



THE NATIONAL CLIMATE CHANGE STRATEGY 10-20-40 VISION

GOVERNMENT OF THE REPUBLIC

National Climate Change Strategy. 10-20-40 Vision

Secretariat of Environment and Natural Resources
Subsecretariat of Planning and Environmental Policy
General Direction of Climate Change Policies

Bld. Adolfo Ruiz Cortines 4209
Jardines en la Montaña, Tlalpan
C.P. 14210, México, D.F.
www.semarnat.gob.mx

First edition: june 2013

Print and made in Mexico
Cite as: NCCS 2013. National Climate Change Strategy. 10-20-40 Vision
Government of the Republic

Free copy. Not for sale.

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AUTHORS

Juan José Guerra Abud	Diana Lahoz Gómez
Rodolfo Lacy Tamayo	Fátima Alejandra López Solana
Francisco Barnés Regueiro , PhD.	Lucrecia Martín Chávez
Beatriz Bugada Bernal	Elizabeth Mosqueda Rodríguez
Fernando Oléa Tinoco	Eduardo Olivares Lechuga
Luis Alfonso Muñozcano Álvarez	Juana Itzchel Nieto Ruiz
Lucía Cortina Correa	Celia Piguerón Wirz
Mónica Paola Echegoyen López	Mildred Trejo Chávez
Soffía Alarcón Díaz	
Ainara Aranguren Sánchez	
Miguel Ángel Ayala Mata	
Iliana Cárdenes Trujillo	
María Eulalia Mildred Castro Hernández , Biologist	
Gloria Cuevas Guillaumin , Biologist	
Hugo González Manrique Romero	
Víctor Hugo González Sánchez	

Secretariat of the Environment and Natural Resources
Undersecretary of Planning and Environmental Policy
General Direction of Policies for Climate Change
Blvd. Adolfo Ruiz Cortines 4209
Col. Jardines en la Montaña, Tlalpan
C.P. 14210, México, D.F.
www.semarnat.gob.mx

WE APPRECIATE THE COLLABORATION OF:

Andrés Flores Montalvo , PhD.	Iván Islas Cortés
Cecilia Conde Álvarez , PhD.	Luis Conde Álvarez
Julia Martínez Fernández , Biologist	Yusif Nava Assad
Jorge Alberto Tovilla Cao Romero , PhD.	Mariam Nava Assad
Israel Laguna Monroy	Pablo Hernández Ávila
Beatriz Cárdenas Zavala , PhD.	Margot Aguilar, from Solaris Workshops

CLIMATE CHANGE COUNCIL

José Mario Molina Pasquel y Henríquez , PhD.

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Juan Carlos Belausteguigoitia Rius , PhD.

Secretary

Gustavo Alanís Ortega

General Director at the Mexican Center for Environmental Rights, A.C.

Rubén Barocio Ramírez

Coordinator of Environmental Topics at the Mexican Academy of Engineering

Boris Graizbord Ed, PhD.

Director for the LEAD Program at El Colegio de México

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Sergio Madrid Zubirán

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Director of the Atmosphere Science Center at the National Autonomous University of Mexico

Pablo Mulás del Pozo , PhD.

Mexican Representative at the World Energy Council

Norma Patricia Muñoz Sevilla, PhD.

Secretary of Research and Graduate Studies at the National Polytechnic Institute

Carlos Santos-Burgoa Zarnecki, PhD.

Senior Consultant at the Pan American Health Organization

José Aristeo Sarukhán Kermez, PhD.

National Coordinator at the National Commission for the Knowledge and Use of Biodiversity

María Isabel Studer Noguez, PhD.

Founding Director of the Global Institute for Sustainability

Alfonso de la Torre Vega

President of the Consultant Council for the Sustainable Development of the Central Region of the country, PNUD-SEMARNAT Project

We appreciate the support of the United States Agency for International Development (USAID), the Embassy of the United Kingdom, and the Federal Ministry for the Environment, Nature Protection and Nuclear Security of the Federal Republic of Germany (BMU), who, through the German Cooperation for Development (GIZ) contributed to the development and public consultation of this Strategy. Also, we thank the support of several areas of SEMARNAT that collaborated in the making of this document: Coordinator Unit of Social Participation and Transparency (UCPAST), Coordinator Unit for Delegations, General Social Communication Coordination, and the General Direction of Telecommunications and Computer Science (DGIT). For the public consultation of this document we highlight the contribution of the Nuclear Councils of Sustainable Development, REDD+ Mexican Alliance, Climate Works, and the Private Sector Studies Commission for Sustainable Development (CESPEDES). Likewise, we thank the comments received from diverse experts in mitigation and adaptation to climate change from the World Wildlife Fund (WWF), The Nature Conservancy (TNC), the Climate Change Council, the Mario Molina Center for Strategic Studies on Energy and the Environment C.A., and the dependencies that integrate the Intersecretarial Commission on Climate Change.

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PROLOGUE

Climate change is a global challenge that demands a rapid and decisive response from every nation. In order to face it and to contain its effects, it is necessary that each country takes bold actions within its own boundaries.

Mexico assumes its commitment and global responsibility in the face of this challenge, which threatens humankind in general.

Conscious that we are one of the most vulnerable countries to the effects of climate change, we require the complicit action of both citizens and authorities to modify consumption and production habits, so to encourage more sustainable and environmentally friendly practices.

It is fundamental to consolidate alliances between society and governments, with the objective of creating a common front against climate change. It is crucial to take advantage of the talent of the scientific community and of the decided performance to this purpose by the private sector.

In the Government of the Republic we know that one of the most effective ways to stop climate change is by encouraging sustained and sustainable growth of our economy. We must generate an inclusive green growth, based on a higher productivity rather than on the irresponsible exploitation of our natural resources.

The National Climate Change Strategy is the instrument that will guide our actions as a nation, to fight against this phenomenon for the next 40 years. Built upon sound scientific foundations, it poses viable goals that go beyond reducing greenhouse gases. It sets a long term route to improve health and quality of life of the population, while also turning Mexico into a more resilient society.

This Strategy is the result of the joint participation of citizens, enterprises, and academics with the Government of the Republic. Thus, it is the product of a democratic exercise of the whole of our society.

In sum, Mexicans take on the challenge of climate change as an additional motivation to increase productivity, boost competitiveness, generate jobs, and build the thriving and sustainable Mexico that we all look forward to. We have the creativity, the decision, and the talent to accomplish so.

Enrique Peña Nieto

President of the United Mexican States

1. INTRODUCTION

Global action against climate change is inevitable and undelayable. According to the international scientific community, it is necessary that all countries reduce, jointly and decisively, their greenhouse gas and compound emissions in order to avoid the aggravation of their effects. For Mexico, this challenge goes hand in hand with social, economical, and environmental problems that already affect its population, infrastructure, productive systems, and ecosystems.

This phenomenon imposes the need to plan in the long term and act immediately so to adapt ourselves to potentially negative impacts, as well as to reduce greenhouse gases and compounds emissions. This National Climate Change Strategy (NSCC) is the planning instrument that defines a long term vision, and also rules and guides the national policy with a route that establishes national priorities of attention and defines criteria to identify regional priorities.

The long term vision of this guiding instrument poses that the country will grow sustainably and will promote the sustainable and equitable management of its natural resources, as well as the use of clean and renewable energies that will allow for low-emissions of greenhouse gases and compounds. It also aspires to have Mexico become a thriving, competitive, socially inclusive, and globally responsible country that creates enough well paid jobs for all its population, particularly for the most vulnerable. It proposes a socially equitable nation, with a green economy, with ecosystems and populations that are resilient to climate change, and with sustainable cities.

To achieve this vision and with base in a 10-20-40 years route, the NSCC defines the pillars of the national policy on climate change, which in turn sustain the strategic axes in the subject of adaptation that lead us into a resilient country, and the mitigation axes which lead us into a low-emissions development.

To each of these axes correspond lines of action that require integration, continuity of efforts, and the participation, in several cases, of the three orders of government, as well as the legislative powers and every sector of society. It is important to clarify that, due to its guiding character for the first half of this century, this Strategy does not define concrete actions nor

particular responsibilities. The 2013-2018 National Development Plan establishes already the basic actions to follow in the short term, and these will be completed with the Special Program and the state programs for climate change.

To achieve the objectives on adaptation and mitigation, there must exist a coordinated, strong national policy that supports development. That is why the NSCC integrates a chapter to the identification of the pillars of the national policy on climate change. In this section fundamental aspects of said policy are presented: have cross-cutting, articulated, coordinated and inclusive actions and policies; develop fiscal policies and economic and financial instruments with a climatic focus; encourage research; promote the development of a climate culture in society; implement mechanisms of Measurement, Report and Verification (MRV) and Monitoring and Evaluation (M&E); and strengthen international cooperation.

The challenge is enormous. The accomplishment of the mitigation objectives of reducing a 30% of emissions relating to the 2020 baseline and 50% in 2050 relating to the emissions of the year 200 requires structural transformations in the development model of the country.

In spite of the size of this challenge, the general law on Climate Change (GLCC), which entered into force in October 2012 and which mandates the Federal Government into elaborating this Strategy, is the reflection of the decided action of the Mexican State to face it firmly. In the light of the NSCC, Mexico will turn this great challenge into the great opportunity to conserve and sustainably use its natural capital, take advantage of the enormous potential to develop clean energies, correct inefficiencies in the use of energy, generate jobs within a green economy, promote sustainable territorial development, increase competitiveness, and improve public health and quality of life.

This Strategy is a fundamental step toward the instrumentation of the GLCC and shows that the country is moving forward in the fulfillment of its international commitments. It will also be, as we move to its execution, the best argument to demand a collective action of the international community before climate change.

2. CONTEXT

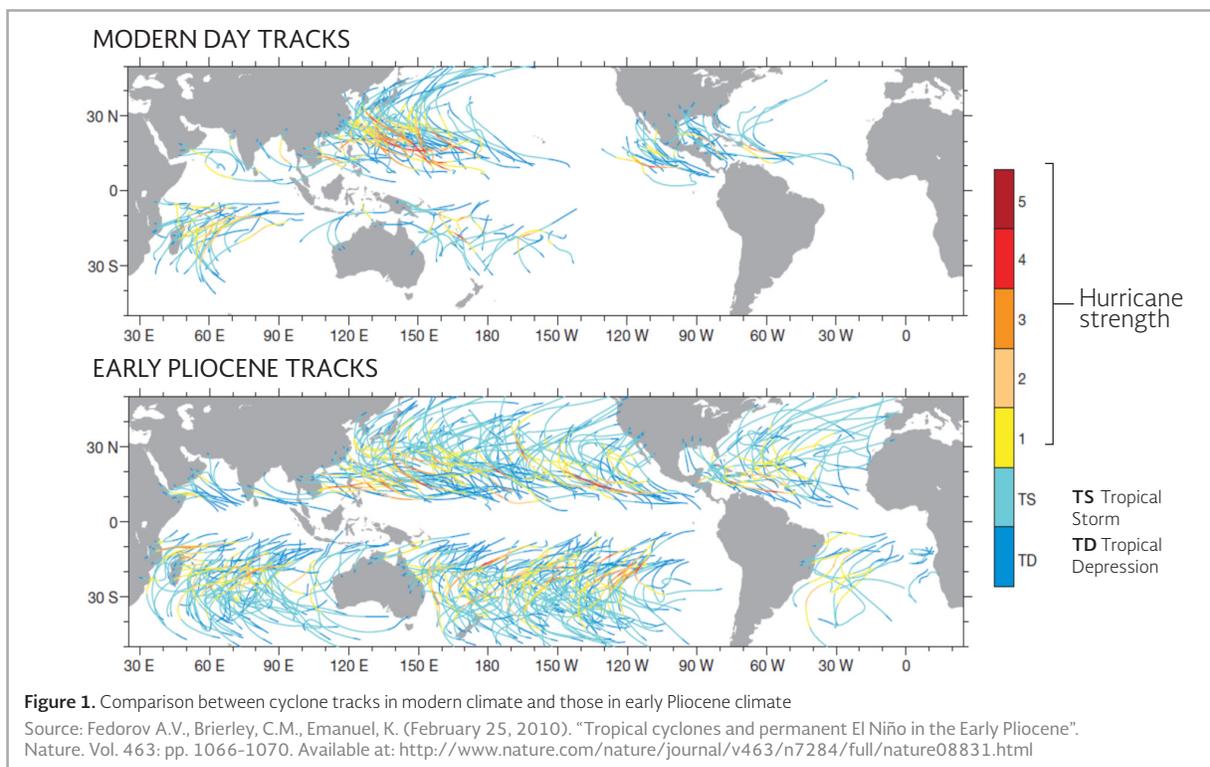
2.1 SCIENCE OF CLIMATE CHANGE

The Intergovernmental Panel on Climate Change (IPCC) has manifested that the warming of the Earth is unequivocal^[1]. The global temperature average of the surface of the Earth has increased since the Industrial Revolution, more notably so in the past 50 years. Scientific evidence allows a highly trusted conclusion that many of the observed changes in the climate system are significant. Likewise, such evidence indicates that human actions, particularly the burning of fossil fuels and deforestation, are causing these changes.

The climate system depends on the balance of several internal and external factors. Among the external factors, solar radiation and orbit cycles stand out, while some of the internal factors are the atmosphere's chemical composition or the cycles of water and carbon. An important increase in the concentration of greenhouse gases (GHG) that alter the atmosphere's chemical composition has been identified in the past decades. This concentration has practically reached 400 parts per million^[2], escalating 40% above

average values registered in the last half million years^[3]. This has as a result the increase in the average temperature of the planet, which could surpass 4°C as we get closer to the end of the century. If this happened, society would face very grave environmental, economic, and social consequences. That is why this crucial moment requires immediate action aimed to minimize the aggravation and impacts of climate change.

Among the possible effects that an increase in the average surface temperature of the Earth of 2°C or 3°C above pre industrial levels are changes in the frequency of extreme events such as droughts and heat waves. Besides, it could change oceanic patterns, which in turn would increase hurricane intensity. For example, it has been studied that this increase in temperature could derive in a similar situation to one occurred in the early Pliocene (between 3 to 5 million years ago), when, because of high sea temperatures, the surface of the sea presented a constant phenomenon similar to El Niño, resulting in high cyclonic activity^[4].



¹ Solomon, S., Qin, D., Manning, M., et al. [editors]. (2007). Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change.

² Earth System Research Laboratory. (Abril / 2013). Trends in Carbon Dioxide. Hawaii, USA: National Oceanic and Atmospheric Administration. Available at: <http://www.esrl.noaa.gov/gmd/ccgg/trends/>

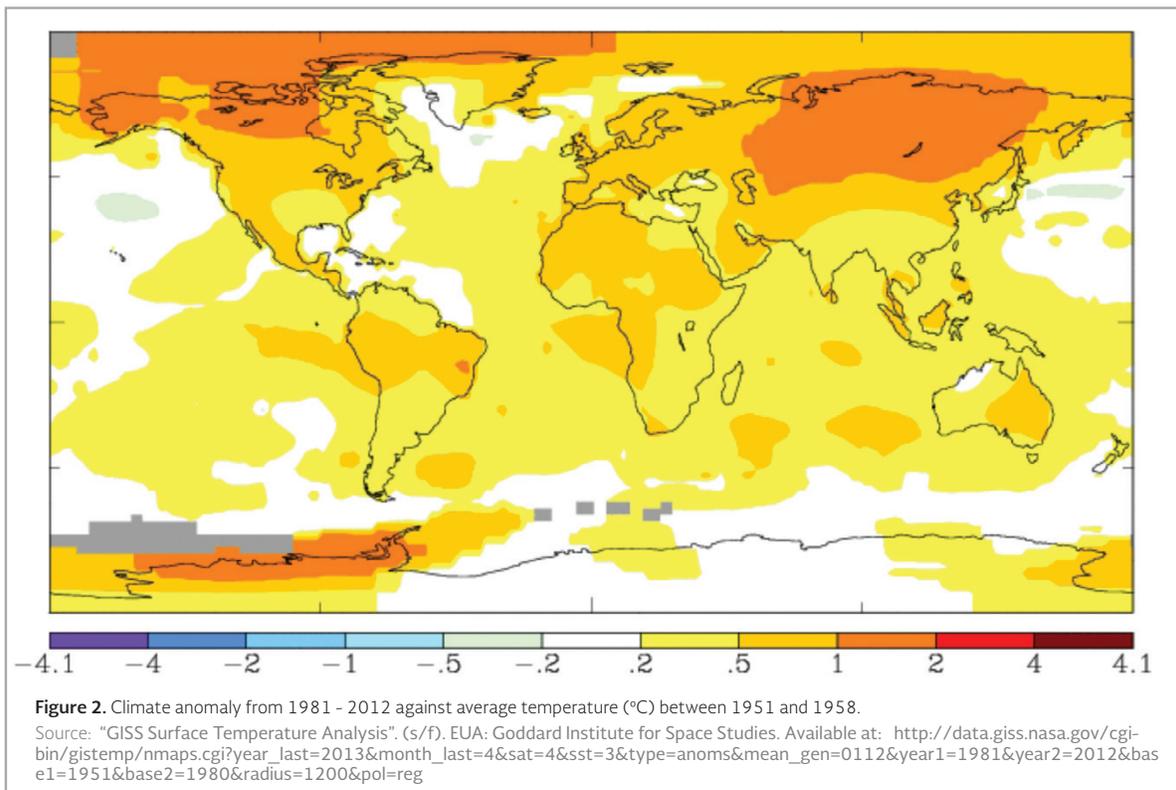
³ Lüthi, D., Le Floch, M., Bereiter, B., et al. (May 15th, 2008). "High-Resolution carbon dioxide concentration record 650,000-800,000 years before present".

As can be observed in figure 1, the current cyclone track is limited to some tropical and subtropical zones of the Atlantic, Indian, and Pacific oceans. However, in a situation such as that of the early Pliocene, these areas would expand through the oceans East to West. Furthermore, the strength of cyclones might augment and have as a result not only more hurricanes, but with a higher intensity, which could have irreversible impacts on the biosphere.

Currently, change in Earth's temperature is evident. As may be seen in figure 2, variation in global temperature between 1981

and 2010, compared to the average between 1951 and 1980, shows extreme temperature conditions, where certain regions of the planet, specially the poles, surpassed 2°C over their historical average.

As much as the international community has committed to reducing their GHG emissions starting from the United Nations Framework Convention on Climate Change (UNFCCC), efforts haven't been enough and the GHG concentration in the atmosphere keeps on growing. Under current conditions,



around the year 2100 the raise in temperature might reach up to 4°C over pre industrial levels⁵. In order to avoid this situation, it is necessary that emissions be reduced considerably.

To maintain the increment in temperature under 2°C, apart from actions for the reducing of CO₂ emissions, it is possible to carry out other short term actions. For example, there exist several climate-forcing gases and compounds that can be treated with additional strategies to those of CO₂. Among them are the

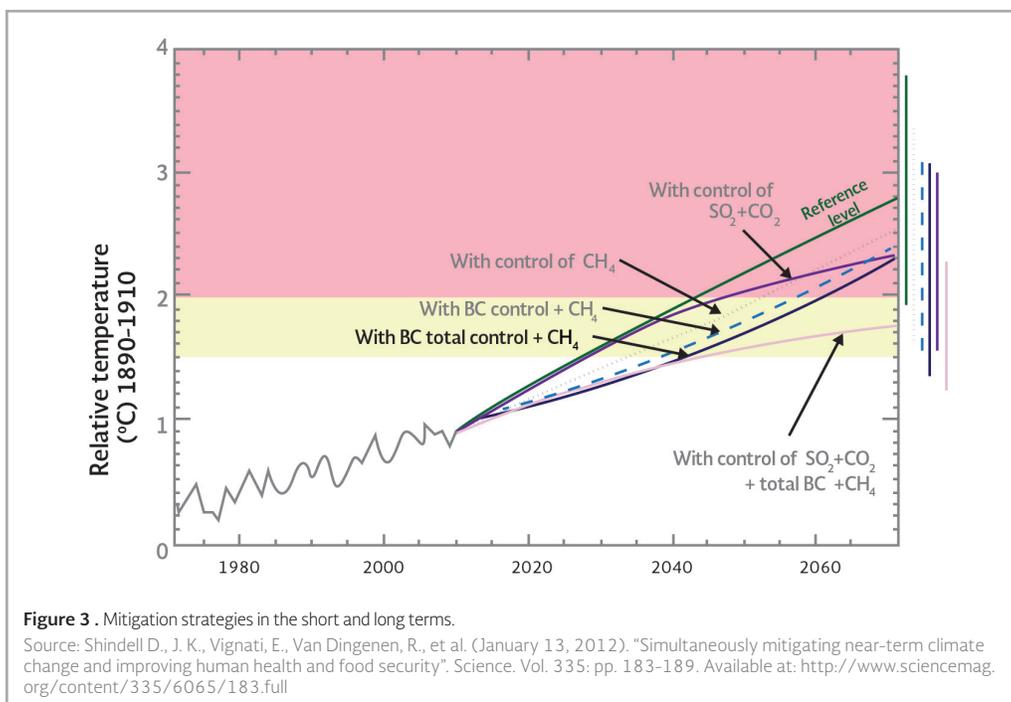
Short-lived Climate Pollutants (SLCPs), the main are as follows: black carbon (BC), methane (CH₄), tropospheric ozone (O₃), and some hydrofluorocarbons (HFC). Unlike other pollutants, such as CO₂, whose lifespan in the atmosphere may last centuries, the lifespan of SLCPs is relatively short and can amount from days up to decades. The control of SLCPs, apart from having an impact on the mitigation of climate change, contributes to the solving of local air pollution problems and positively impacts public health.

