corridors, new conservation units and improvement of the management effectiveness of those that already exist, with landscape recovery projects, contributing to the goal of protecting and conserving the State’s ecosystems.

## TARGET MILESTONES

### 2022

- IStart implementing the Environmental Regularization Program (PRA); define multifunctional forest hubs and agroforestry hubs; to consolidate the ZEE – Ecological-Economic Zoning and the ZEE-SP Network; use Nature Based Solutions to increase soil permeability, flood control and flood through partnerships with municipalities; prioritize the watershed protection areas, especially those that serve the large metropolitan regions of the State; technically qualify the municipalities to develop in consortium solutions, preferably their Climate Action Plans (emissions and resilience); use the network of State universities and technical schools in training and in the search for solutions; i started on your characterization of new protected areas and long-term landscape restoration projects;



## 2025

- Invest in programs to defend against floods, landslides and coastal impacts, combating heat islands; ensure that the Environmental Regularization Program is in full implementation; implementation of at least 50,000 hectares of multifunctional forest hubs; create instruments that value the recovery and maintenance of native vegetation, allowing the objectives of the Agro Legal Program (Decree No. 65,182, of 09/16/2020) and other programs to encourage environmental regularization to be achieved; increase the total number of areas restored through the management of multifunctional forests, agroforestry or forest-livestock systems that combine the production of wood, non-timber products and ecosystem services, and incentive programs; creation of the State Plan for the Preparation of Communities Exposed to Technological Risk of Chemical Origin, based on Technical Standard P4003 - CETESB and Creation of a State Commission for Prevention, Preparation and Response to Technological Accidents (Na-Tech); propose a Forest and Wetlands Restoration Plan; propose socio-educational actions to eliminate waste from rivers and seas; strengthen the educational actions of the State Civil Defense and Protection System aimed at increasing the resilience of populations living in risk areas, seeking their effective participation in the prevention, preparation and mitigation of risks through the formation of Community Centers for Civil Defense and Protection; invest, on an ongoing basis, in improving the issuance of early warnings through the technical-scientific development of the monitoring of risk areas;

## 2030

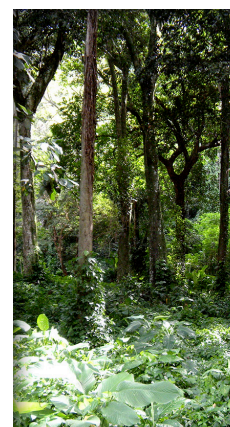
- Recover about 350 thousand hectares (about half of the State's permanent protection areas or APPs to be restored);

## 2040

- Reach 800 thousand hectares (all APPs restored, which is also equivalent to the goal of the Agro Legal program);

## 2050

- Achieve 1.5 million hectares in restoration and with management of multifunctional forests, agroforestry or forest-livestock systems that combine the production of wood, non-wood products and ecosystem services.



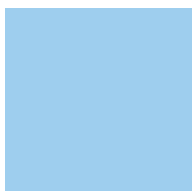


This last axis addresses the different forms of financing for a low-carbon, competitive and resilient economy. Within this context, it aims to insert São Paulo in a global environment, with the search for innovation through research, technological development and information exchange. The international experience offers opportunities for us to identify the best financing and support mechanisms to bring investments from the private sector in the most diverse projects, so as to offer a business environment that is sufficiently clear to the demands of investors.

Innovation managers, entrepreneurs and financial institutions will focus on progress in the key technologies of the future. Alongside specific green policies, this will also be supported by the record increase in public investment in research and development. Desenvolve SP, Investe SP and FAPESP should collaborate to accelerate the technological transition, as well as the development of innovative low-carbon systems and processes in the priority areas outlined by this Plan. Private investment in innovation will also be encouraged and thus reduce the risks of climate finance.

Green innovation will help reduce the cost of transitioning to emission neutrality by 2050, foster the development of better products, create new business models and influence consumer behavior. São Paulo will contribute to the advancement of technologies for the decarbonization of the economy, contributing to the neutrality of emissions at the national level. São Paulo should seek, foster and disseminate international partnerships aimed at exchanging knowledge and technologies in the key areas of PAC2050. The federative articulation should focus on financing lines and regulatory frameworks aimed at low carbon options, contemplating taxonomies that clearly identify the concept of climate finance through renewable, efficient and more adaptable options to the impacts of global warming. The R&D projects to be launched must contemplate all sizes of companies, through public calls, notices, non-refundable resources and other forms of call.

Financing and tax exemption in low-carbon infrastructure with greater potential for generating income and employment will deserve special attention. Likewise, in many cases, funding cross-cuts various adaptive measures, such as prevention of pollution and diseases, assistance to the most vulnerable populations and ecosystem services. Incorporating climate justice as a strategic guideline, Ecological-Economic Zoning should become an important instrument to ensure that infrastructure financing reaches the most vulnerable populations - alongside the pillars of water security, safeguarding biodiversity, competitive and sustainable economy and reducing regional inequalities.



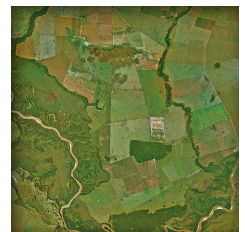


Economic incentive programs, especially in the form of Payment for Environmental Services, will be implemented by the State and local governments, encouraging private landowners to invest in and contribute to the conservation of natural vegetation or rational exploitation of forest products. With this, the standing forest will be recognized as an economic asset, a vector for development and quality of life. Private investments arising from environmental compensation will be channeled towards the consolidation and expansion of conservation units in strategic areas for the preservation of biodiversity - always seeking to equate land regularization processes. Protection in private areas will be promoted through economic incentive programs for the Private Natural Heritage Reserves (RPPN) program.

The ICMS Ambiental (environmental value added tax) directs resources to the budgets of municipalities with the greatest coverage of natural vegetation, guaranteeing the financing of economic activities that contribute to forest conservation, water security and renewable energy, and adequate solid waste management. A green credit line will be implemented to finance forestry projects that contribute to the generation of ecosystem services, aiming at the productive restoration of 800 thousand hectares by 2050, covering areas of springs and banks of streams and rivers in the State of São Paulo.

The Environmental Regularization Program/PRA, in compliance with the Brazilian Forest Code, will support and promote restoration actions and, when necessary, will encourage the compensation of Legal Reserve areas, with priority for areas in the State itself. Biodiversity credits that, in addition to carbon credits, generate positive material and immaterial externalities for the well-being of society through the protection and conservation of fauna and flora, water flow management, habitat protection, food security, in addition to demanding responsible corporate governance social and adhering to the goals of sustainable development.

Protection of springs and the integration of farming-livestock-forests (ILPF), one of the main points of the São Paulo Plan for Low Carbon Agriculture, will have priority in public financing in this area. Such actions involve converting around 20% of the pastures of low agricultural suitability in SP into restored areas, without generating conflicts with the intensive agricultural activities already consolidated. Green credit lines will be proposed for Low Carbon Agriculture, in connection with the State ABC Plan. Others may be proposed to supply the chain of advanced fuels - the case, for example, of palm trees associated with large-scale aviation biokerosene and green diesel plants.



Efforts should be made so that the tax system, at the state and national level, encourages the Circular Economy, including, among others, reverse logistics systems, recycling and alternative technological routes, through differentiated taxation.

In line with the climate neutrality goal, one of the basic premises of the PAC2050 is that it promotes the progressive transformation of the infrastructure in São Paulo. Thus, many of its proposals require substantial investments, in line with international economic changes, and making use of tax, regulatory and financial strategies. Opportunities are the installation of battery and electric vehicle factories, the electrification of railways, the generation and storage of solar energy, the expansion and modernization of the distribution and energy supply network for vehicles.

The Plan is based on an expectation of a return higher than the status quo, in which the commitment to emissions and lack of resilience implies higher costs in the future. Adjusting routes is another basic premise of the Plan, always considering that a series of commitments have already been made and that there is an important challenge in adapting them to an objective of climate neutrality. Positive economic impacts can be achieved by measures such as efficiency, circular economy, research, development and innovation. Along these lines, a program of regulatory, normative, credit and tax incentives should be provided. These must meet a wide spectrum of needs, ranging from micro and small businesses to large centralized projects. Innovation must be invested in to make the most of proven technologies and bring in new, lasting and skilled jobs.

Progress in this transition depends heavily on reforming the tax and regulatory systems, regulating the most polluting and less efficient options while encouraging options that are more aligned with the objectives of the PAC2050, in order to accelerate the technological learning curves and finance the public services of high quality and infrastructure consistently with the transition and transformation proposals. Supply chains, targeted investments in infrastructure, public transport, active mobility and the circular economy should be encouraged. The ambition is to invest heavily in research, development, innovation and dissemination by 2030, expanding the production scale and also enabling rules that induce new business models to support these projects. Technical, environmental and economic assessments carried out by the various agents should help in making the decision to invest in innovation to make the most of the various existing and future technologies.