⁴ Fedorov A.V., Brierley, C.M., Emanuel, K. (February 25th, 2010). "Tropical cyclones and permanent El Niño in the Early Pliocene"

⁵ The World Bank. (2012). Turn Down The Heat, why a 4°C warmer world must be avoided.

As can be seen in figure 3, a better control of SLCPs –such as BC and CH₄– in the short term, joint with actions for the mitigation of CO₂ emissions, could avoid a larger increase in temperature. That is why it is important to include them in the mitigation

strategy. Nevertheless, it is important to underline that in the medium and long terms, the control and reduction of every greenhouse gas and compound are indispensable for the mitigation of climate change ^[6].



2.2 INTERNATIONAL CONTEXT

For over two decades, the answer to the challenge of climate change has been presented as a shared ground in the arenas of international negotiation. The United Nations Framework Convention on Climate Change establishes a series of mechanisms whose objective is to stabilize the GHG concentrations in the atmosphere so that they will allow for sustainable development^[7].

The objective hasn't yet been reached through this multilateral agreement, which is why it becomes necessary to transit to the adoption of a new global instrument that legally binds universal participation, science-based, with differentiated yet comparable commitments. In the 18th Conference of the Parties of the UNFCCC (COP18), held in Doha, Qatar, on December 2012, an amendment to the Kyoto Protocol^[8] was approved, which formalizes the entry into force of the second commitment period, and was also advanced in the denominated Durban Platform

for Enhanced Action. This Platform aims to achieve a protocol, another instrument, or an agreed legally binding result for 2015, which will be enforced in 2020 at the most. Keeping pace with this processes, Nationally Appropriate Mitigation Actions (NAMA) are being encouraged for developing countries, with the possibility of being backed and facilitated through international funding and technologies. These actions are meant to contribute to the fulfillment of the voluntary emission reduction goals determined by developing countries.

The effectiveness of agreements achieved in the multilateral setting is affected by the lack of commitment some countries have shown in the reduction of emissions, and to both generate and manage sufficient resources in the carrying out of adaptation measures. Also, both the polarization of positions and the absence of leadership of strategic countries to overcome these differences, prevail.

⁶ Solomon, S., Qin, D., Manning, M., et al. [editors]. (2007). "Summary for Policymakers" in *Climate Change 2007: The Physical Science Basis*. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge, UK and New York, USA: Cambridge University Press

⁷ Article 2 of the UNFCCC: "The ultimate objective of this Convention and any related legal instruments that the Conference of the Parties may adopt is to achieve, in accordance with the relevant provisions of the Convention, stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. Such a level should be achieved within a time frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner". Available at: <http://unfccc.int/resource/docs/convkp/conveng.pdf>

⁸ The Kyoto Protocol adopted in 1997 during COP-3 establishes quantifiable objectives for reducing GHG emissions in Annex I or developed countries. Mexico adheres to this protocol as non-Annex I country. Available at: <http://unfccc.int/resource/docs/convkp/kpspan.pdf>

In face of this scenario, both emerging carbon markets and bilateral cooperation actions take form and value. The European Union, countries such as Australia, Japan, and New Zealand, several states in the United States of America, and provinces in Canada, have created emission markets that promote mitigation actions starting from emission caps and commerce measures. These markets minimize the cost of GHG reduction, promote new capacity building and the strengthening of Measurement, Review, and Verification systems.

Within international actions on the subject of adaptation, Mexico encourages the implementation of the Adaptation Framework approved by COP 16 held in Cancun, which establishes

that adaptation should be faced with the same level of priority than mitigation. Under this approach, national efforts for the adaptation to climate change have counted on the support of technical and financial resources received through bilateral cooperation from, among other countries, Germany, the United Kingdom, and France, as well as from multilateral organisms.

Battling climate change requires international cooperation, but also, a decisive national commitment for the development of effective response measures to climate change that will simultaneously provide direct benefit to the population, especially to the most vulnerable.

2.3 NATIONAL CONTEXT

Highly vulnerable conditions in the face of climate change prevail in Mexico⁹. Information on historical climate impact and both socioeconomic and socioecological trends, added to current industrialization and urbanization phenomena, as well as the indiscriminate use and consequent decay of natural resources, among others, represent an environmental, social, and economical problem that will grow worse due to the effects of climate change. In that context, adaptation should be a central component of any effort in the struggle against climate

change. In regards to CO₂ emission, Mexico contributed, in 2011, with 1.4% of global emissions mainly derived from the burning of fossil fuels. According to these numbers, Mexico is the twelfth highest emitter in the world¹⁰.

Even though it could be said that our contribution is not significant if compared to that of high emitters, Mexico is a globally responsible country, and holds the conviction that economic development could and should be achieved while protecting the environment, for this is a public good of which every country in the world depends.

2.3.1 NATIONAL POLICY ON CLIMATE CHANGE AND INSTRUMENTS

General Law on Climate Change

The main political instrument that the country counts on to battle climate change is the General Law on Climate Change.

This legal commitment has as an objective to regulate, encourage, and make possible the implementation of a national policy on climate change, and also incorporates adaptation and mitigation actions with a long term approach that is systematic, decentralized, participatory and integral.

The GLCC clearly determines the scope and content of the national policy on climate change, defines the obligations of State authorities and the faculties of the three government orders. It also establishes the institutional mechanisms needed to face this challenge. According to the Law, the federal government is in charge of formulating and conducting the national policy on climate change according to clearly defined

principles¹¹, among which social co responsibility significantly stands out.

National System on Climate Change

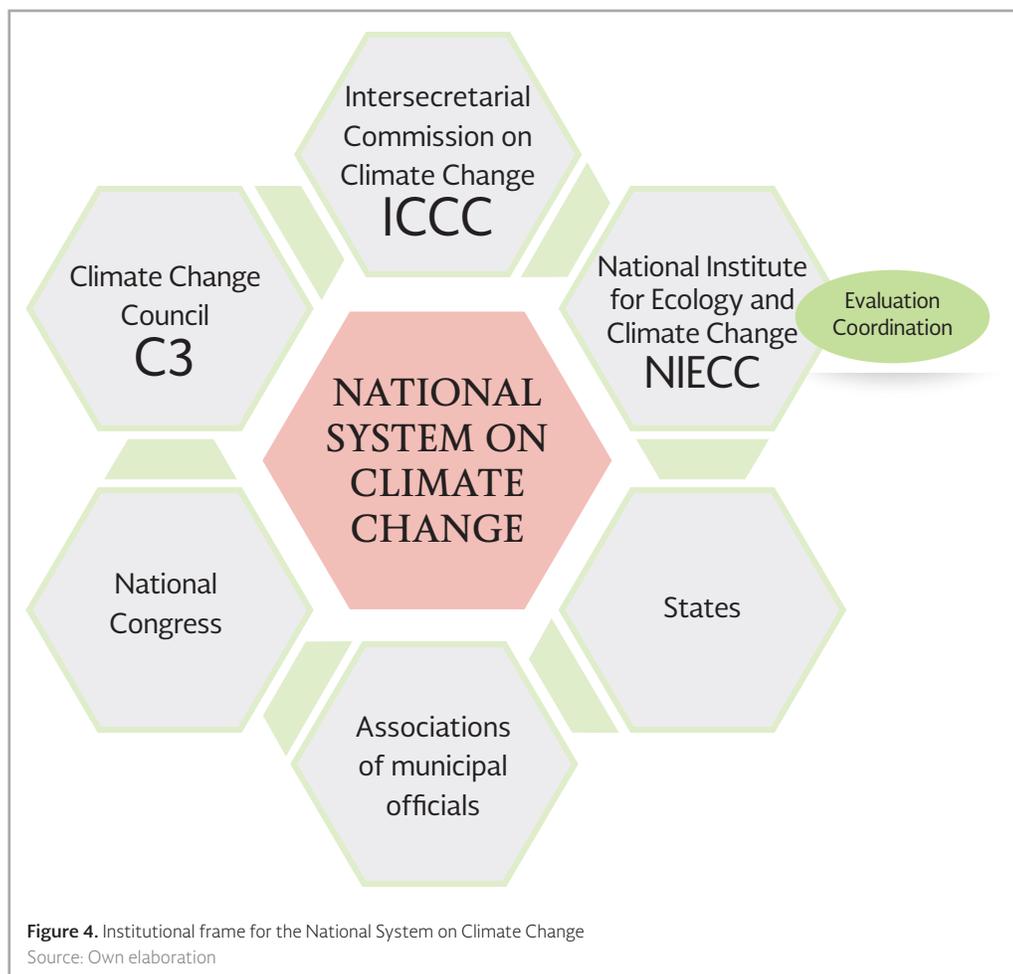
To achieve the effective coordination of different government orders as well as the agreement between public, private, and social sectors, the GLCC foresees the integration of the National System on Climate Change (NSCC). This system must propitiate synergy to jointly face the country's vulnerability and risks before this phenomenon and establish priority actions of mitigation and adaptation.

The Intersecretarial Commission on Climate Change (ICCC); the National Institute for Ecology and Climate Change (NIECC); the Climate Change Council (C₃); states; associations of municipal officials; and the Congress of the Union integrate the NSCC. See figure 4.

⁹ Section 6.1 of this Strategy presents a diagnosis of the country's vulnerability situation.

¹⁰ International Energy Agency. (2012). CO Emissions from Fuel Combustion. Paris, France: OCDE/IEA

¹¹ Said principles are stated in section 2.3.2 of this document.



The ICCC is the permanent mechanism in charge of coordinating actions between dependencies and entities of the Federal Public Administration (FPA) in the matter of climate change. It is integrated by 13 secretariats of State: Secretariat of Interior (SEGOB), Secretariat of Foreign Affairs (SRE), Secretariat of Navy (SEMAR), Secretariat of Finance (SHCP), Secretariat of Social Development (SEDESOL), Secretariat of Environment (SEMARNAT),

Secretariat of Energy (SENER), Secretariat of Economy (SE), Secretariat of Agriculture (SAGARPA), Secretariat of Communications (SCT), Secretariat of Education (SEP), Secretariat of Health (SSA), and Secretariat of Tourism (SECTUR).

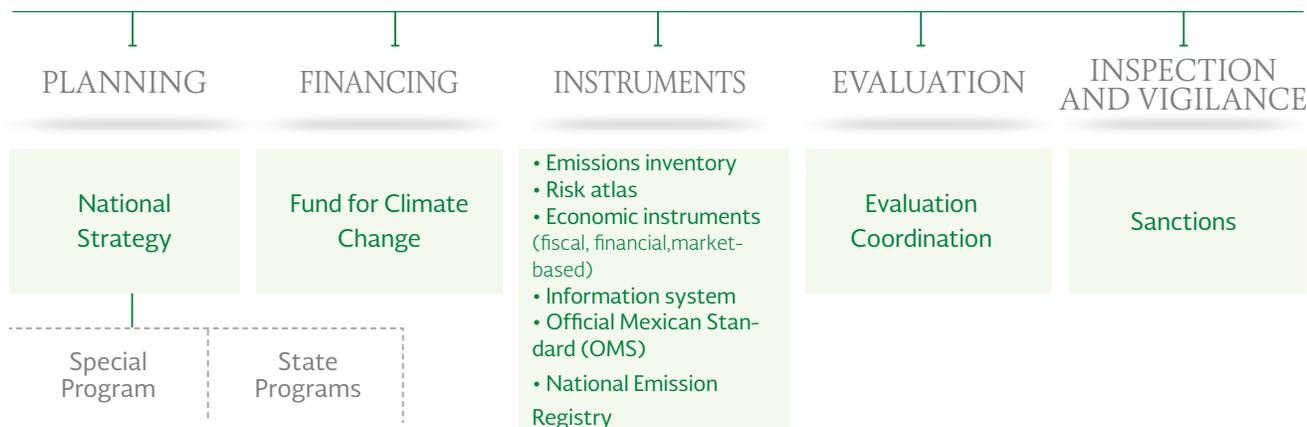
Among the functions of the ICCC are: 1) formulate and implement national policies for mitigation and adaptation to climate change, as well as their incorporation to the corresponding sector programs and actions; 2) develop the criteria for the cross-cutting and integral nature of public policies so that they will be applied by dependencies and entities of the centralized and state-owned Federal Public Administration; 3) approve the NSCC; and 4) participate in the elaboration and carrying out of the Special Program on Climate Change (SPCC).

The NIECC is the research institute created by the GLCC to coordinate and put in action study and research projects of scientific and technological value, with the assistance of academic, investigative, institutions, whether public or private, national or foreign, in the subject of climate change. It is the institution in charge of making prospective sector analysis and of collaborating in the building of strategies, plans, programs, and instruments related with climate change. Its work includes the estimate of future costs associated with this phenomenon and the benefits derived from the actions to battle against it. The evaluation of the national policy on climate change relies on the Evaluation Coordination, integrated by the head of the NIECC and six local advisors, and may be conducted through one or several independent organisms.

The C3 is the permanent consulting organ of the ICCC and is integrated by members coming from the social, academic, and private sectors, with renowned merit and experience in climate change. Among its functions stand out: 1) to advise the ICCC and recommend the realization of studies, policies, and actions, as well as setting goals oriented to facing the adverse effects of climate change, and 2) promote both informed and responsible social participation, through public consultation.

THE GENERAL LAW ON CLIMATE CHANGE

INSTITUTIONAL FRAME NATIONAL SYSTEM ON CLIMATE CHANGE



WITH TRANSPARENCY, ACCESS TO INFORMATION, AND SOCIAL PARTICIPATION.

Figure 5. Policy instruments foreseen on the General Law on Climate Change.

Source: Own elaboration.

Policy instruments

Added up to the institutional frame, the GLCC foresaw a series of financial, regulatory, technical, planning, evaluation, and vigilance instruments within the national policy on climate change. See figure 5.

Among the planning instruments that the GLCC dictates, the NSCC stands out. Other planning instruments are the SPCC and the State Programs on Climate Change.

The GLCC also foresees different tools, such as the National Inventory of GHG Emissions, the National Registry of Emissions, the Climate Change Information System, the Climate Change Fund, economic instruments, Official Mexican Standard, and national, state, and municipal risk atlases. Chart 1 shows some of these instruments and points out the government orders involved with them.



INSTRUMENTS FOR THE POLICY ON CLIMATE CHANGE WITHIN THE THREE ORDERS OF GOVERNMENT

NATIONAL	FEDERAL	STATE	MUNICIPAL
JUDICIAL FRAMEWORK	General Law on Climate Change	Existing state laws on the subject of climate change ¹	
PLANNING	National Strategy of Climate Change	Special Program for Climate Change	State programs for Climate Change ² Municipal programs on the subject of climate change
INSTITUTIONAL ARRANGEMENTS	National System on Climate Change National Institute for Ecology and Climate Change	Intersecretarial Commission on Climate Change Climate Change Council	Statal intersecretarial commissions on climate change ³
INSTRUMENTS	National Registry of Emissions National Inventory of Emissions National Risk Atlas Information System	Official Mexican Standard	Statal Inventories of Emissions Statal Risk Atlas Vulnerable Municipalities Risk Atlas
EVALUATION	Evaluation Coordination NIECC	Evaluation Coordination NIECC	State program evaluation procedures Municipal program evaluation procedures
FINANCING	Climate Change Fund	Climate Change Fund	Climate Change Fund and State funds Climate Change Fund and management of other resources

¹ Up to February 2013, five state laws on climate change had been published: Veracruz (November 2010), Chiapas (December 2010), Federal District (June 2011), Quintana Roo (May 2012), and Baja California (June 2012).

² It is mentioned in the Fifth National Communication before UNFCCC that eight states possess this kind of programs: Chiapas, Federal District, Guanajuato, Hidalgo, Nuevo Leon, Puebla, Tabasco, and Veracruz.

³ It is mentioned in the Fifth National Communication before UNFCCC that 16 states possess this kind of commissions: Campeche, Coahuila, Distrito Federal, Durango, Guanajuato, Guerrero, Jalisco, Michoacan, Queretaro, Quintana Roo, San Luis Potosi, Tabasco, Tamaulipas, Tlaxcala, Veracruz, and Yucatan.

Chart 1. Instruments for the policy on climate change within the three orders of government.

Fuente: SEMARNAT. (2012). *Quinta Comunicación Nacional ante la CMNUCC*. México: Gobierno Federal. Recuperado de: www2.ine.gob.mx/publicaciones/download/685.pdf

2.3.2 GUIDING PRINCIPLES FOR THE NATIONAL POLICY ON CLIMATE CHANGE

Based upon the General Law on Climate Change, the guiding principles that sustain the National Policy on Climate Change and that also reign over the content of the NSCC are as follows:

- » Sustainability in the exploitation or use of ecosystems and natural resources
- » Shared responsibility between State and society
- » Precaution in the face of uncertainty
- » Prevention of environmental damage and preservation of ecological equilibrium
- » Adoption of productivity and responsible consumption patterns
- » Integrality and cross-cutting nature in the adoption of a coordinated and cooperative approach between government orders, as well as with social, public, and private sectors
- » Effective citizenship participation
- » Environmental responsibility
- » Transparency, information and justice access
- » Commitment to economy and economical development without harming competitiveness in the face of international markets



Joanna Acosta/Banco de imágenes CONABIO



3. OBJECTIVE OF THE NATIONAL STRATEGY ON CLIMATE CHANGE

3.1 OBJECTIVE

The National Strategy on Climate Change is the guiding instrument of the national policy on climate change both in the medium and long terms to face the effects of climate change and transition to a competitive, sustainable, and low-carbon emission^[12] economy. Being the guiding instrument, it describes the strategic axes and lines of action to follow based on the available information about the present and future environment, so to orient the policies within all three government orders, as well as it encourages a shared responsibility with diverse sectors of society. This with the objective of attending to national priorities and attaining the desirable horizon for the country in the long term^[13].

3.2 SCOPE

It is important to mention that the Strategy is not comprehensive and does not intend to define concrete actions neither in the short term nor within the entities responsible for their fulfillment. On a federal level, the SPCC will define objectives and specific mitigation and adaptation actions every six years, while it points out responsible entities and goals. On a local level, in accordance to the GLCC and its respective areas of competence, those will be state programs in the matter of climate change and municipal programs on climate change.

The ensemble of those planning instruments, the effective operation of the institutional framework foreseen in the GLCC, the development of economic instruments, and the design of appropriate technical tools in accordance with this Strategy will allow to accomplish both the medium and the long term goals.

3.3 ELABORATION PROCESS

Technical and scientific inputs have been majorly provided by NIECC and other research centers across the country that are dedicated to this subject. A special effort has been put into reflecting the state of the art of every topic mentioned within the Strategy, as well as into referencing source of information in their respective areas.

In regard of the pillars, axes, and lines of action, we highlight the use of documents written and published in 2012 on the subjects of adaptation and mitigation:

- » Adaptation to Climate Change in Mexico: Vision, Elements, and Criteria for Decision Making. (ICCC, 2012).
- » Bases for a Low-emission Development in Mexico. (NIECC, 2012).

In adherence to what is stated in the GLCC, the Strategy has been elaborated by SEMARNAT with the participation of NIECC. It has been enriched with formal contributions by every dependency in the ICCC and with the visions and perceptions collected through bilateral meetings with focal areas of climate change in the Federal Public Administration (FPA). It has been reinforced, also, by an ample participative and consultative process. At first instance, through input received from the Nuclear Councils on Sustainable Development^[14] in every state and the Federal District. Secondly, by the results of a workshop attended by over 80 representatives from the organized civil society and participants from the academic, private, and public sectors; most of them climate change specialists^[15]. Thirdly, by input received through a nationwide online consultation^[16]. Finally, vital contributions by the Climate Change Council were added to the Strategy.

¹² Article 60 of the GLCC.

¹³ Mexico's Vision in the face of climate change is defined in Chapter 4 of this document.

¹⁴ The Nuclear Councils on Sustainable Development are plural spaces integrated by the private, academic, and governmental sectors.