An example of change of course in the PAC2050 is the use of natural gas effectively as a transition to a low carbon economy. Mentioned here are researches and projects associated with synergy with accelerated electrification, with the hydrogen economy and with biomethane, with the replacement of diesel oil and gasoline in various applications, with the capture and geological storage of CO<sub>2</sub> and with the mechanisms of market and emission pricing. The transition from fossil energy is a need that should be supported by strategies such as research and development of various technologies. Universities and research centers will be essential in this endeavor and, to that end, several measures will be strengthened, including lines of academic research in partnership with the private sector, leveraging centers of excellence in the great universities of São Paulo.

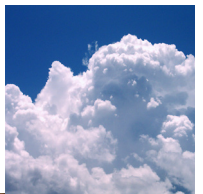
Actions to promote the national production of essential materials for the implementation of technological routes should be foreseen. The State should promote the creation of green technological conglomerates, with anchor industries that will mobilize supply chains, directly impacting the increase in the employment offer and recognizing the most climate-sustainable production chains in the territory of São Paulo.

The Plan intends to position the State of São Paulo as a leader in carbon markets, guiding economic activities and facilitating climate finance. The form and reach of this market can be better defined after the outcome of the Glasgow Conference, COP26, 2021. It is intended that these markets become powerful long-term indicators for investments, alongside other tools such as carbon pricing, regulation and other levers to maximize growth opportunities and ensure an equitable balance of contributions across society.

Combined, these measures will provide investors with security and a clear framework for establishing the low-carbon finance needed for a zero-carbon-net economy by 2050.

Improving green finance and innovation, in tandem with proper regulation, offers:

- potential for hundreds of thousands of jobs by 2030, in particular new jobs in industry, commerce and services via new opportunities in low-carbon sectors
- government contributions in carbon-net-zero innovation, leveraging greater resources from the private sector
- financing and partnerships encouraging short-term investment







## TARGET MILESTONES:

### 2022

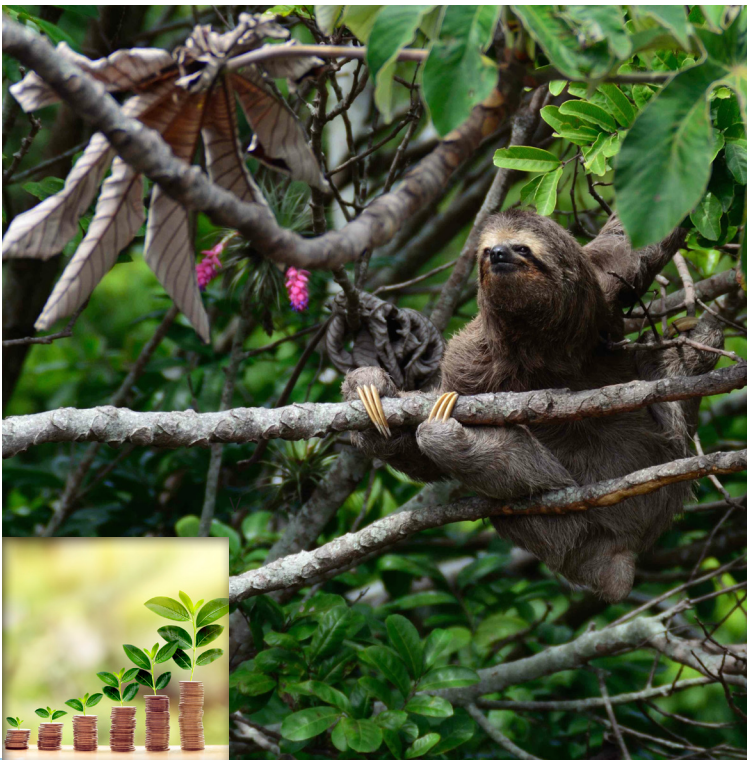
- Start with the Secretariat of Projects, Budget and Management budget discussions in line with PAC2050; publish the priorities of the innovation portfolio; study the profile of existing State funds to receive PAC2050 climate projects; create fund for projects to be fully established in the next 5 years;

### 2025

- Creation of a climate innovation hub in public-private partnership; encourage the installation in buildings and large projects of distributed solar photovoltaic generation;

### 2050

- investment in climate research and development reaches 2% of São Paulo GDP.







Picinguaba Beach - São Paulo's State North Coast



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