¹⁵ This workshop was held on April 12th, 2013, at the Royal Pedregal Hotel, in Mexico City.

¹⁶ The poll was available from April 8th to the 26th, 2013 on the SEMARNAT website. 12,900 participants were registered, whose information was systematized, analyzed, and evaluated. This poll was supported by GIZ on behalf of the BMU.

3.4 STRUCTURE

By acknowledging that in order to achieve the objectives of the two fundamental sides of adaptation and mitigation of climate change a full-bodied national policy that supports development must exist, the NSCC integrates a topic about the pillars of the national policy on climate change. In other words, the national policy on climate change serves as a foundation for the topics of adaptation and mitigation.

It is so that the Strategy is integrated by the three following topics:

	Topic	Terminology
1	Pillars of the national policy on climate change	P
2	Adaptation to the effects of climate change	A
3	Low-emissions development / Mitigacion	M

Each of these topics integrates a brief diagnosis of the country's situation:

- » **Pillars of the national policy on climate change** integrates a brief analysis of the country's policy on climate change. It is complemented by the contents in section 2.3.1.
- » **Adaptation to the effects of climate change** includes climate scenarios as well as an evaluation and diagnosis of the vulnerability and adaptation capacity of the country. The technical sustain is integrated in the methodological annex, available at: www.encc.gob.mx
- » **Low-emissions development / Mitigation** incorporates a landscape on the country's emissions, the mitigation opportunities, the baseline emissions and scenario, and objective trajectory of emissions. The technical rationale is integrated in the methodological annex, available at: www.encc.gob.mx

Afterwards, each of these topics contains a section in which the policy pillars or the strategic axes and lines of action are described. These pillars and axes define desired objectives, of a more complex nature because they require a variety of actors, actions, resources, and perspectives to achieve them. The NSCC defines six pillars of the national policy on climate change (P), three strategic axes in the subject of adaptation (A) that lead us toward a resilient country, and five strategic axes in the subject of mitigation (M) that take us toward a low-emissions development. Figure 6 breaks down the pillars and strategic axes.



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PILLARS FOR THE NATIONAL POLICY ON CLIMATE CHANGE

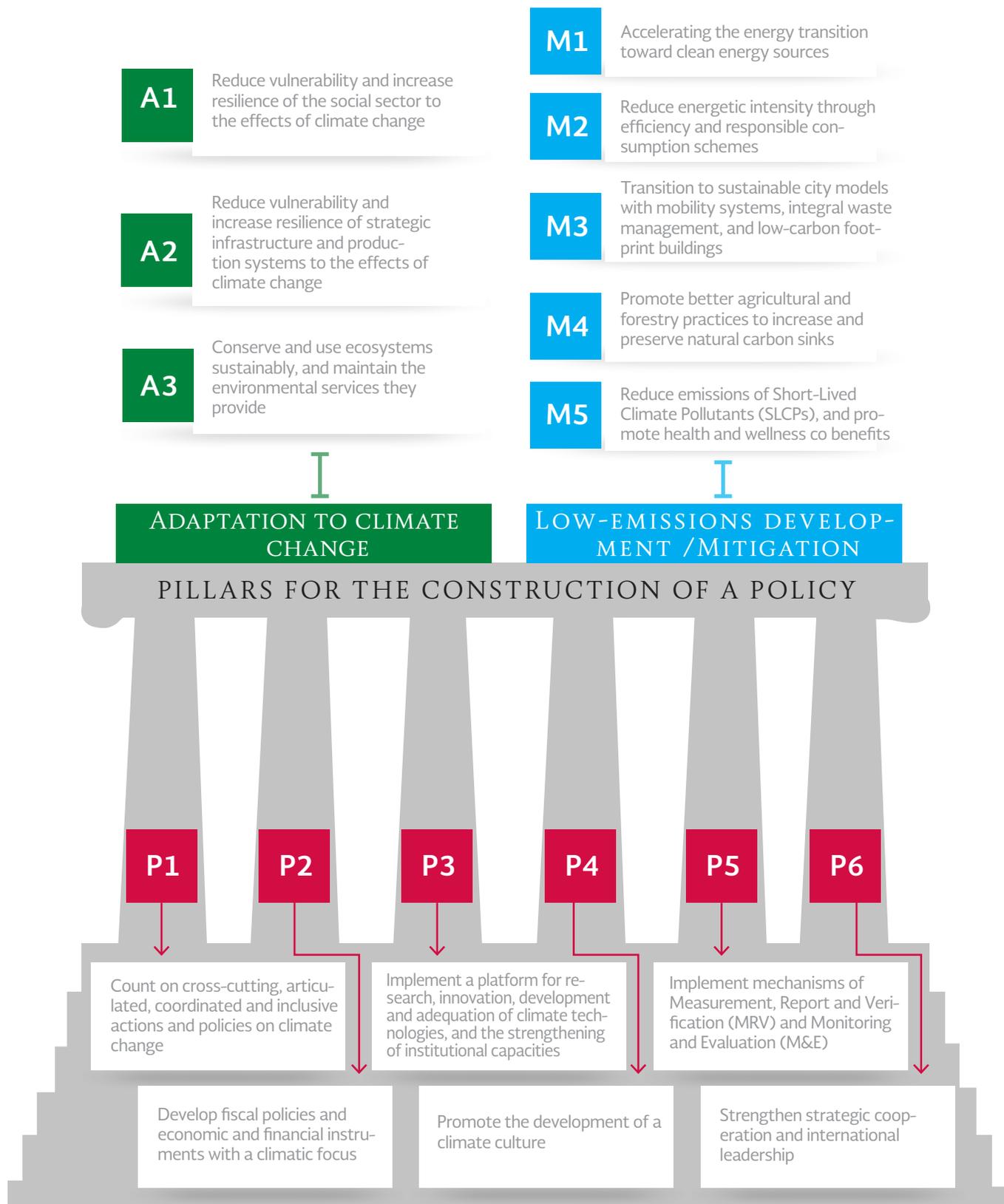


Figure 6. Structural map of the National Strategy for Climate Change
Source: Own elaboration.

Lines of action in turn integrate the pillars and strategic axes. These last are guidelines that involve different activities which require participation, integration, and continuity of effort, and that also procure pointing out critical aspects for their fulfillment. The order of the lines of action is also relevant because it aims to present firstly those lines of action that are indispensable to the fulfillment of the pillar or axis.

Some lines of action have a specificity level that is more profound than others. This is due, in several cases, to the detection of their attending to specific barriers in the fulfillment of the mitigation and adaptation objectives. In those cases, an icon on the side of lines of action specifies to which strategic axis it contributes (A1, A2, A3, M1, M2, M3, M4, M5). Also, the icon  signals when social participation is fundamental for the execution of the lines; this includes the entrepreneurial, academic, social,

etcetera sector. The letter “T” indicates that all the strategic axes are involved.



P1.14 Encourage interstate and intermunicipal action of producers and other technical public agents for the environmental management that is coherent in a landscape unit level. **A2, A3, M4, **

The adaptation and mitigation topics integrate prioritization criteria. If we part from the base that resources are limited for the execution of mitigation and adaptation actions, this section aims to give criteria to decision makers so that they might capitalize the actions in the three government orders, in conformity with their respective competencies.



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4. 10 / 20 / 40 YEARS VISION

Mexico grows sustainably with the encouragement of sustainable, equitable, and efficient management of its natural resources, as well as the use of clean and renewable energies that allow for low greenhouse gases and compounds emissions development. Mexico is a thriving, competitive, socially inclusive, and globally responsible country, that generates enough and well-remunerated jobs for the whole of its population, particularly the most vulnerable. Mexico is a nation with a green economy, with ecosystems and population that are resilient to climate change, and with sustainable cities.

The following chart identifies the main milestones for the following 10, 20, and 40 years that would allow us to reach the proposed vision.

AREA	10 YEARS
SOCIETY/ POPULATION	<ul style="list-style-type: none"> ➔ Attention is given to the groups most vulnerable to the effects of climate change. ➔ Society is involved and actively participates in the subject of climate change.
ECOSYSTEMS (WATER, FORESTS, BIODIVERSITY)	<ul style="list-style-type: none"> ➔ The most vulnerable ecosystems are protected and receive both attention and capital flow. ➔ Ecosystemic management and sustainable management become axes for the conservation strategy. ➔ Actions for conservation and sustainable use are implemented across the country. ➔ Integral territorial management schemes are implemented. ➔ Proper financial schemes for the promotion of sustainable landscapes. ➔ Technical and technological tools for local adaptation exist and are utilized. ➔ Strategies are implemented for the transition to a zero percent rate of carbon loss in original ecosystems.
ENERGY	<ul style="list-style-type: none"> ➔ Clean technologies are integrated to the national productive development. ➔ Socioeconomic schemes give an incentive to the use of clean energy. ➔ Incentive system promotes the larger advantages in the use of non-fossil fuels, energy efficiency, power saving, and sustainable public transportation related to the use of fossil fuels. ➔ Close to achieving 35% in power generation provided by clean energy sources.
EMISSIONS	<ul style="list-style-type: none"> ➔ 30% reduction in emissions regarding the base line. ➔ Mexico presents a substantial reduction of Short-lived Climate Pollutants. ➔ State-owned (parastatal) energy industries implement schemes for energy efficiency in all their operations and increase the use of renewable energies. ➔ Urban centers with a population over fifty thousand inhabitants have an infrastructure for waste management that avoids methane (CH₄) emissions to the atmosphere.
PRODUCTIVE SYSTEMS	<ul style="list-style-type: none"> ➔ Environmental impacts in the productive sector are understood, acknowledged, monitored, and battled. ➔ Production technologies and practices contribute in the diminishment of climate change risks. ➔ NAMAs (Nationally Appropriate Mitigation Actions) are implemented in diverse economic sectors.
PRIVATE SECTOR / INDUSTRY	<ul style="list-style-type: none"> ➔ Enterprises incorporate climate change criteria in their production projects. ➔ Main sources of GHG report their emissions component in the National Emissions Registry. ➔ Enterprises reduce their gas and compound emissions, and take advantage of opportunities in energy efficiency, power saving, and use of clean and renewable energy.
MOBILITY	<ul style="list-style-type: none"> ➔ Both public and private sectors adopt sustainable mobility systems. ➔ Socioeconomic schemes give incentives to the use of sustainable transportation. ➔ Common use of electric vehicles in public transportation.

Chart 2. 10 / 20 / 40 years route. Source: Own elaboration

20 YEARS

- Society is committed to the task of reducing the effects of climate change.
 - Human settlements have widened their adaptive capacity to the strikes of climate change.
-
- Ecosystems and their inhabitant species are conserved and used sustainably.
 - Natural resources are valued economically in a right and adequate manner.
 - Sufficient infrastructure exists for a sustainable and efficient management of water.
 - Efficient use of hydric resources helps restore ecological and physical functions of water bodies.
 - Economic and social development of the country is boosted through the betterment of Mexico's natural capital.
-
- At least 40% of electric power generation comes from clean sources.
 - Power generation through clean sources creates jobs, including vulnerable sectors.
 - Residential, tourism, and industrial sectors use diverse energy sources, efficient energy schemes, and power saving.
-
- Economic growth decoupled from the dependency on fossil fuels and their environmental impacts.
 - Short-lived Climate Pollutant emissions are minimized.
-
- Positive rate in forest carbon sinks.
 - Sustainable management of forests stops deforestation.
 - Sustainable management practices in the extraction, farming, and forestry sectors, increase productivity, reduce vulnerability, and conserve the soil.
-
- Enterprises integrally manage their wastes.
 - Production and sustainable consumption schemes are implemented.
-
- Urban development plans integrate sustainable transportation systems to cover population needs in a clean, efficient and safe manner.
 - Cargo transportation is multimodal, efficient, and low-emission.

40 YEARS

- Society is culturally and socially integrated to battling climate change.
 - Rural society is barely vulnerable to climate change.
-
- Hydric balance is ensured through sustainable and efficient use of water.
 - Conservation and sustainable use of ecosystems help them improve their resilience against climate change.
 - Adequate levels of resilience, locally.
-
- Clean energy generation supports economic development of every productive sector in a sustainable and equitable way.
 - At least 50% of energy generation comes from clean sources.
-
- 50% decrease in emissions in regard to those in the year 2000.
-
- Production systems are resilient to the effects of climate change.
-
- Enterprises have sustainable production cycles.
-
- Common use of electric trains and vehicles.



5. PILLARS OF THE NATIONAL POLICY ON CLIMATE CHANGE

5.1 DIAGNOSIS

Climate change poses wide challenges to every sector of the Mexican society, and their attention requires an effective and coherent coordination between every actor and institution involved. We present a brief diagnosis of some of the pillars of the national policy on climate change, which exist to face this challenge.

Cross-cutting public policy

In the sphere of design and institutional management of the national policy on climate change, during the last few decades the building of a general action framework against climate change has been achieved. The best reference of this is the GLCC, which distributes attributions and competencies of each government order and also establishes the institutional, planning, economic, financial, sanction, and vigilance instruments for the climate policy. These instruments are framed within the guiding principles mentioned in this document, among which social co responsibility should be highlighted. Likewise, the GLCC establishes the national medium and long-term goals, as well as their deadlines.

Climate change is a crosscutting challenge because it involves diverse sectors of society and government orders. Thus, its combat implicates the integration of multiple and diverse actors. The federation is endowed with instruments that require escalating to regional, state, and local realities. However, to the date of publication of this Strategy, only one fourth of the Mexican states had concluded the elaboration process for their state programs on climate change, and only five states counted on state laws in the matter of climate change; the elaboration of municipal programs on climate change have begun in the municipal level.

Economic, financial, and fiscal instruments

The actions for combating climate change require a backup of accessible, opportune, and sufficient economic resources for their effective fulfillment. Mexico has limited resources to face a diversity of challenges, which forces us to plan more efficient schemes for the use of the country's resources. In spite of this, there persist in Mexico fiscal, financial, and economic schemes that generate inefficient exploitation of natural resources, and that, also, accentuate

the economic breach within the population. To advance into better practices requires a new planning of such schemes, as well as the creation of new figures, instruments, regulations, policies, and programs for a more responsible managing of resources, which will result in better living conditions for the population. Some examples refer to the conservation of ecosystems and the species that inhabit them; the sustainable exploitation of forests and wildlife; the establishment of an effective control over protected natural areas; the generation of an economic value of environmental services; the sliding in gasoline prices; and, finally, the implementation of new pricing schemes in the sectors that utilize the most water and power. Nevertheless, everything mentioned is insufficient in face of the multiple needs in the matter of climate change and sustainable development for the general vision as a country.

The country's performance in the matter of climate change has attracted the attention of the international community, as well as that of cooperation agencies, international organisms, and even the international private sector, who have identified opportunities of action against climate change from our country. However, Mexico is not the only one to demonstrate high competitiveness to propose and execute initiatives to stop climate change. Therefore, to generate, ordain, and prioritize the canalization, application, and supervision of financial, economic, and fiscal resources, is a priority that will allow for a solid backup for the national policy on climate change in front of the eventual funding sources.

Research, development and adoption of technologies

A subject of special importance in the fight against climate change is the generation of formal knowledge and its application in techniques, procedures, and technologies through the use of science, technological innovation, and education as means to protect and maintain sustainable development. Research on climate change is relatively new in our country, so that the generation of knowledge about it becomes extremely significant and requires an ongoing dedication from the three government orders, academic institutions such as universities, research networks, the productive sector, and society as a whole.

In Mexico some support schemes exist to generate wider knowledge on climate change, such as higher education

programs in governmental institutions, and of research in the National Institute of Ecology and Climate Change. There also exist efforts to promote the actions for adaptation and strengthen those meant for mitigation; however, it is required that the research on the effects of climate change, the development of mitigation technology, and the identification of better practices to face the effects of this phenomenon are integrated within a platform. This must have as an objective the integration of the generated knowledge and propitiate the generation of knowledge that is focalized on the different regions of the country. The requirements in the subject include: research on habitat fragmentation through territorial and protected spaces management; analysis of the population's vulnerability and identification of works; infrastructure; the equipment of productive sectors as a measure of adaptation; research related with the productive sector, encouragement of technologies for the measurement of climate parameters; clean energy production followed by patent generation; waste management, etcetera.

Building of a climate culture

Mexico has a growing population that is increasingly plural and dynamic, generator and demander of intellectual, cultural, and scientific resources. Education and knowledge are indispensable tools for the citizens to exercise their rights, acknowledge their responsibilities, and become capable of making well-founded decisions over aspects of everyday life. In our country, the scope of basic level schooling is practically universal, which allows it to be an effective vehicle for the communication of knowledge on climate change. Besides, principles of environmental education exist with a few components of climate change in elementary and middle levels. There is also the implementation of training programs

about sustainability and climate change in the private, social, and academic sectors. In the civil society sphere there are still few products and services that inform the consumer of their ecologic footprint, and those that regard and inform the user on the emissions generated during its life-cycle are very few.

Between 2009 and 2012 a study was conducted in order to measure the perception of climate change among the average citizen¹⁷. In 2009, 87% of the polled population said they were worried about climate change; in 2012, almost 97% of the polled said they were very, somehow, or a little worried about climate change, and less than 4% said they weren't worried at all. This shows that the Mexican population is concerned about the subject of climate change. This Strategy, through the lines of action that it proposes, will serve as a guide for the citizens to fulfill their co responsible obligation to protect Mexico's environment.

Social participation, transparency, access to information and justice

As is established in the 10th principle of the 1992 Rio Declaration on Environment and Development, this Strategy refrains that "the best way to handle environmental issues is with participation of all concerned citizens, at the relevant level. At the national level, each individual shall have appropriate access to information concerning the environment that is held by public authorities [...] and the opportunity to participate in decision-making processes. States shall facilitate and encourage public awareness and participation by making information widely available. Effective access to judicial and administrative proceedings, including redress and remedy, shall be provided".



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¹⁷ Estudio Nacional de Percepción en materia de cambio climático. (2009). Mexico: CECADESU. / Estudio Nacional de Percepción en materia de cambio climático. (2010). Mexico: CECADESU. / Estudio Nacional de Percepción en materia de cambio climático. (2011). Mexico: CECADESU. / Evaluación de la Percepción social en materia de cambio climático. (2012). Mexico: CECADESU.

Environmental responsibility, introduced to our Constitution through a constitutional amendment to article 4 in February 2012, and the recent approval of the Federal Law on Environmental Responsibility in April 2013, will allow individuals access to the national justice system and demand the reparation of environmental damage. This gives society the opportunity of asserting the right to a healthy environment and also to achieve an objective of the GLCC.

Measurement, Report, and Verification and Monitoring and Evaluation

The instruments for Measurement, Report, and Verification, also those for Monitoring and Evaluation, ensure transparency and certainty of actions, as well as guarantee environmental integrity, comparability, consistence, transparency, and data accuracy. The MRV and M&E methodologies permit to assure the quality of adaptation and mitigation actions, for which they are nationally useful in the design, implementation, and evaluation of a public policy regarding the subject. A favorable perception of the use of these methodologies exists on the international level, even to the point of the generation of schemes for the accompaniment and association between developed and developing countries in order to share knowledge and experience. Mexico has actively participated in the setting of international criteria that define the use and scope of methodologies, and has begun to train in diverse orders to incorporate MRV and M&E into its own activities against climate change. Regarding this National Strategy, the GLCC mandates that the national policy on climate change is sustained on the essential MRV and M&E activities, thus it becomes relevant that the three government orders assume the task of actively incorporating these criteria in their schemes for government and public policies.

Strategic cooperation and international leadership

On the international stage, Mexico has procured being a relevant actor among developing countries, and, in general, among those committed with the effective combat of climate change.

The country is a part of the UNFCCC and the correspondent Kyoto Protocol. Besides, Mexico served as president and host of COP 16 in 2010, and participates in other instruments and international schemes relating to climate change. Therefore, Mexico actively participates in the negotiations to secure, improve, and perfect the according international regime. This has resulted in a significant leadership that seeks to strengthen and secure itself in Latin America and the Caribbean through South-South cooperation.

Mexico aspires to maintain and increase its international recognition, and seeks to translate it into the generation of more and better global agreements. For that, it seeks to settle as a key actor in the region, and also serve as a bridge to other developing countries. A solid national commitment will allow for the generation of guidelines for active participation that is directed toward solving the main problems faced by the international community in the face of climate change.

The drive and importance that the topic of climate change has gained in Mexico is notable. However, it is necessary to reinforce what has already been achieved and to generate better results in the future through the exploration of new ways to implement public policies that reach the whole of the country's population. Pending tasks mainly refer to the coordination between governmental orders and entities and of them with society in general. The previous by means of the implementation of new governance schemes, including every sector in the decision-making and the generation of a wide sense of shared responsibility, which will allow the establishment of useful institutional agreements to combat climate change. In the following years, Mexico must generate action frameworks with guidelines that permit the implementation of the cross-cutting lines of action posed in this Strategy in a way that is coordinated, coherent, and oriented to achieving the objectives set for the country. Therefore, the pillars of the national policy on climate change constitute the cornerstone of this NSCC.



Tren Suburbano/Banco de imágenes SCT

5.2 PILLARS OF THE POLICY AND LINES OF ACTION



P1 COUNT ON CROSS-CUTTING, ARTICULATED, COORDINATED AND INCLUSIVE ACTIONS AND POLICIES ON CLIMATE CHANGE

The effective instrumentation of the national policy on climate change requires of a cross-cutting coordination between sectors and actors, of the revision of the judicial framework so to avoid opposition, and of the inclusion of every social group. The articulation of these actors and instruments is indispensable for the execution of adaptation and mitigation policies and actions posed in the National Climate Change Strategy.

LINES OF ACTION:

- ➔ **P1.1** Incorporate objectives and goals for the adaptation and mitigation of climate change in the National and State Plans and Programs and in the sectorials of the FPA. **T**
- ➔ **P1.2** Implement the National System on Climate Change as a coordination mechanism between public, private, and social sectors, and as an articulate planning platform between government orders. **T** ☒
- ➔ **P1.3** Guarantee through the Climate Change Council the involvement of academic, private, and social sectors as a support in the ICCC decision-making. **T, ☒**
- ➔ **P1.4** Develop, harmonize, and strengthen the current judicial framework in order to incorporate climate change criteria, through the coordinated work between the executive and legislative powers in the three government orders. **T**
- ➔ **P1.5** Promote the access of individuals to environmental justice and repairing of environmental damage *in natura* whenever possible, or else the redress in priority sites for climate change. **T**
- ➔ **P1.6** Consolidate the institutional framework on climate change through intersectoral and cross-cutting agreements, the creation of specific areas and local advisory groups in attention to the subject, among other options, in the three orders of government and the sectors of society. **T, ☒**
- ➔ **P1.7** Consider gender, ethnicity, disability, inequality, wellbeing, and inequity in the access to public services, for the design of all climate change policies, and also involve different sectors of society in their implementation. In whatever corresponds, introduce the principle of “free, prior, and informed consent”. **T, ☒**
- ➔ **P1.8** Implement intersectoral mitigation and adaptation actions through the coordination and concurrence between dependencies and of these with both public and private entities. **T, ☒**
- ➔ **P1.9** Guarantee the inclusion of adaptation and mitigation to climate change criteria in the political instruments such as the evaluation of environmental impact and the general, state, and municipal ordainments of territory; marine ecological codes; territorial and urban development tourism ordainments. **A1, A2, A3, M3, ☒**
- ➔ **P1.10** Align the planning and urban development relating to soil, sustainable buildings, housing, energy, transport, mobility, green areas, coastlines, integral waste management, and water in order to reduce the carbon footprint of population settlements. **M3**
- ➔ **P1.11** Guarantee the cross-cutting incorporation of water-related criteria in the development and instrumentation of climate change public policies. **A1, A2, A3, M1, M3, M4**
- ➔ **P1.12** Guarantee the harmony between policies, programs, and institutional agreements for climate change and rural sustainable development, working to attend deforestation and woodland degradation as a multifactorial problem in the three government orders. **A2, A3, M4**
- ➔ **P1.13** Introduce climate change criteria in order to articulate and improve the laws, policies, and instruments that boost sustainable forest management. **A2, A3, M4**
- ➔ **P1.14** Encourage interstate and intermunicipal association of producers and other technical public agents for a coherent environmental management on a landscape unit level. **A2, A3, M4, ☒**
- ➔ **P1.15** Create and fortify local institutions for the regulation and planning of regional and metropolitan transportation, particularly on mobility, infrastructure optimization, transportation routes, and minimizing of deficiencies. **M3, ☒**
- ➔ **P1.16** Guarantee the consistency of instruments and programs in agricultural, fishing, forestry, and urban sectors, in order to achieve synergy in the matter of adaptation and mitigation, and to avoid their opposition. **A2, A3, M3, M4, ☒**
- ➔ **P1.17** Encourage the evaluation of the environmental impact in sectoral programs and projects. **T**
- ➔ **P1.18** Fortify existent epidemiologic vigilance systems and include them in the design of actions in attention to health impacts related to climate changes, such as infectious intestinal disease, acute respiratory infections, food-poisoning related with phenomena like red tide, and attention to population affected by disasters such as hurricanes and flooding. **A1**

☒ Social participation.



P2 DEVELOP FISCAL POLICIES AND ECONOMIC AND FINANCIAL INSTRUMENTS WITH A CLIMATE APPROACH

The actions for fighting against climate change require a backup of accessible, opportune, and sufficient economic resources for their effective fulfillment. Simultaneously, it is required to send economical signals that reflect the cost of environmental damage of greenhouse gases and compounds. Mexico can increase the use of economic instruments. The development of fiscal policies and economic instruments with a climate approach will boost the promotion of a low-emissions economic development and will raise competitiveness.

LINES OF ACTION:

- ➔ **P2.1** Design a national policy of economic, fiscal, financial, and market instruments to incentivize mitigation and adaptation actions. This includes utilizing focalized subsidies, eliminate or decouple inefficient subsidies, and create both public and private financial instruments. **T**
- ➔ **P2.2** Establish the mechanisms needed to turn the Climate Change Fund into an efficient and effective platform for the canalization of resources provided by other funds, among them, international. **T**
- ➔ **P2.3** Assign enough budgetary resources for the execution of adaptation and mitigation actions and specify them in federal, state, and municipal budgets. **T**
- ➔ **P2.4** Articulate existent national funds and other financial sources to foster climate change actions. **T**
- ➔ **P2.5** Ensure that economic and financial resources are canalized to the attention of priority climate actions and are considered socio-environmental safeguards. **T, R**
- ➔ **P2.6** Link available public and private financial resources in the implementation of mitigation and adaptation actions. **R**
- ➔ **P2.7** Promote sustainable production in the country through the use of economical incentives. **T**
- ➔ **P2.8** Privilege the funding of national research and technology development for the adaptation and mitigation of climate change. **R**
- ➔ **P2.9** Encourage new economical and financial mechanisms, including NAMAs and possible emission markets, to incentive mitigation actions. **M1, M2, M3, M4, M5, R**
- ➔ **P2.10** Determine energy pricing in conformity with an analysis of its life-cycle that considers externalities, including the associated cost of greenhouse emissions. **M1, M2**
- ➔ **P2.11** Restate the current energy and water subsidies' structure to incentive the growth in efficiency both in the power and in the water consumption. **M2, M4**
- ➔ **P2.12** Ajustar gradualmente las tarifas de uso doméstico de electricidad y agua a los precios reales de mercado, con la aplicación de medidas compensatorias para grupos vulnerables. **M1, M2**
- ➔ **P2.13** Redirect fossil fuel subsidies in order to strengthen, among others, sustainable, efficient, and safe public transportation, as well as the railway system. **M2, M3, M5**
- ➔ **P2.14** Guarantee the incorporation of climate change criteria in the guidelines of development banking for favoring projects that involve renewable, clean energies and that promote the transition to less carbon-intensive technologies. **M1, M2, M3, M4, M5**
- ➔ **P2.15** Encourage a scheme that boosts voluntary carbon markets, including forest carbon. **A3, M4**
- ➔ **P2.16** Identify, strengthen, or generate specific economic and financial instruments that incentive the redress, conservation, sustainable use, and resilience of ecosystems and the ecosystemic services they provide. **A3, M4, R**
- ➔ **P2.17** Design and/or adequate economic and financial instruments and incentives for REDD+, while guaranteeing fair and equitable conditions in the distribution of the gathered benefits of avoided emissions. **A1, A2, A3, M4, R**
- ➔ **P2.18** Consolidate the participation of social and private sectors in financial and market mechanisms that promote adaptation and mitigation of climate change. **M4, R**



P3 IMPLEMENT A PLATFORM FOR RESEARCH, INNOVATION, DEVELOPMENT AND ADEQUATION OF CLIMATE TECHNOLOGIES AND FORTIFY INSTITUTIONAL CAPACITIES.

With the objective of making the right choices to abate climate change and adapt to it, our country requires the generation of scientific and technological knowledge articulated on a broadcasting platform. This will allow to create synergies, promote collaboration and avoid duplicity. Technology innovation will permit the development of new production capacities and the recovery of economical resources. Parallel to this lies the need to create national capacities in the three government orders through training in priority subjects related with adaptation and mitigation. Training the decision-makers will sustain policy generation and allow the appropriation of knowledge and its successful application.

LINES OF ACTION:

- P3.1** Create and operate an information platform that opens to the public the advances in relation with national research on climate change. **T, R**
 - P3.2** Develop and operate national, regional, and local research and exchange and technological development platforms in order to communicate state, municipal, and regional priorities, as well as establish consortiums for research, development, and innovation in low-emission services and technologies. **T**
 - P3.3** Generate mechanisms so that the decision-making of every government actor and of society is founded on scientific information and knowledge of climate change. **T, R**
 - P3.4** Promote the elaboration of science and technology studies and research projects on climate change, on a national, state, regional, and municipal level, through think-tanks that favor effective coordination among academic and research institutions, whether public, private, national or international. **T, R**
 - P3.5** Identify, systematize, analyze, and broadcast existent knowledge on climate change in the country, according to national requirements, with the objective that it becomes the foundation of the national policy on climate change. **T**
 - P3.6** Encourage research and focalize technological innovation actions by region, ecosystems, population settlements, equipment and infrastructure, productive sectors, and social groups in the evaluation of vulnerability and the design of the measures for adaptations so that the country's infrastructure is prepared to face the risks posed by disasters caused by climate change, and that there will exist technology capable of consolidating Mexico as an emergent power in the next following years. **A1, A2, A3**
 - P3.7** Ensure the academy-industry bonding for development, appropriation, and transference of reduction and control of greenhouse gases and compounds technologies. **M1, M2, M3, M4, M5, R**
 - P3.8** Encourage research, development, and adequation in Mexico of advanced technologies for the generation of renewable, clean energy such as: oceanic, thermosolar, hydrogen, and bioenergetics, among others. **M1, R**
 - P3.9** Encourage the improvement of technologies related with monitoring meteorological, climatological, and hydrometric conditions. **A1, A2**
 - P3.10** Identify, systematize, and analyze the available information on climate change in the country, particularly on adaptation, where research is required in the productive sectors due to the occurrence of climate events such as droughts and hurricanes; it is also needed to determine the vulnerability of infrastructure, the generation of work mechanisms and schemes for the organization of territorial ecological ordainments to increase resilience. **T**
 - P3.11** Generate knowledge through national research in order to understand and interpret climate change and its impacts in Mexico. **T, R**
 - P3.12** Create and strengthen coordination, collaboration, and networking schemes that integrate and take advantage of local knowledge. **T**
- Strengthening of capacities**
- P3.13** Create and strengthen training schemes on the matter of climate change in the three government orders, as well as in the legislative and judiciary powers. **T, R**
 - P3.14** Fortify capacities of the authorities in the three governments orders in order to access financial sources, both national and international. **T**
 - P3.15** Train the sectors in the three government orders for the use of effective planning instruments on mitigation and adaptation. **T**
 - P3.16** Strengthen the capacities for territorial management on a landscape level, for example, by creating local technical agents, local development agents, and agents for new spaces of collaborative management. **A1, A2, A3, M4, R**
 - P3.17** Train on climate change those responsible for the budget assignment, in the three government orders and the legislative power, due to the importance of providing funds for adaptation and disaster prevention, and for mitigation actions. **T**
 - P3.18** Develop institutional capacities for the establishment of mechanism and procedures for measurement, reporting, verifying, monitoring, and evaluating the mitigation and adaptation actions. **T**
 - P3.19** Encourage the development of a connectivity strategy between terrestrial, coastal, and marine ecosystems, their complementarity and connectivity, so to favor the maintenance of regional ecological processes and promoting state and municipal natural protected areas. **A3, M4**
 - P3.20** Generate capacities in technological research and innovation on the subject of SLCPs and their warming potential, in order to identify local and national actions that can be included in the mitigation strategies because of their co benefits. **M5**



P4 PROMOTE THE DEVELOPMENT OF A CLIMATE CULTURE.

To successfully face climate change it is indispensable to turn around the population's production and consumption patterns. To do so, Mexico requires an informed, conscious, committed, participative society that also demands accountability from their government. It is fundamental to guarantee that there exist educational programs and effective broadcasting mechanisms for the required actions that need implementation in such a transcendent policy as this one.

LINES OF ACTION:

- ➔ **P4.1** Educate, inform, and raise awareness through massive communication campaigns and training programs so to induce a change toward sustainable consumption and production patterns. **T, R**
- ➔ **P4.2** Generate educational projects for the elementary, middle, and higher education on climate change, in order to model a culture that can be translated into values, conscience, knowledge, behavioral changes, and attitudes. **R**
- Transparency**
- ➔ **P4.3** Encourage co responsible social participation in the formulation, implementation, and vigilance of the national policy on climate change. **T, R**
- ➔ **P4.4** Encourage accountability on climate change from authorities in the three government orders through the effective broadcast of the national policy on climate change as well as the results of its evaluation. **T, R**
- ➔ **P4.5** Elaborate regulations so that consumers will obtain timely and adequate information on the emissions associated with production and consumption of goods and services available in the market. **M1, M2, M3, M4, M5**
- ➔ **P4.6** Use information technologies to communicate to the citizens the climate change situation of the country, the GHG emissions inventories, the National Emissions Registry, and the Information System on Climate Change. **T**
- ➔ **P4.7** Design and put into action an effective communication strategy in every sector of society, taking in account the diversity of contexts (cultural, economical, political, ethnical, gender-related, and others). **T, R**



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P5 IMPLEMENT MECHANISMS FOR MEASUREMENT, REPORT, AND VERIFICATION (MRV) AND MONITORING AND EVALUATION (M&E).

The mitigation and adaptation actions on climate change require the development of instruments for Measurement, Report, and Verification, as well as Monitoring and Evaluation. These instruments provide transparency and action certainty, likewise, they guarantee environmental integrity, comparability, consistence, transparency and data precision. The previous will allow to evaluate and provide feedback on the design of climate change policies, encouraging their efficiency and impact. Particularly, the right and efficient application of budgetary, international, public, and private resources will have a direct impact on the achievement of the objectives of the national policy for adaptation and mitigation.

LINES OF ACTION:

- P5.1** Implement mechanisms of Measurement, Report, and Verification, as well as of Monitoring and Evaluation in regards to the measures of mitigation and adaptation to climate change. **T**
- P5.2** Develop an M&E system of public policies that includes criteria and indicators for the adaptation to climate change. **A1, A2, A3**
- P5.3** Measure, report, and verify the origin, use, and results of the budget and resources that come from international, private, and public funding, destined to battle climate change in Mexico. **T, R**
- P5.4** Gradually fortify the verification mechanisms according to the type of measures and financial schemes. **T, R**
- P5.5** Nurture, with the participation of the three government orders, the information of emissions, reductions and transactions of stationary and mobile sources of the sectors that are subject of reporting to the National Emissions Registry, with the inclusion of verification mechanisms. **M1, M2, M3, M4, M5, R**
- P5.6** Build and update, with clear and transparent criteria, the elaboration and update of the inventories of emissions, the national baseline, as well as sectorial lines and mitigation trajectories with the objective of following up and frequently evaluating the mitigation policies. **M1, M2, M3, M4, M5**
- P5.7** Establish mechanisms to ensure that the recommendations offered by the Coordination Evaluation are considered, and, in their case, be reflected in adjustments to the national policy on climate change. **T**
- P5.8** Establish and develop mechanisms that put at the disposal of whom it may concern the methodologies for measurement, monitoring, verification, and reporting the mitigation actions, as well as their constant updating. **M1, M2, M3, M4, M5**
- P5.9** Develop a national forestry monitoring system, transparent and full-bodied, for the monitoring, reporting, and verification of mitigation actions in the forestry sector. **M4, R**
- P5.10** Integrate and maintain a national information system of safeguards associated to the implementation of REDD* action to guarantee that they are observed and respected. **A1, A2, A3, M4, R**
- P5.11** Establish mechanisms for the measurement of financial, human, and ecological risks due to diverse climate affectations in all economic sectors and regions of the country. **R**
- P5.12** Strengthen the design of health indicators related to climate change, where environmental, working, and social factors of the population are analyzed so to provide the National Epidemiologic Vigilance System with updated information in order to carry out prevention and attention actions for vulnerable population.. **A1**



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P6 STRENGTHEN STRATEGIC COOPERATION AND INTERNATIONAL LEADERSHIP

This pillar aims to maintain and fortify Mexico's presence as a relevant actor in the international arena, as well as in the Latin American and Caribbean region through the recognition of its high vulnerability to climate change and its potential of mitigation of GHG emissions. This position grants access to international climate funding and permits the maintenance of strategic bilateral and regional cooperation.

LINES OF ACTION:

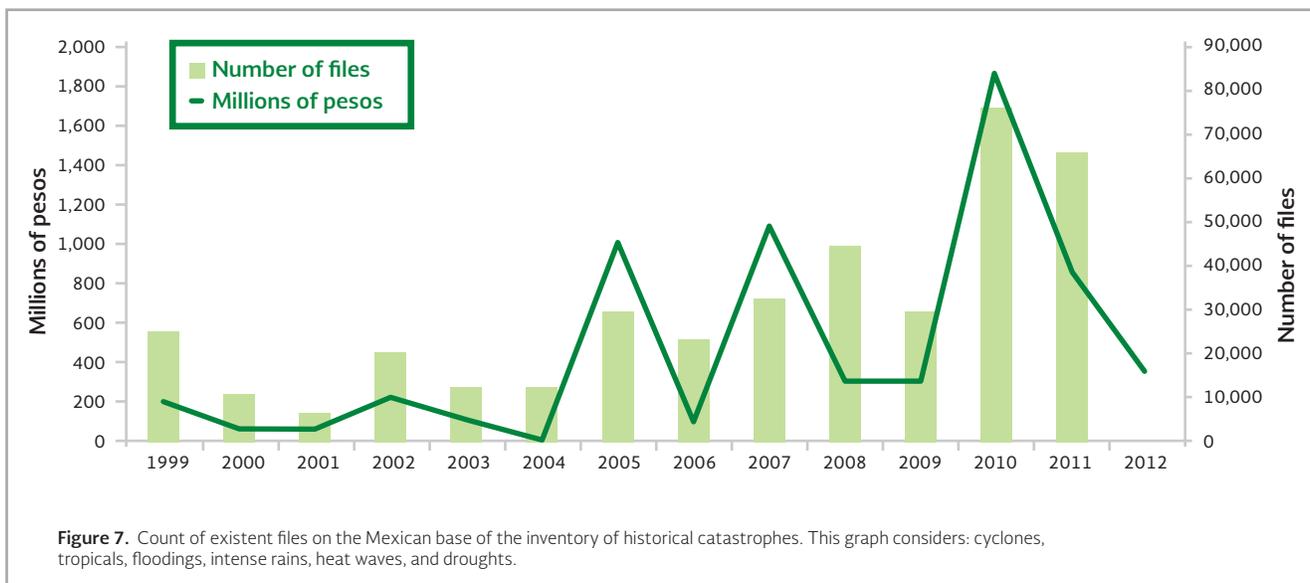
- ➔ **P6.1** Contribute to the global efforts for strengthening the climate change regime within the United Nations, seeking to increase the ambition level of commitment and mitigation actions of all countries. **T**
- ➔ **P6.2** Boost and take advantage of the implementation of additional efforts in mitigation and adaptation within the frame of multilateral, regional, or bilateral processes, complementary to the United Nations Framework Convention on Climate Change. **T**
- ➔ **P6.3** Encourage the opportunities of bilateral cooperation and sharing of experiences and improved practices within frame of South-South cooperation. **T**
- ➔ **P6.4** Maintain Mexico's active and proactive presence in international negotiations on climate change, sustaining the country's position on a national inclusive dialogue. **T, R**
- ➔ **P6.5** Position Mexico in the international arena by increasing its ambition level in regards of mitigation and its need for adaptation due to high vulnerability, within boundaries of a binding judicial agreement. **T**
- ➔ **P6.6** Identify and promote the access to international funding sources that will allow to determine specific actions for both mitigation and adaptation. **T**
- ➔ **P6.7** Capitalize synergies of the three Rio conventions (Convention on Biological Diversity, United Nations Convention to Combat Desertification, and the UNFCCC) with the objective of fostering their impact. **T**
- ➔ **P6.8** Consistently link Mexico's international position in the subject of climate change to national actions. **T**

6. ADAPTATION TO THE EFFECTS OF CLIMATE CHANGE

6.1 DIAGNOSIS OF VULNERABILITY IN THE FACE OF CLIMATE CHANGE

In the last few years, Mexico has faced an increasing number of affectations due to extreme hydrometeorological events such as tropical cyclones, floods, and droughts, to mention a few of those which have produced human losses and high economical and social costs. Economical damage related to these events has gone from a yearly average of 730 million pesos

in the period from 1980 to 1999, to 21 billion 950 million pesos in the period that spans from the year 2000 to 2012¹⁸. This growth, apart of being associated to a higher occurrence of events, obeys an increase in exposure, for example, because of growing urbanization. Evolution of disaster occurrence due to climate events and their associated damage can be observed in figure 7.



In order to understand the associated risk of climate events it is important to analyze it from two perspectives: the occurrence of historical events and the projection of future events, because both of them provide different and complimentary information. Historical analysis establishes a basis to understand the impact of a changing climate; while the usage of coupled models of general atmosphere circulation¹⁹ allows to understand future climate behavior. Geological, ecosystemic, and anthropological local conditions are determinant in the incidence of events, so that it is

probable that hydrometeorological events will recur in the zones where they have previously happened.

The climate change scenarios are generated in a context of uncertainty regarding future climate, which constitutes a serious problem of communications of future risks associated with global and regional climate change. However, these scenarios are constructed with the most advanced and updated models that are internationally available.

¹⁸ National Center for Disaster Prevention (CENAPRED), 2013.

¹⁹ The term "coupled" refers to the fact that the models simulate interactions between the atmosphere, the Earth cortex, and the ocean.

The Mexican Network of Climate Modeling^[20] developed an ensemble of projections that represents the country's climatology under different climate change scenarios. There exists a consensus that, through the next few decades, Mexico will experience a general growth in temperature that will surpass 6% of the historic average, and that it will be superior to the global increase in the same period. Recent history already shows indication of this growth. Consequently, we can expect an increase in the risk of climate events related with temperature growth, such as heat waves or the decrease of agricultural outputs, even in locations where they have not been historically registered. Regarding rainfall, most models do not incorporate the

effect of tropical depressions, norths, and cyclones, so that in rainfall projections the degree of uncertainty is higher. Applying the guiding principle of the NSCC related with precaution in the face of uncertainty, we part from the historical occurrence of these phenomena as the best information for the analysis.

The present diagnosis of risks and vulnerability in the face of climate change integrates, within a conceptual framework developed by the IPCC^[21], the central adaptation concepts^[22]: risk of disaster, exposure, vulnerability, and frequency of climate events (danger). The results of said diagnosis are shown in figure 8.

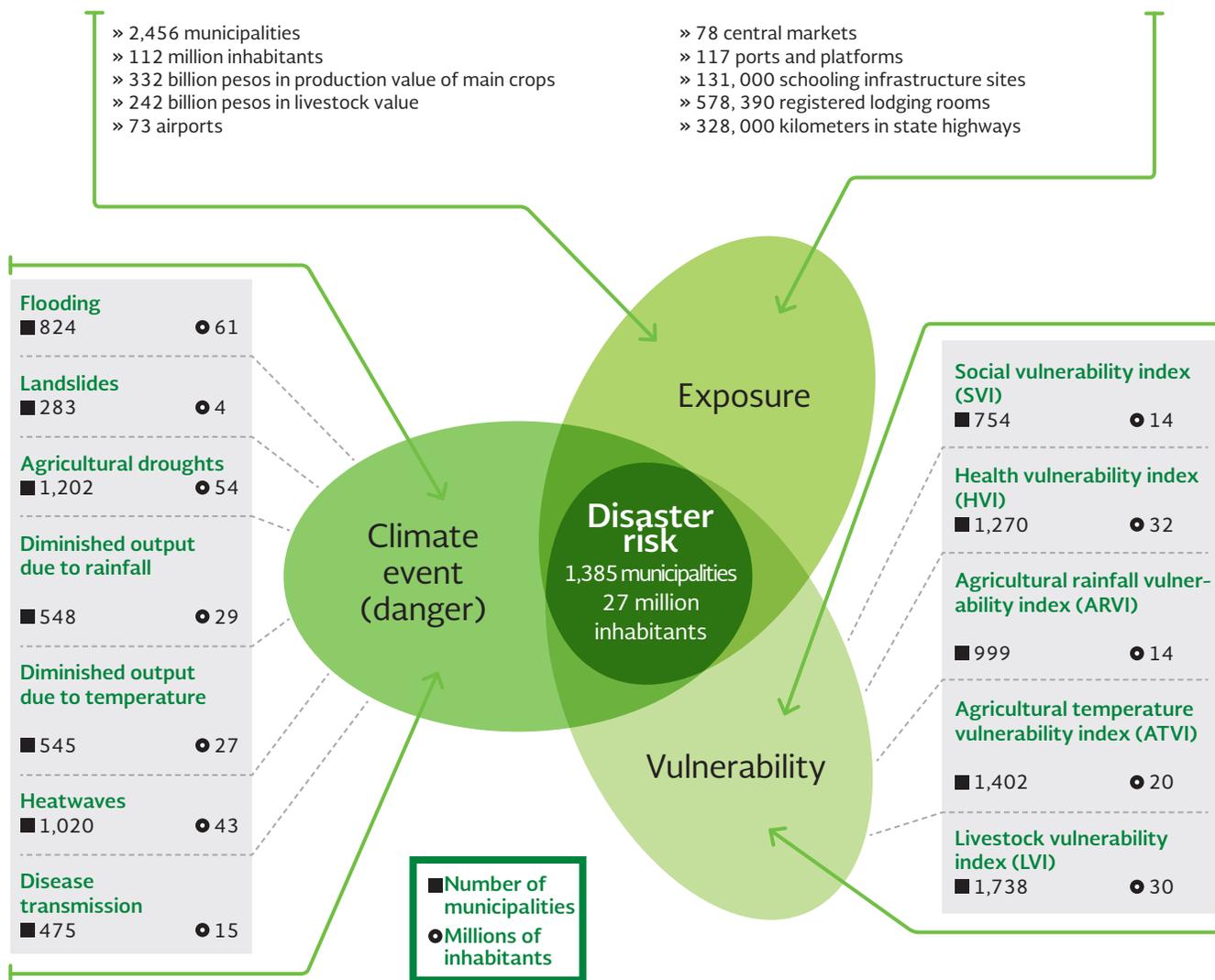


Figure 8. The data for climate events was calculated from the information given by the Climate Research Unit of the University of East Anglia (CRU) and by the Mario Molina Center (CMM by its spanish initials).
Exposure source; INEGI and General Port Direction.

²⁰ Integrated by the UNAM Atmosphere Science Center, the Scientific Research and Superior Education Center in Ensenada, Baja California, the Mexican Institute of Water Technology, and the National meteorological Service, coordinated by the National Institute of Environment and Climate Change; together they have joined the results of 15 global models in an ensemble of projections that better represent the country's climatology.

²¹ Intergovernmental Panel on Climate Change. (2012). Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation

²² See concept definitions in the Glossary.

The following climate events were analyzed: droughts, floods, landslides, decrease in agricultural and livestock outputs, disease transmission, and heat waves.

To measure exposure, apart from the population, strategic social and economical infrastructure that is also exposed to catastrophic events was considered. The value of this infrastructure is not limited to intrinsic asset value, but incorporates the provided services for the country's development, such as federal highways and central markets.

The vulnerability analysis for this case considers both the social aspect –through the Health Vulnerability Index and the Social Vulnerability Index developed by CENAPRED^[23]– and the production aspect –through farming vulnerability indexes (Agricultural Temperature Vulnerability Index, Rainfall Vulnerability Index, and Livestock Vulnerability Index). It should be

noted that this study does not contemplate the ecosystemic aspect.

The danger was defined in function of the frequency of occurrence of events, measured by their return period, which affect specific sectors^[24]. For example: an increasing change in the temperature patterns may provoke a decrease in agricultural outputs, an increase in heat waves, or an increase in disease transmission.

Based on previous elements, high disaster risk municipalities were defined as those with a high vulnerability and high risk of occurrence of climate events. The results show that of the 2,456 municipalities in the country, there exist 1,385 within that category, and these concentrate 27 million inhabitants. Among them we could find 255 municipalities that participate in the Crusade against Hunger and that concentrate 10.4 million inhabitants.

The breakdown by climate event in high-risk municipalities is shown in figure 9

This analysis concludes that:

- » There are important increases in the temperature-associated risk; these affects, among others, agricultural outputs.
- » The farming sector presents the higher risk against climate events.
- » It is likely there will be an increase in droughts, particularly in the Northern region of the country, which will mainly affect livestock.
- » The population in municipalities with a high risk related to human health surpasses the population exposed to events such as flooding and landslides.

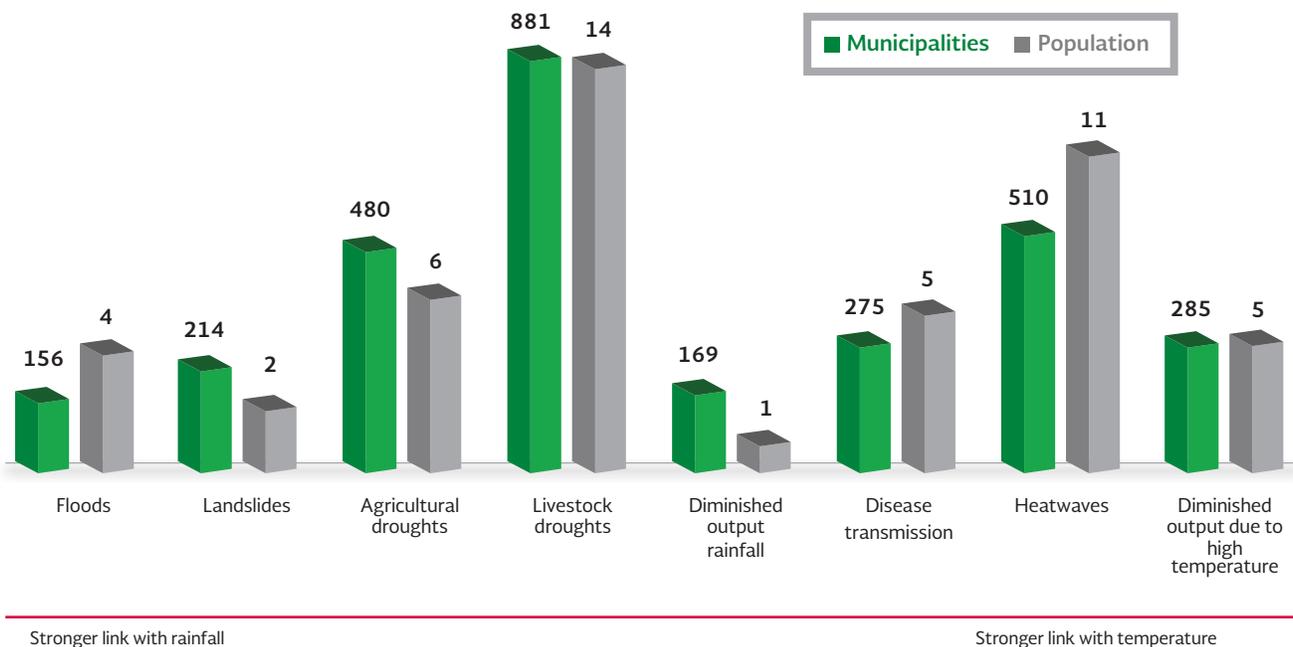


Figure 9. Climate events in high-risk municipalities.

Source: Climate research Unit, Climate projections by the Mexican Climate Modeling Network (CICESE, IMTA, CCA-UNAM y SMN), Mario Molina Center's flooding and landslide danger; risk values based upon information provided by INEGI, qbic methodology, NIECC and GGGI.

²³Developed by CENAPRED, incorporates socioeconomic indicators, prevention capacity, and response capacity, as well as local risk perception that influences the population's preparation to face climate events.

²⁴See Methodological annex for the definition and risk calculations and return periods.

Next, we illustrate as an example two maps of Mexico: figure 10 shows municipalities identified as having high vulnerability and high risk of occurrence of climate events. While figure 13 presents the energy infrastructure in zones identified as in high danger, and very high risk of flooding.

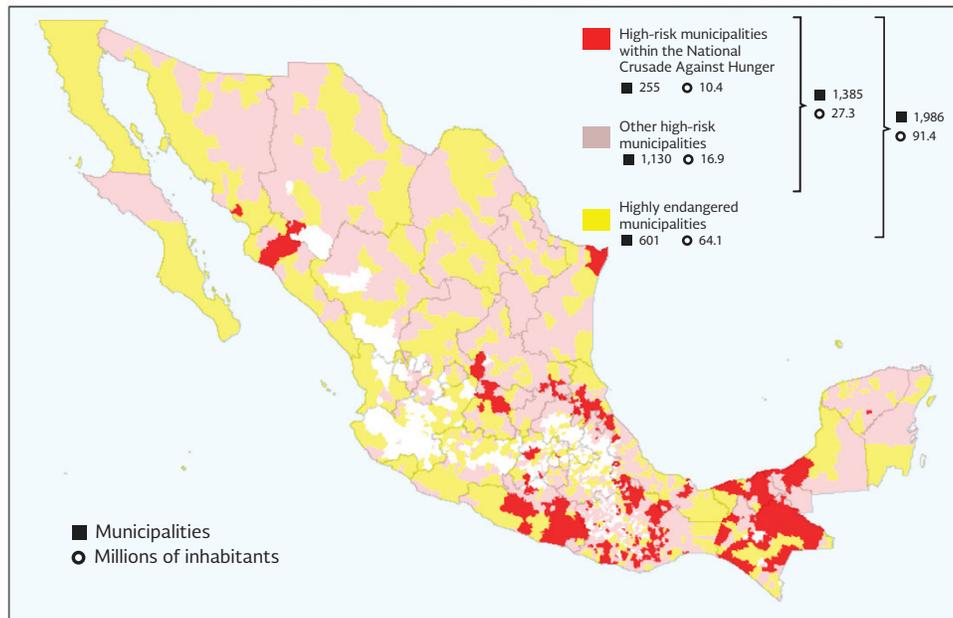


Figure 10. Municipalities with high vulnerability and risk of climate event occurrence.

Source: Based upon climate projections by the Mexican Climate Modeling Network (CICESE, IMTA, CCA-UNAM, SMN, INECC), CENAPRED vulnerability indexes. Built upon information provided by INEGI and the Secretariat of Health; risk values based on information by INEGI, qbic methodology, NIECC, and GGGI.

The vulnerability breakdown for these municipalities is shown in figure 11. This analysis concludes that:

- » 64% of the municipalities are high-risk in livestock.
- » 12 million people live in municipalities with a high-risk in human health.
- » 1,224 municipalities are vulnerable to more than one climate event.

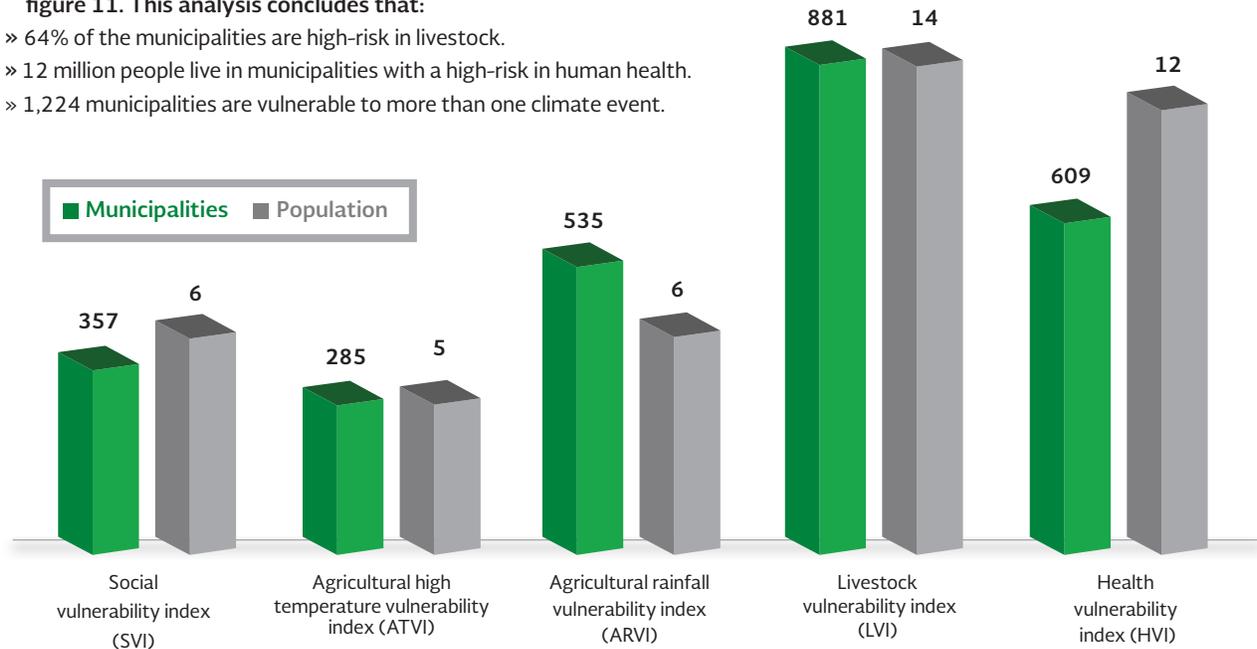


Figure 11. Vulnerability indexes by CENAPRED, built upon information by SAGARPA, COTECOCA, and SSA. Qbic methodology, NIECC, and GGI.

Population, if the most valuable good, is not the only value exposed to dangerous events. Strategic social and economical infrastructure is also exposed to catastrophic events, among which tropical cyclones, floods, and landslides stand out. An early diagnosis allows for the identification of a substantial part of strategic assets that is located in zones considered in high danger. Figure 12 shows an analysis of strategic infrastructure in municipalities with a high risk of floods and landslides.

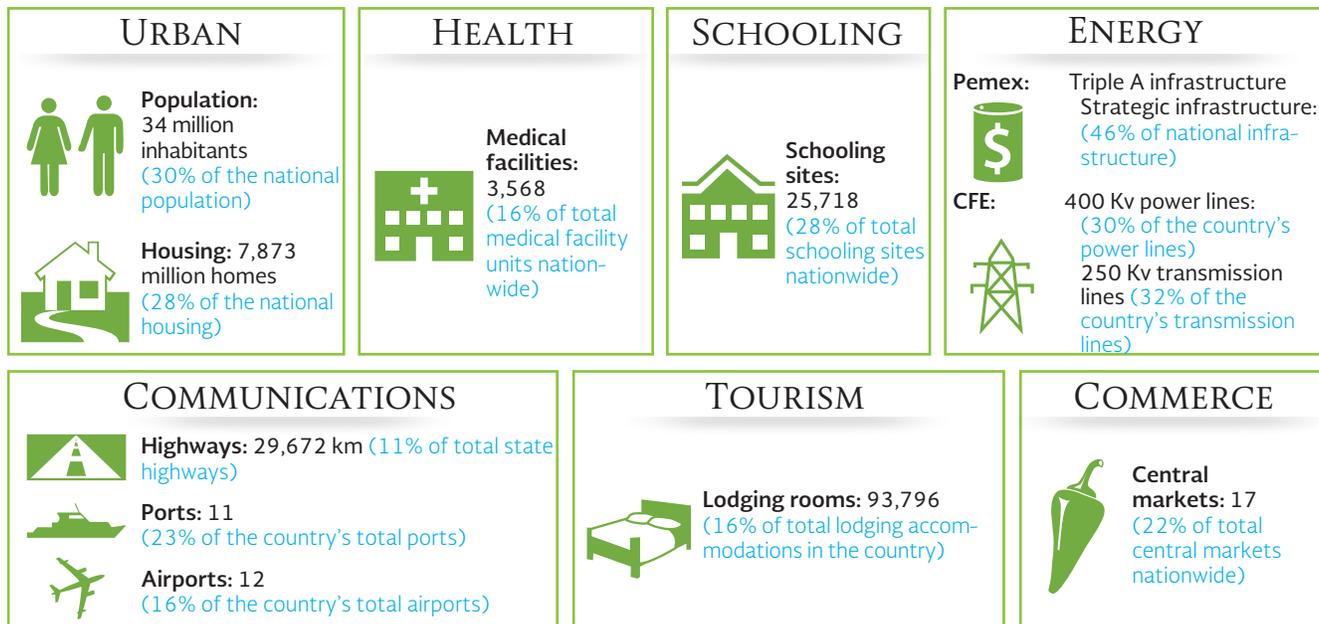


Figure 12. Climate projections by the Mexican Climate Modeling Network (CICESE, IMTA, CCA-UNAM, SMN, INECC), flooding and landslide risks. Source: Mario Molina Center, risk values based on information by INEGI, National Strategy for Climate Change 10-20-40 Vision.

The present diagnosis is only a starting point for the adaptation actions. The process for the understanding of climate change impact on social and economical systems must continue. It is necessary to complement the list of climate events and understand the exposure of ecosystems and sectors.

As the ability improves of understanding projected patterns of rainfall, temperature, and wind, among other elements related to

climate, we shall incorporate new knowledge to the design and establishment of specific lines of action in the subject of adaptation to climate change. The adaptation must be carried out locally, and thus it is important to consider in greater detail the regional conditions and impacts, and to involve states and municipalities in the development of local adaptation plans. For that, local priorities, needs, knowledge, and capacity must be taken into account so that they empower people in order to plan and face the impacts of climate change.

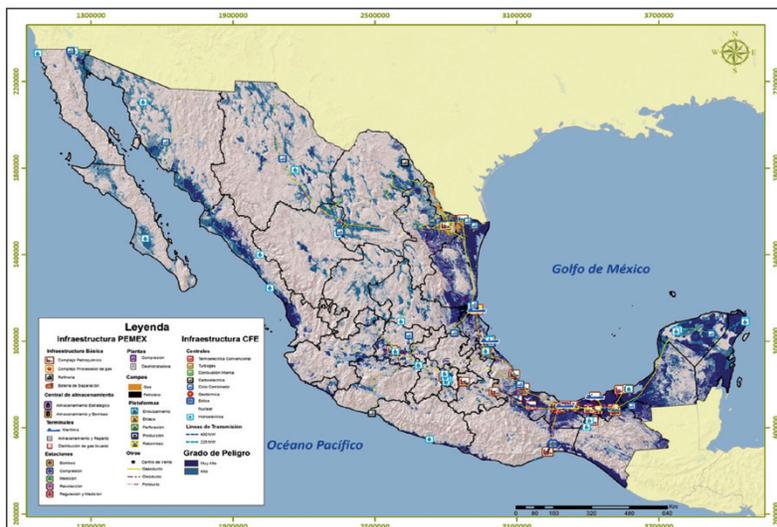


Figure 13. Energetic infrastructure in municipalities with high and extremely high risk of flooding. Source: Mario Molina Center, 2013, based upon information by INEGI, PEMEX, CFE and SMN.

6.2 STRATEGIC AXES AND LINES OF ACTION²⁵



A1 REDUCE VULNERABILITY AND INCREASE RESILIENCE OF THE SOCIAL SECTOR AGAINST THE EFFECTS OF CLIMATE CHANGE

Mexico is especially vulnerable to the effects of climate change and, in recent decades, some effects related to this phenomenon have occurred, such as: decrease in water availability and the presence of floods, droughts, and diseases such as dengue or acute diarrheic infections. According to the geographical characteristics and socioenvironmental, economic, and health conditions, the problem may grow more intense. The evaluation of vulnerability and the implementation of adaptation measures must be carried out locally, in response to particular conditions. This axis establishes lines of action that favor the conditions for the reduction of vulnerability and the increase in resilience of the population and of the systems that contribute to a better quality of life.

LINES OF ACTION:

- ➔ **A1.1** Strengthen the identification and attention of social zones, settlements, and groups that are priorities for the reduction of vulnerability and the increase of resilience of human settlement in rural, urban, and coastal areas.
- ➔ **A1.2** Strengthen the population's Integral Risk Management, including communication systems, early alert, local evacuation plans, reduction and risk management brought upon by extreme hydrometeorological events.
- ➔ **A1.3** Increase the resources destined to the attention of disaster by securing a greater proportion for prevention.
- ➔ **A1.4** Strengthen immediate and effective response mechanisms in zones that are impacted by the effects of climate change, as part of civil protection plans and actions.
- ➔ **A1.5** Strengthen the application of soil use regulations so to diminish irregular settlements until they are eliminated from endangered zones.
- ➔ **A1.6** Implement and fortify public policies focused on guaranteeing quality and quantity availability of water in zones that are considered as priorities due to the scarcity probability derived from climate change, with an emphasis on fortifying eco hydrological services provided by ecosystems.
- ➔ **A1.7** Guarantee alimentary security in the face of climate threats by giving preference to integral basin management measures, biodiversity conservancy, and soil restoration, as well as other ecological support systems.
- ➔ **A1.8** Implement and strengthen public policies focused on reducing health risks associated with climate change effects. In order to do so the more susceptible and sensitive groups should be considered because of their biological and health conditions.
- ➔ **A1.9** Design and strengthen public policies to protect the population's patrimony (housing, infrastructure, etcetera) in the face of climate change impact.
- ➔ **A1.10** Increase and strengthen public policies focused on reducing risks to public health infrastructure.
- ➔ **A1.11** Design and include a gender approach in the strategies for the reduction of social vulnerability.
- ➔ **A1.12** Implement and fortify public policies for the education of the population on disaster risk management.
- ➔ **A1.13** Implement transparent and inclusive mechanisms that secure social participation in the design and implementation of strategies for the adaptation to climate change, such as communal, district, municipal, and state councils focused on the reduction of social vulnerability.

²⁵ The building process for a policy of adaptation in Mexico has produced the three strategic axes contained in this segment. They are based upon three key inputs: the first is the document Marco de Políticas de Adaptación a Mediano Plazo published by SEMARNAT in the year 2010; the second is the document Adaptación al cambio climático en México: visión, elementos y criterios para la toma de decisiones, published by the NIE in 2012; and finally, the third input comprises feedback by the 13 secretariats that integrate the ICCC, as well as the opinion of key experts in this topic.



A2 REDUCE VULNERABILITY AND INCREASE RESILIENCE OF STRATEGIC INFRASTRUCTURE AND PRODUCTIVE SYSTEMS AGAINST THE EFFECTS OF CLIMATE CHANGE

Climate change poses huge challenges in the subject of adaptation of productive systems. The characteristics of impacts and the way in which we respond to them will depend on the type of system: farming, forestry, exploitation of wildlife, aquicultural, fishing, industrial, extraction, and tourism, or of strategic infrastructure. Likewise, they will depend on the risks to which the system is exposed. Each production system needs to take in account different aspects of climate change so to increase its productivity and competitiveness. This axis presents lines of action aimed to the strengthening of resilience and the reduction of vulnerability in productive systems and strategic infrastructure in the face of climate change.

LINES OF ACTION:

- ➔ **A2.1** Develop and strengthen periodical evaluations of vulnerability for each productive sector and disseminate it to both producers and decision-makers.
- ➔ **A2.2** Integrate criteria for the adaptation to climate change in existing productive programs.
- ➔ **A2.3** Secure social participation through the creation of intermunicipal conferences with the objective of defining and applying adaptation criteria in local productive projects that require the collaboration between municipalities and the participation of local inhabitants.
- ➔ **A2.4** Design and fortify tools for local risk monitoring, vulnerability analysis, and adaptation options for productive sectors.
- ➔ **A2.5** Consider climate change scenarios in the determination of vocation and adaptation of soil use for the establishment of productive activities.
- ➔ **A2.6** Encourage the efficient and sustainable use of water resources in every productive activities by periodically updating total water availability.
- ➔ **A2.7** Endow with quality infrastructure, employ adequate techniques, and fortify operational organisms to guarantee water availability for the food sector.
- ➔ **A2.8** Identify productive opportunities that are presented in function of climate change with the carrying out of local and regional adaptation strategies.
- ➔ **A2.9** Implement techniques and technologies in all productive sectors that foster the efficient use of resources and manage risks associated with climate change.
- ➔ **A2.10** Rescue and maintain Mexican millennial agricultural tradition as an option for the reinforcement and protection of native agrobiodiversity for the adaptation of agricultural produce to climate change.
- ➔ **A2.11** Strengthen the existing strategic infrastructure (communications, transportation, energy, among others) considering climate scenarios.
- ➔ **A2.12** Incorporate climate change criteria in the planning and building of a new productive and strategic infrastructure.



A3 CONSERVE AND USE ECOSYSTEMS SUSTAINABLY AND MAINTAIN THE ENVIRONMENTAL SERVICES PROVIDED BY THEM

In Mexico there exists a great diversity of ecosystems that provide a vast quantity of environmental services to society (such as oxygen, water, fuels, and food); these ecosystems are seriously threatened by human activity, including the effects of climate change. The present lines of action aim to guide policies and instruments in order to sustainably exploit ecosystems, by restoring their eco hydrological functionality and the services provided to society, and so increase their resilience.

LINES OF ACTION:

- ➔ **A3.1** Encourage integral territorial management for the reduction of vulnerability in the face of climate change of ecosystems, considering sustainable exploitation and management, as well as protection, conservancy, and redress; with an emphasis on priority regions and hydrographic basins.
- ➔ **A3.2** Guarantee the redress, connectivity, sustainable exploitation, and conservancy of ecosystems such as forests, jungles, coastal systems, oceans, riparian ecosystems, wetlands, and the biotic communities they keep, as well as their environmental services.
- ➔ **A3.3** Articulate different programs for the fostering of activities in one same territory so as to stabilize agricultural and urban frontiers, as a way to reduce pressure over ecosystems and ensure their ecological functionality.
- ➔ **A3.4** Ensure the inclusion of ecosystem, biological communities, and priority species' vulnerability in the vulnerability atlas in the face of climate change.
- ➔ **A3.5** Guarantee eco hydrological connectivity for the preservation of biodiversity and environmental services, the integrality of ecosystems, the conservancy of species, and the increase of their resilience in the face of climate change.
- ➔ **A3.6** Generate or modify judicial and territorial management instruments that reduce the vulnerability of ecosystems and biological communities in the face of climate change, starting from the implementation of adaptation measures.
- ➔ **A3.7** Develop adaptation programs for the maintenance and increase of both shallow and subterranean water availability, with a focus on integral management of hydrographic basins.
- ➔ **A3.8** Establish and strengthen sustainable communal management schemes for forestry ecosystems.
- ➔ **A3.9** Increase the reforestation surface as well as the redress of ecosystems with native species, apt for regional climate conditions.
- ➔ **A3.10** Strengthen the attention to exacerbated problems due to climate change, through integral fire management and combat of plague and disease.
- ➔ **A3.11** Guarantee environmental protection of ecosystems against public works and industrial and productive projects (mining, textile, cementing, energetic, farming, tourism, among others), through the incorporation of climate change criteria in planning instruments, like environmental impact and territorial ecological ordinance.
- ➔ **A3.12** Develop tools and create economical valuation schemes for ecosystemic services in order to help their conservancy and sustainable development.
- ➔ **A3.13** Create state funds for the redress of the most decayed and vulnerable ecosystems, as well as for the prevention and recovery of ecosystems that have been affected by extreme climate events.
- ➔ **A3.14** Establish and apply evaluation mechanisms on the impact of adaptation measures that are implemented locally, as a means to ensure their effectiveness in the face of climate change.
- ➔ **A3.15** Fortify vigilance and environmental protection organs, foster their cooperation and coordination, as well as reinforce their inspection, vigilance, and execution capacities.
- ➔ **A3.16** Encourage social participation and training in processes that favors ecosystem adaptation in the face of climate change effects, through the establishment of organs such as citizens' observatories of forest fires, plagues, phenological changes, among others.

6.3 CRITERIA FOR THE PRIORIZATION OF ADAPTATION MEASURES^[26]

As part of this Strategy's scope, an orientation is presented about selection, design and implementation processes of specific measures of adaptation. Adaptation to climate change must be achieved through local processes; the design of the developing measures will depend on the region and context in which they are implemented.

Under the premise that resources will always be limited in face of this challenge's magnitude, it is necessary to strategically choose the measures to put into action.

This section contributes a series of criteria to guide the prioritisation of local measures that may serve as tools for decision-makers.

The main criteria to consider in the election of adaptation measures are described on the following page. The grading of prospected measures must part from a multicriteria analysis that considers environmental, social, and economical perspectives. Each criterion may be assigned a different weight, according to its importance within its specific context, or else, new criteria might be added as needed.



Inundación por el paso del huracán Stan en Tapachula/CENAPRED

²⁶ The present criteria has been built upon a series of environmental documents and methodologies, such as Alduce and Neri's Adaptation Practices Utility Index (2008); UNEP's MCA4 Climate: A practical framework for planning pro-development climate policies. (2011); the Adaptación al cambio climático en México: visión, elementos y criterios para la toma de decisiones by NEI (2012); the General Law on Climate Change (2012), and the project Construcción de una herramienta para la identificación y priorización de medidas de adaptación al cambio climático en México, supported by GIZ in behalf of the BMU (s/f).



CRITERIA	DESCRIPTION
Attention to most vulnerable populations	➤ The measure prioritizes support for populations whose conditions make them more vulnerable to the effects of climate change.
Cross-cutting policies, programs or projects	➤ The measure is coherent and is articulated with instruments from the policy on climate change, such as the NSCC, state and municipal programs, sectoral programs from different government orders, among others.
Prevention encouragement	➤ The measure encourages planned adaptation from a preventive approach and bets on prevention rather than on reaction.
Sustainability in the use and exploitation of natural resources	➤ The measure promotes sustainable exploitation of natural resources. This includes water, soil, and biotic resources.
Conservation of ecosystems and their biodiversity	➤ The measure contemplates preserving and restoring ecosystems and the services provided by them to augment resilience to climate change and to stop deterioration processes.
Active participation of target population and strengthening of capacities	➤ The population is actively involved by adding in their knowledge and experience in every step of the process, and appropriates the measure.
Strengthening of adaptation capacities	➤ The measure encourages the strengthening of individual, group, or network capacities in the subject of adaptation to climate change.
Feasibility	➤ The measure considers institutional, financial, political, regulatory, technical, and social capacity that will allow its implementation and sustainability.
Cost-effectivity or cost-benefit	➤ The cost of the measure is low compared with its effectivity or its benefits to reducing vulnerability.
Coordination between actors and sectors	➤ The measure promotes coordination between different sectors and institutions in the three orders of government, academy, and civil society.
Flexibility	➤ The measure may be adjusted in response to specific needs, besides, it produces benefits under any climate change scenario.
Monitoring and evaluation	➤ The measure presents a proposal for its monitoring and evaluation, which includes strategic impact indicators focused on their fulfillment.

Chart 3. Aspects evaluated in the selection of adaptation measures.

Source: Own elaboration.

7. DESARROLLO BAJO EN EMISIONES / MITIGACIÓN

7.1 POLICY ON MITIGATION OF CLIMATE CHANGE

In order to achieve a sustainable and sustained economic development that is defined by low-carbon emission, the General Law on Climate Change indicates that mitigation efforts should begin with the actions that have the greatest potential in emission reduction, with the lower cost, and that achieve, simultaneously, environmental, social, and economical benefits. There are opportunities for the reduction of greenhouse gas emissions that are cost-effective and that result in considerable environmental co benefits, as is the case of the improvements in energy efficiency. Likewise, the control of Short-lived Climate Pollutants^[27] presents attractive economical opportunities for the reduction of toxic compounds that influence significantly the global increase in Earth's temperature. The actions aimed to the prevention and control of SLCP emissions simultaneously contribute to the mitigation of climate change in the short term, and to the immediate improvement of air quality, generating positive effects in both public health and the conservancy of the ecosystems that comprise national territory.

That is why, complementarily to the GHG reduction efforts and as a part of the portfolio of priority mitigation actions for the country, the control of SLCPs is a fundamental part of this Strategy, as is conceptually shown in figure 14.

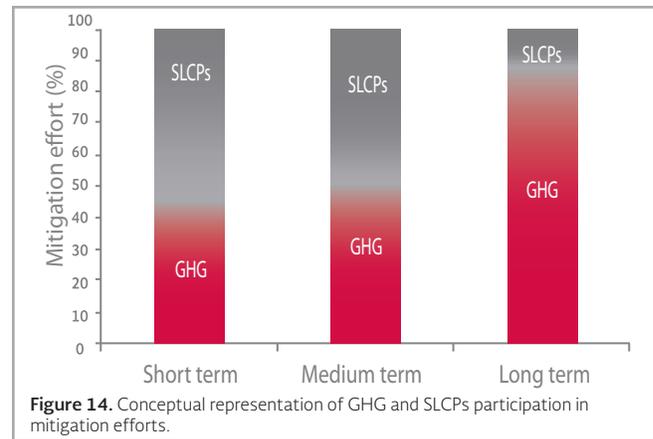


Figure 15 points out some characteristics of the mitigation efforts which must be put into action both immediately and in the long term.

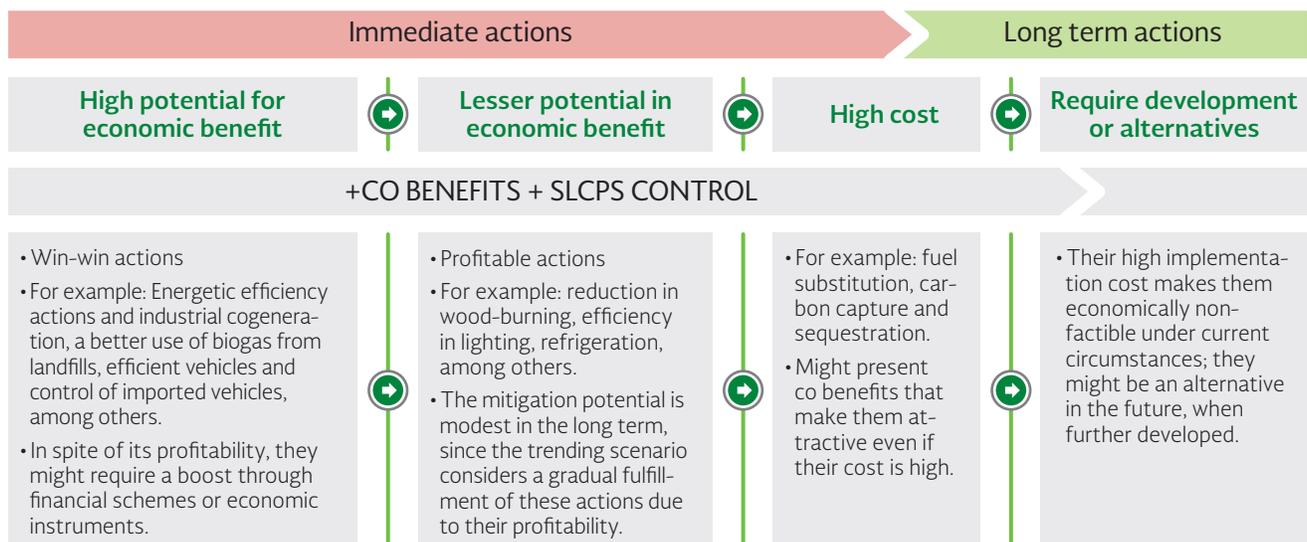


Figure 15. Execution terms for mitigation actions, in conformity with guidelines defined in the General Law on Climate Change. Source: Own elaboration

²⁷Section 7.3 presents a diagnosis of SLCP emissions in the country.



Chart 4 details the main criteria used to identify priority actions in the short, medium, and long terms.

CRITERIA	DESCRIPTION
Mitigation potential	<p>➤ It is the quantity of emissions that can be reduced or avoided through the implementation of mitigation actions, compared to current trends and technologies.</p>
Marginal cost of abatement	<p>➤ It is the economic impact per unit of reduced carbon equivalent, resultant from implementing mitigation actions. The marginal cost of abatement is negative for mitigation actions that represent saving or economic benefit in a certain term; marginal cost is positive when actions represent a cost.</p>
Environmental and social co benefits	<p>➤ This criteria considers those benefits in the population's quality of life. Examples for this advantages are: access to renewable energy infrastructure for marginal communities, diminishment in soil erosion brought up by reforestation programs, or the reduction of harmful species due to a better municipal management of solid waste. In spite of how hard it can be to quantify or value them, these benefits need to be incorporated to the measure election exercises.</p>
Health co benefits	<p>➤ Some mitigation actions, generally associated with the reduction of the use of fossil fuels, generate economic savings because of positive health impact. The actions focused on the reduction of SLCPs are a clear example of measures that contribute to the betterment of air quality, and consequently the betterment of the population's health.</p>
Increase in national productivity	<p>➤ Besides abatement cost, there exist other positive impacts in national productivity, which may be hard to quantify, and that, regardless, should be taken into account. For example, the optimization of urban transportation routes, urban planning, and massive transportation projects reduce traffic jams in road infrastructure; also, they diminish travel times and operation costs of vehicles, increase efficiency in the mobility of inhabitants.</p>
Barriers	<p>➤ There might exist barriers for the implementation of mitigation actions; they could be financial, technological, regulatory, or social. These must be analyzed in the planning process and action election, to contemplate their feasibility and ways to overcome them.</p>

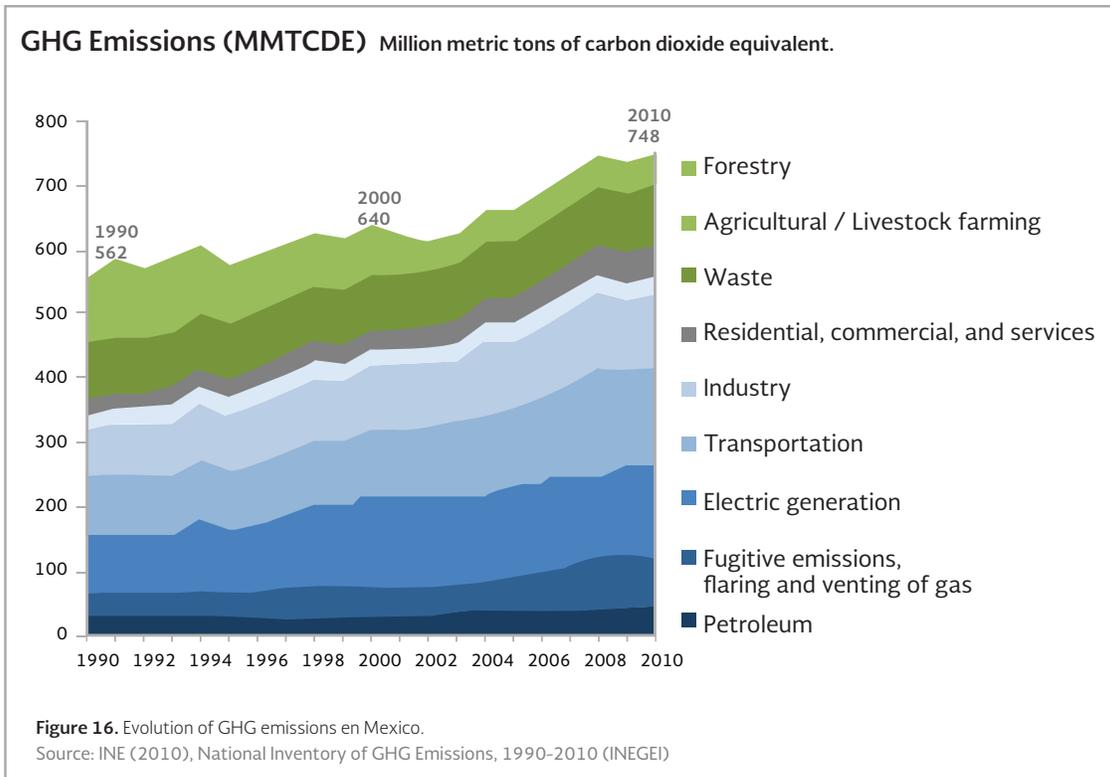
Chart 4. Main criteria for the identification of priority actions in the short, medium, and long term
Source: Own elaboration²⁸.

²⁸ The present criteria were built upon the established in the General Law on Climate Change (2012) and in the Bases for a Strategy on Low-Emissions Development in Mexico (NEI, 2012).

7.2 DIAGNÓSTICO DE EMISIONES DE GEI

Emissions

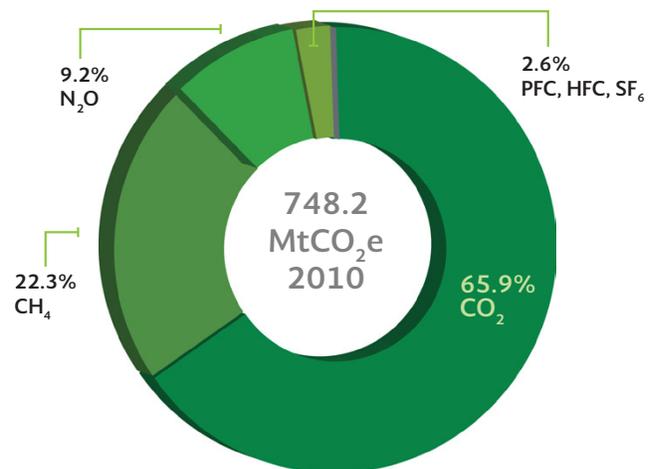
In 2010, Mexico emitted to the atmosphere greenhouse gases (GHG) equivalent to 748 million metric tons of CO₂ (MMTCDE), this represents an increase of 33% in regards to the emissions registered in 1990 (figure 16). In the period that spans from 2001 to 2010, GHG emissions present an average annual growth rate (AAGR) of 2.6%, while the GDP presented an AAGR of 1.9%.



The emissions that presented a higher growth are those that came from fugitive emissions, waste, and transportation, with an average annual growth rate between 1990 and 2010 of 5.3%, 5.1%, and 4.1% respectively. This is mainly due to the growth of per capita GDP, the urbanization presented in Mexico during this period, and the fast growth of vehicle flock (with an AAGR of 6.3% between 2004 and 2009).

The energy sector is the largest source of GHG emissions in Mexico, with a growth in emissions of 58% and an AAGR of 2.3% between 1990 and 2010.

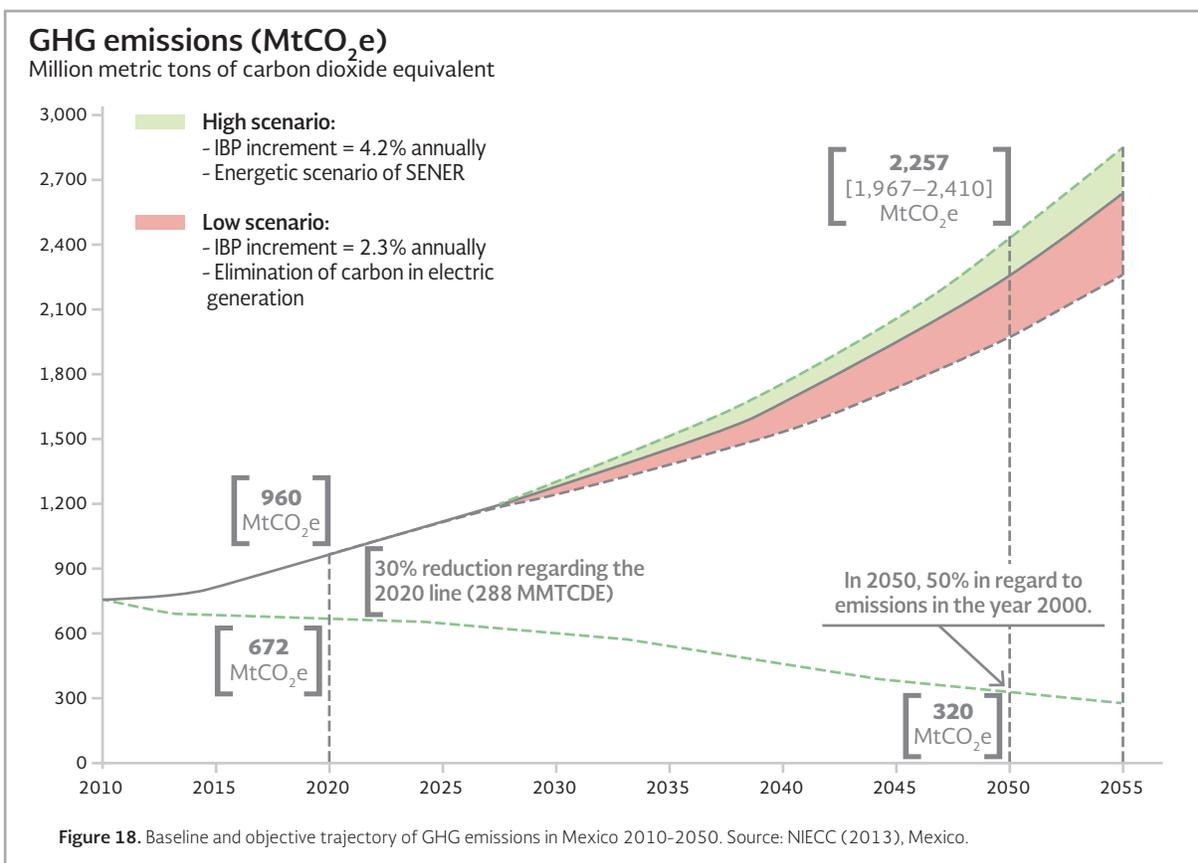
Figure 17 shows the breakdown of emissions by type of gas registered by the NIGHGE (2010), in which emissions of CO₂ represent the 65.9%, CH₄ the 22.3%, N₂O the 9.2%, and PFC, HFC, and SFC the 2.6%. Which amounts to a total 748.2 MMTCDE.



Baseline and objective trajectory of GHG emissions

The baseline for GHG emissions in Mexico is a trend projection of GHG emissions in absence of mitigation actions. It is built upon data provided by the National Inventory of GHG Emissions (NIGHGE), Sectorial Prospects^[29], and projected growth of both GDP and population.

The baseline supposes an average annual 3.6% growth of the GDP, consistent with National Energy Prospects (registered by the SENER in 2012). According to this scenario, GHG emissions in Mexico would reach 960 MMTCDE in 2020, 1,276 MMTCDE in 2030, and 2,257 MMTCDE in 2050. In the medium and long terms, the uncertainty of baseline calculations might be considerable. Figure 18 also shows both high and low scenarios for the trending scenario rank.



This trending scenario is the starting point in the design of policies and actions meant to achieve the goals for the reduction of emissions in Mexico:

- » In 2020, abate 30% of emissions in regard to the baseline, and
- » In 2050, reduce 50% of emissions in regard to those registered in the year 2000.

The identified trajectory that would allow the fulfillment of these objectives implicates that in 2020 the annual emissions should be reduced by about 288 MMTCDE and to 2050 the total emissions should reach a maximum level of 320 MMTCDE.

Mitigation potentials

Several studies offer reduction potentials for GHG emissions that would be significant to the country. For example, the analysis of abatement cost curves performed in the year 2010 by the NIE showed a mitigation potential to 2020 close to 261 MMTCDE. A different exercise is shown in figure 19, evaluating different initiatives for the reduction of GHG based on the same analysis^[30].

²⁹ The SENER elaborates prospects for the energy sector (petroleum, natural gas, LP gas, raw petrol, renewable energies, and electric sector) and SAGARPA, those related with the farming sector.

³⁰ For further detail consult the Methodological Annex available at: www.encc.gob.mx

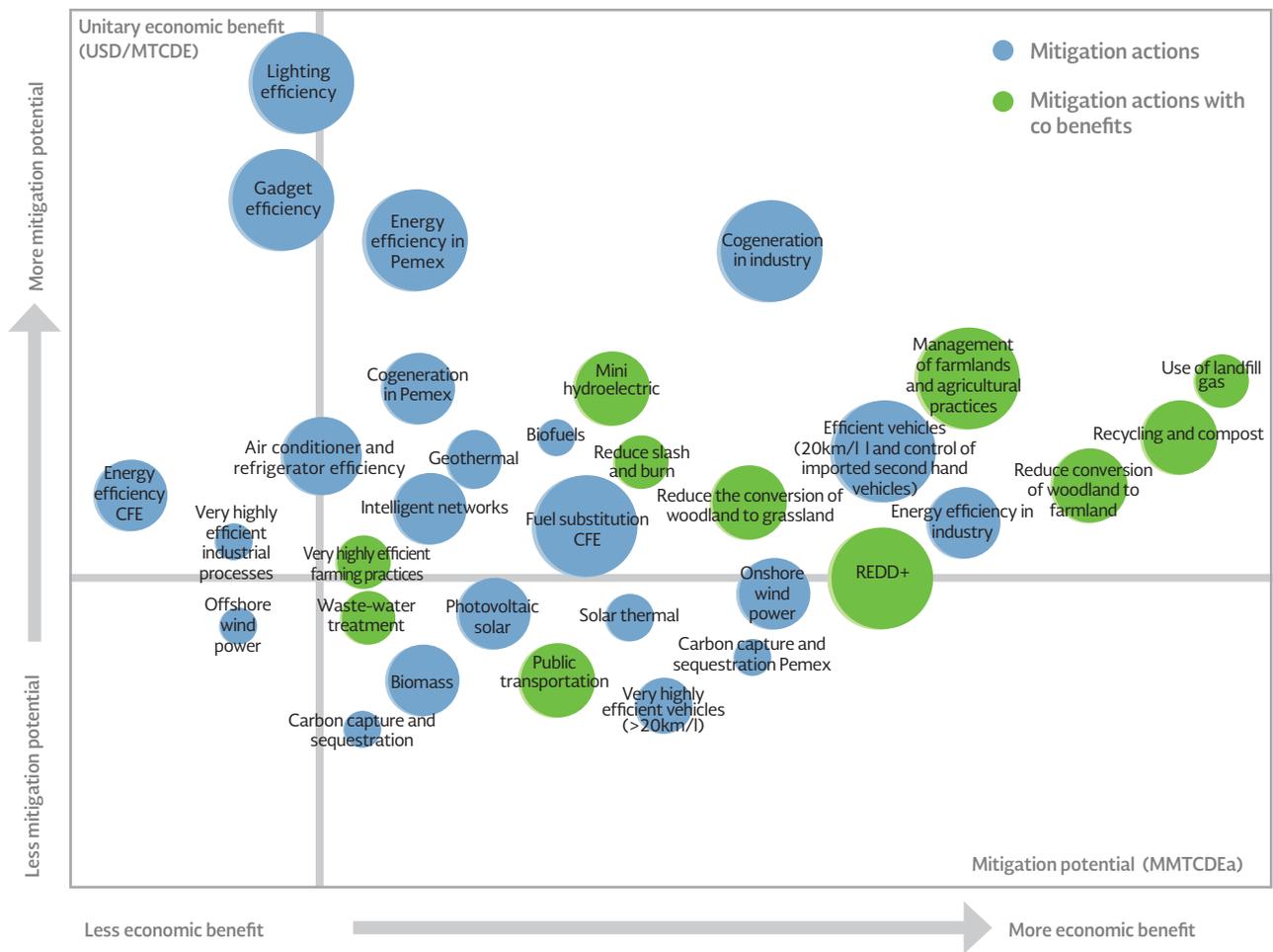


Figure 19. Matrix for the mitigation actions in the medium term (2020-2050). In this figure, the size of the circles represents the viability of the projects given current conditions; the wider the circle, the bigger the viability. Green-colored circles indicate actions with co benefits.

These kinds of exercises should be updated frequently in order to consider new economical, technological, and regulative conditions that provide more and better elements for the planning of mitigation actions.

7.3 SLCP EMISSIONS DIAGNOSIS

SLCPs, also known as Short-lived climate forcers, include: methane, black carbon, tropospheric ozone, and some hydrofluorocarbons. These pollutants have important effects over climate and a shorter lifespan on the atmosphere than that of CO₂. The influence that each type of emission has over climate change is determined by calculating the radiative forcing (W/m^2) of the gas or particle of interest.

Along with global efforts for the reduction of CO₂, the action over SLCPs offers important opportunities to stop climate change for the coming decades, as was discussed in section 2.1. Likewise, these efforts would provide significant co benefits for public health in Mexico.

The SLCPs origin in several sources and behave in different ways:

- Methane has an atmospheric lifespan of approximately 12 years, but has a very high warming potential. Besides its significant impact over warming as a GHG, methane is one of the precursors of tropospheric ozone, another SLCP.

- Black soot particles or BC are majorly generated by the incomplete burning of fossil fuels in industrial and transportation processes, as well as in small scaled processes such as brick-making, or even the burning of very diverse natural materials such as wood, agricultural by-products, and urban and industrial waste. Even though they can travel long distances, these particles have a short atmospheric lifespan, measured in either hours or weeks. As methane, BC warms the atmosphere more intensely than CO₂; evidence exists that the warming potential of BC is very high. Some authors even locate it as the second pollutant that contributes the most to climate change, right after CO₂; in a 20 year period it contributes up to 3,200 times more than CO₂. Besides, BC contributes to the reduction of the albedo and has a great impact on population's health.

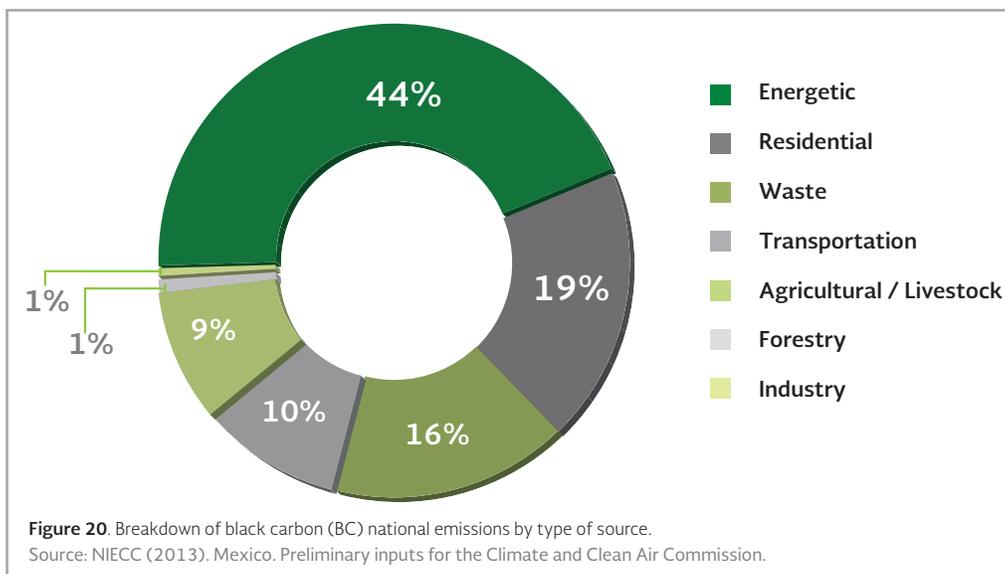
- Unlike other air pollutants, O₃ isn't directly emitted. It is a secondary pollutant formed in the troposphere through complex photochemical reactions between Volatile Organic Compounds (VOC), nitrogen oxides (NOx), carbon monoxide (CO), and CH₄, mainly. Ozone has an important impact on health, agricultural crops, and other ecosystems such as forests. In Mexico, tropospheric ozone levels in the two biggest metropolitan areas surpass, through most of the year, the recommended levels for health protection^[32]. It is necessary that control strategies are focused on the mitigation of its precursors' emissions.

- Hydrofluorocarbons are a group of chemical products manufactured for their use in refrigeration and aerosols, among others. The HFC, even though they represent a small fraction of all GHG, are rapidly growing in the atmosphere, and their radiative forcement is particularly high. The emission of these products could grow twenty times over in the next three decades if the necessary measures to reduce their consumption aren't carried out^[33].

Emissions

Recent studies estimate that in 2010, Mexico emitted 0.0351 million tons of Black Carbon. Figure 20 shows the relative distribution of BC in 2010. The energy sector includes emissions originated by: petroleum and gas, electric generation and fugitive emissions; it is the greatest contributor of emissions, with 44%. It is followed by residential emissions of the burning of wood with the 19%, of waste with the 16%, transportation with 10%, farming sector with 9% and forestry and industry with 1% each.

At the moment there isn't a baseline of SLCP emissions expressed in CO₂ equivalent, since there is still no international scientific consensus over its conversion factors.



³¹ Bond, T.C., Doherty, S.J., Fahey, D.W., et al. (2013). Bounding the role of black carbon in the climate system: A scientific assessment. *In Journal of Geophysical Research: Atmospheres*

³² NIE. (2011). *Cuarto almanaque de datos y tendencias de la calidad del aire en 20 ciudades mexicanas (2000-2009)*.

³³ UNEP. (2011). *Short Lived Climate Pollutants*.

7.4 STRATEGIC AXES AND LINES OF ACTION



M1 ACCELERATE THE ENERGY TRANSITION TOWARD CLEAN ENERGY SOURCES

Mexico has a great potential in energy generation through clean and renewable sources, and, even if there have emerged new possibilities for the exploitation of such sources with the participation of the private sector, mechanisms haven't sufficed. The following lines of action seek to focus efforts in overcoming the main barriers that have stopped the complete immersion of renewable energies in the national energetic system.

LINES OF ACTION:

- ➔ **M1.1** Strengthen the regulation and institutional scheme, and the use of economical instruments in order to take advantage of clean energy sources and more efficient technologies.
- ➔ **M1.2** Encourage the generation of power through the use of clean sources and more efficient technologies in substitution of fossil fuels, minimizing its environmental and social impact.
- ➔ **M1.3** Increase the penetration of renewable energies, and reduce energy losses through the use of intelligent networks and the distributed generation in the national electric system.
- ➔ **M1.4** Turn state-owned power enterprises into central axes of the battle against climate change, so that they foster a strategy for the development of renewable energy as well as energy saving.
- ➔ **M1.5** Encourage the participation of the private and state-owned sectors in power generation through renewable energy sources and efficient co generation.
- ➔ **M1.6** Facilitate the interconnection between power centrals with renewable energies in the regions of the country with the greater potential and economical feasibility.
- Wind power**
- ➔ **M1.7** Encourage the generation of wind-powered energy and take advantage of its terrestrial and oceanic potential to ensure technological, social, and environmental compatibility.
- Photovoltaic**
- ➔ **M1.8** Promote investment in photovoltaic systems in high potential regions of the country.
- ➔ **M1.9** Encourage distributed generation through the use of photovoltaic systems within the industry, residential, and service sectors.
- Geothermal**
- ➔ **M1.10** Boost the technological development of geothermal energy with schemes that reduce exploration risks and offer guarantees on the rights of resource exploitation.
- Hydroelectric**
- ➔ **M1.11** Take advantage of the existent potential of electric energy through the installing of new great hydroelectric plants. This will be done only in zones where social and environmental impact can be compensated. Likewise, take advantage of the water stored in these installations for other uses such as irrigation, protection against floods, water supply for cities, roads, sailing, environmental services, landscaping, and tourism.
- ➔ **M1.12** Encourage the generation of small, mini, and micro hydroelectric plants that have their niche in industrial self-sustaining, productive activities in a rural environment, and in those zones that present high costs of interconnection to the network, so that their ecological and social compatibility may be secured.
- Nuclear**
- ➔ **M1.13** Consider among the planning of the diversification of the generation park the implementation of a nuclear program as a possible substitute to the use of fossil fuels, and only if it is chosen to develop this program.
- Solar Thermal**
- ➔ **M1.14** Encourage the use of solar thermal energy, including its exploitation for the warming of water, in services, industry, residential, and tourism sectors.



M2 REDUCE ENERGETIC INTENSITY THROUGH EFFICIENCY AND RESPONSIBLE CONSUMPTION SCHEMES

Energetic efficiency not only derives in savings, but it also contributes to the reduction of GHG emissions, while simultaneously supporting the growth and competitiveness goals of the country. This axis pretends to boost the measures that accompany a responsible consumption of energy, that result of the change in consumption habits, as well as of technological improvements.

LINES OF ACTION:

➔ **M2.1** Encourage energetic efficiency and saving of the national energetic system, as well as savings in every activity according to the GDP.

➔ **M2.2** Take advantage of the potential of mitigation actions with the inclusion of efficient cogeneration, energetic efficiency in lighting, air conditioning, efficient refrigeration, and water heating.

Consumption habits and Certification

➔ **M2.3** Promote a change in practice and behavior of final users, particularly in the residential, service, tourism, and industry sectors through economic instruments and energy efficiency and power saving campaigns.

➔ **M2.4** Encourage and promote the development of mechanisms to provide trustworthy and timely information to the consumer about energy efficiency and GHG emissions, such as labeling and certification.

➔ **M2.5** Implement sustainable practices in the public and private sectors by means of using high standards of efficiency and green shopping criteria.

More efficient technology

➔ **M2.6** Increase the energy efficiency of private and public trucking transportation, be it cargo or passengers, through the establishment of Official Standards and schemes of improved logistic and technology, including a modal change for the reduction of emissions and the consumption of fuel.

➔ **M2.7** Reduce emissions by means of the modernization of the vehicle pool, as well as the retirement and final disposal of inefficient units.

➔ **M2.8** Execute projects of efficient water use in the farming sector, including efficient irrigation systems that in turn reduce power consumption.

➔ **M2.9** Continue the exploration of technologies for the capture and sequestration of carbon, looking forward to the implementation of projects, and include their association with the improved recovery of hydrocarbons.

Transformation processes

➔ **M2.10** Boost technologies relating to high energy efficiency, fuel substitution, industrial process redesign, and technologies for the capture of CO2 emissions, within high energy intensity industries such as the cement, steel, petroleum, chemical, and petrochemical industries.

➔ **M2.11** Reduce energy consumption and GHG emissions through the execution of energy efficiency projects derived from integral energy diagnosis in the petroleum, industrial, and electrical sectors.

➔ **M2.12** Reduce losses in transmission and distribution of energy through the modernization of electric lines and substations, as well as through the improvement of the distribution grid.

Regulation and normativity

➔ **M2.13** Adequate, and in its case, design the legal and regulatory framework applicable to fuels for the reduction of GHG emissions, particularly those that aren't currently regulated, such as fuel oil and marine diesel.

➔ **M2.14** Create a mandatory national vehicle verification system, including applicable control mechanisms as well as revising and in turn adjusting emission norms for the vehicle pool with the participation of the three government orders so to ensure high efficiency indexes in all additions to the national vehicle park, including that of imported, used vehicles.



M3 TRANSITION TO SUSTAINABLE CITY MODELS WITH MOBILITY SYSTEMS, INTEGRAL WASTE MANAGEMENT, AND LOW-CARBON FOOTPRINT BUILDINGS

Within framework of this axis, a sustainable city is part of an urban development model capable of regulating territory, guiding its use toward efficient mobility systems, low-carbon footprint buildings, and an integral management of water and waste. The focus of the policy application is, firstly, locally.

LINES OF ACTION:

Sustainable urban development

M3.1 Increase the controlled and efficient use of territory by diminishing urban expansion and guaranteeing the access to intra-urban land territory, promote mixed use and vertical buildings, privilege densification before openness to new settlements on the periphery and include the integration of urban woodlands and the definition of limits to the growth of cities.

Buildings

M3.2 Promote strengthening, adoption, and application of regulations, standards, and laws to boost technologies for the saving and exploitation of water, energy, gas, thermal isolation, use of renewable energy, and carbon capture practices (for example: green roofs, vertical gardens, and urban orchards) in new and preexistent buildings.

Mobility

M3.3 Encourage the evolution toward public transportation systems that are safe, clean, low-emission, accessible, and comfortable; this would strengthen regional and national interconnectivity with the generation of multimodal efficient networks with support from the federal government, as a part of an integral policy for urban development and mobility that reduces travel times and distances.

M3.4 Develop regulatory beings with the vision of transportation demand on a national and regional level, in order to optimize transportation systems that reduce travel times and distances.

M3.5 Encourage programs for the reduction of population displacements, such as: foster office work at home, housing exchange or lease to bring people closer to their academic or work stations, collective transportation services for enterprises, wider variety of schedules. For that, the diversification and hierarchization of the offer in equipment and urban services in inhabited areas with a mixed use of land.

M3.6 Boost efficient and low-emission transportation systems, and modifyadjust the regulatory framework and pricing to foster reinvestment and continuous improvement.

M3.7 Generate incentives, infrastructure, and programs in order to favor non-motorized transportation, articulated within integral transportation systems, in which the pedestrian and the cyclist are given priority for the sake of immediate environmental and health benefits.

Integral waste management

M3.8 Encourage the participation of the private sector in projects for separation, reutilization, waste recycling, development of biogas plants, water treatment plants, and the creation of gathering centers, by means of a previous development and reinforcement of mechanisms, regulations, and markets. That as a boost for this sector's investment, and as shared responsibility measures in waste generation.

M3.9 Boost new technologies and infrastructure for waste water treatment, the integral management of solid waste, and the exploitation of biogas energy, through co investment schemes and economical instruments that will facilitate self-funding of the operation and maintenance of new and preexistent infrastructure.

M3.10 Create regional organs for the development of landfills and water treatment with a long term national and regional vision, give certainty to projects with long development periods and take advantage of scaled economies, with the modificationadjustment of regulatory framework and pricings in order to encourage reinvestment and continuous improvement.

M3.11 Promote and develop state and municipal plans of integral waste management in accordance with the National Program for Integral Waste Management, that foster the participation of society in the separation of waste and exploitation of them.

M3.12 Correct and promote pricing systems of the recollection and disposal services, so that it will incentive reinvestment in technological and logistic improvements, and that better national and international practices may be implemented.

M3.13 Promote vigilance, inspection, and sanction application actions as a central axis in the fulfillment of normativity of integral waste management.



M4 PROMOTE BETTER AGRICULTURAL AND FORESTRY PRACTICES TO INCREASE AND PRESERVE NATURAL CARBON SINKS ↑

Forests are important carbon reservoirs; their destruction and decay constitutes one of the most important emission sources globally. Simultaneously, their conservancy and sustainable management may contribute to increasing the quantity of carbon stored in them. Farming activities, on the other hand, are key to alimentary security, but lots of them contribute to GHG emissions. This axis poses key lines of action to be developed within the agricultural and forestry sectors, aiming to boost practices that reduce emissions and avoid policies that may diminish their mitigation scope. It is key for this axis to apply policies with a landscape focus that acts on big compacted areas, such as biological corridors or basins, in order to consider in a wider way the condition of its natural resources, trends, the influence of human action, and the opportunities for conservancy, redress, and development.

LINES OF ACTION:

- ➔ **M4.1** Boost the planned and sustainable use and exploitation of forest resources by local communities as a mechanism that incentives preservation and conservancy of forestry resources so to stop the deforestation rate and avoid changes in the use of soil by taking care of natural capital.
- ➔ **M4.2** Strengthen sustainable forestry management and the enrichment of decayed forest ecosystems to secure the increase in carbon storage and guaranteeing its permanence.
- ➔ **M4.3** Boost the incorporation of woodlands to sustainable management and certification schemes in order to stop the decay and maximize the capture and permanence of carbon.
- ➔ **M4.4** Encourage programs for the preservation of forest ecosystems for priority regions so to maintain carbon sinks, securing federal, state, and municipal intervention.
- ➔ **M4.5** Design and operate plans, programs, and policies directed to reducing deforestation and decay of forests and jungles, framed within a REDD Strategy, which must include a sustainable rural development and landscaping focus, in regard to social and environmental safeguards.
- ➔ **M4.6** Establish redress, regeneration, or reforestation schemes for the capture and storage of carbon in Natural Protected Areas, as well as other instruments of territorial and terrestrial ecosystems conservancy.
- ➔ **M4.7** Implement soil conservancy schemes that ensure its integrity and increase carbon capture.
- ➔ **M4.8** Increase the establishment of farming and forestry production schemes that have a greater mitigation potential and that bring environmental and social co benefits such as silvopasture agroforestry and the link of traditional knowledge with agricultural and livestock current problems.
- ➔ **M4.9** Encourage farming practices that preserve and augment carbon capture on soil and biomass, such as conservancy cultivation and productive restructuring in which yearly single-crops are replaced with polyculture or perennial crops.
- ➔ **M4.10** Apply schemes that bring about the reduction of emissions derived from inadequate use of fire in woodlands and farmlands.
- ➔ **M4.11** Implementation of agricultural policies oriented to carrying out a better use of fertilizers, rationalize their use, produce and apply biofertilizers, as well as the efficient use of nitrogenates.
- ➔ **M4.12** Implement exploitation schemes related with waste management derived from livestock activities.
- ➔ **M4.13** Implement actions for energy efficiency and use of renewable energy in agricultural, livestock, and fishing projects, as well as boost biodigesters.
- ➔ **M4.14** Establish livestock production schemes that reduce emissions and capture carbon in grazing lands through the adequate management of livestock, animal cargo adjustments, and planned grazing.
- ➔ **M4.15** Strengthen vigilance in forest zones in order to avoid illegal cut and the propagation of forestry fires, as well as promote the establishment of communal vigilance corps.



M5 REDUCE EMISSIONS OF SHORT-LIVED CLIMATE POLLUTANTS (SLCPS), AND PROMOTE HEALTH AND WELLNESS CO BENEFITS

This axis poses lines of actions for reducing SLCP emissions, and in such a way, contribute to the reduction of climate change impacts in a regional level, as well as the decrease of global warming trends in the short term. In a parallel manner, these lines of action will foster multiple benefits that include an improvement of air quality, health, and crops.

LINES OF ACTION:

- ➔ **M5.1** Promote the elaboration of normativity that regulates SLCP sources and uses.
- ➔ **M5.2** Hierarchization of the emission source of every SLCP in function of the magnitude of its emissions, potential for global warming, mitigation costs, and also the development of reduction mechanisms.
- ➔ **M5.3** Accelerate the penetration of refrigerators with a low global warming potential in different sectors that include air conditioning, refrigeration, and foaming agents, and the reduction of leaks, management and disposal of HFC.
- ➔ **M5.4** Strengthen the programs for good refrigeration practices, recovery and final disposal of chlorofluorocarbons (CFC), Hydrofluorocarbons (HFC), and HCFC.
- ➔ **M5.5** Fortify normativity and programs for: prevention and control of forestry fires, carrying out of prescribed burnings, and control of agricultural burning practices.
- ➔ **M5.6** Implement schemes for the sustainable exploitation of forestry biomass and agricultural waste.
- ➔ **M5.7** Implement clean transportation systems in cargo transportation corridors.
- ➔ **M5.8** Encourage the implementation of programs for emission reduction and operational efficiency aimed at operational, administrative, technological, and financial characteristics and needs of the truck-man and small transporter.
- ➔ **M5.9** Boost the substitution of open fires for efficient and low-black carbon emission stoves, with a special emphasis on municipalities with high and very high marginalization and turn off the unsustainable use of wood.
- ➔ **M5.10** Encourage the use of technologies and fuels that diminish the emission of black carbon, such as particle filters and ultra-low-sulfur diesel in internal combustion to diesel motors.
- ➔ **M5.11** Boost the reduction of BC emissions in the medium and big industry by means of a change in coke fuel, fuel oil, and diesel for low-black carbon emission fuels, the implementation of emission control systems and energy efficiency within processes.
- ➔ **M5.12** Encourage the reduction of BC emissions in the micro and small industries through productive restructuring, technological change, and energy efficiency in industries such as the brick industry.
- ➔ **M5.13** Eliminate open sky burning in dumps, landfills, and backyards.
- ➔ **M5.14** Establish MRV mechanisms in operations of burning and venting of methane during gas and petroleum production, as well as reinforce vigilance.
- ➔ **M5.15** Implementation of actions for the reduction of fugitive methane emissions, mainly within petroleum, gas, and mining exploitation, as well as in natural gas conduction, processing, and distributing procedures.
- ➔ **M5.16** Encourage exploitation and electric generation projects from biogas originated in landfills and water treatment plants, and avoid methane and VOC emission to the atmosphere.
- ➔ **M5.17** Boost control of emissions of VOC, tropospheric ozone precursors, in the aerobic treatment of organic waste (compost).
- ➔ **M5.18** Control volatile organic compound control in industry sources, gasoline service stations, and solvent-using areas and service sources.
- ➔ **M5.19** Implement a measurement and accounting system for SLCP emissions in order to track emitting sources and monitor and evaluate the effectiveness of implemented policies for the reduction of these pollutants' emissions.

8. REVIEW, EVALUATION, AND ADEQUATION OF THE NATIONAL STRATEGY ON CLIMATE CHANGE

The Secretariat of Environment, along with the Intersecretarial Commission on Climate Change, will review the NSCC at least once every ten years in the matter of mitigation and every six years in the matter of adaptation. These reviews must explain the deviations that, if any, are noticed between estimated projections and evaluated results. Likewise, scenarios, projections, objectives, and corresponding goals will be updated.

Based upon those reviews and the results of whichever evaluations are conducted by the NIECC General Evaluation Coordination and the Council, the National Strategy on Climate Change might be updated. The Special Program on Climate Change and the state programs must adapt to said update. In no case will

reviews and updates be made in the lessening of goals, projections, and objectives that have been previously posed, nor will they encourage their reduction.

The Intersecretarial Commission on Climate Change will be able to propose and approve the adjustments or modifications to scenarios, trajectories, actions, or goals comprised in the National Strategy when: 1) new international commitments on the subject have been adopted; 2) new relevant scientific or technological knowledge is developed; c) it is required so by policies on matters of environment, natural resources, economy, energy, sustainable transportation, health, and alimentary security; and 4) they derive from the results of the NIECC Evaluation Coordination evaluations.

GLOSSARY

ADAPTATION: Measures and adjustments in human or natural systems that come as a response to climate stimulus, whether projected or real, or their effects, which can moderate damage or take advantage of their benefic aspects.

ADAPTIVE CAPACITY OF ECOSYSTEMS: The ability of ecosystems to adjust to climate change (climate variation and its extremes included) in order to moderate potential damage, take advantage of opportunities, and face its consequences.

ADAPTIVE CAPACITY: Ensemble of capacities, resources, and institutions of a country or region that would allow to implement effective adaptation measures.

BASELINE EMISSIONS: Estimate of emissions, absorption, or capture of greenhouse gases or compounds associated to a baseline scenario. They do not incorporate new abatement measures.

BASELINE SCENARIO: Hypothetical description of what could happen with the variables that determine emissions, absorptions, or captures of greenhouse gases and compounds.

BIODIVERSITY: The variability of living organisms of any habitat, included, among others, terrestrial and maritime ecosystems, and other aquatic ecosystems and ecological compounds from which they are a part of. Comprehends the diversity within every species, among species, and among ecosystems.

BIOFUEL: Fuel produced from organic matter or from vegetable combustible oils. Biofuel examples are: alcohol, black bleach derived from the process of paper manufacture, wood, and soy oil.

BIOLOGICAL CORRIDORS: Geographic track that allows for the exchange and migration of wildlife within one or more ecosystems. Its function is to maintain connectivity of biological processes in order to avoid the isolation of populations.

CAPACITY BUILDING: Process of development of techniques and institutional capacities so that they can participate in every aspect of adaptation, mitigation, and research relating to climate change.

CARBON DIOXIDE (CO₂): Gas that exists spontaneously and also as a byproduct of burnt fossil fuels originated in fossil carbon deposits, such as petroleum, gas or charcoal, the burning of biomass, or the changes in usage of soil and other industrial processes. It is the anthropogenic greenhouse gas that most affects the radiative equilibrium of Earth.

CERTIFIED EMISSION REDUCTION: Emission reductions expressed in Metric tons of carbon dioxide equivalent (MTCDE) and

achieved through activities or projects that were certified by any entity authorized to those effects.

CLEAN TRANSPORTATION: Transportation systems that adopt strategies, technologies, and better practices, and that are efficient and low-carbon emitters. A few examples of clean transportation projects would be: BRT systems, trolleys, metro bus transit systems, suburban trains and metro systems (rapid transit trains), integrated massive transportation corridors, optimization of public transportation routes; integration of stations and terminals, construction of bike paths and installment of bicycle parking spots in massive transportation stations, as well as improvement measures for the operation of transit such as intersections, signaling, and public parking.

CLIMATE ANOMALY: The difference between average temperature in a period that spans several decades or more, and the climate during a particular month or season.

CLIMATE CHANGE: Variation in climate attributed directly or indirectly to human activity and that alters the composition of the global atmosphere, adding up to the natural variability of climate observed during comparable periods of time.

DANGER: It is defined in relation with the occurrence of climate events, such as changes in temperature and rainfall, related phenomena (v.gr., tropical cyclones or droughts), as well as social and economic alterations derived from them (v.gr., decrease in agricultural outputs or increase in disease incidence).

DEFORESTATION: Loss of forest vegetation, due to natural or induced causes, to any other condition.

DEGRADATION: Process of decay in the capacity of forest ecosystems to provide environmental services as well as production capacity.

DESERTIFICATION: Decay of arid and semi-arid soil and sub-humid dry zones. Process mainly provoked by climate variations and human activities such as excessive farming and grazing, deforestation, and lack of irrigation.

DISASTER RISK: Probability of the occurrence of severe alterations to the normal functioning of a society due to weather or climate events that interact with social vulnerability conditions.

DISASTER: Result of the occurrence of one or more severe and/or extreme disturbing agents, whether linked or not, of natural or human origin, that when happening at a certain time in a certain zone, cause damage and that because of their magnitude exceed response capacities from the affected community.



DROUGHT: In general terms, a drought is “the prolonged absence or accentuated insufficiency of rainfall”, or rather “an insufficiency that originates water scarcity for a certain activity or group of people”, or else “a period of abnormally dry meteorological conditions sufficiently prolonged so that the absence of rainfall causes an important hydrological disequilibrium”.

ECOLOGICAL CONNECTIVITY: The connection of ecological processes through several levels; it includes processes related to trophic relations, perturbation processes, and hydroecological fluxes.

ECOLOGICAL INTEGRITY: It refers to the condition of an ecosystem in which its structure and function remain intact due to human-caused stress, and in which ecosystemic biodiversity and supporting processes probably persist.

ECOLOGICAL ORDINANCE: The environmental policy instrument whose objective is to regulate or induce the use of soil and productive actions so as to achieve environmental protection and preservation, as well as the sustainable use of natural resources, based on their trends of decay and potentialities of use.

ECOSYSTEM: The basic functional unit of interaction between living organisms and between those and their environment, within a determined time and space.

ECOSYSTEMIC RESILIENCE TO CLIMATE CHANGE: An ecosystem’s ability to maintain its functions after being disturbed. A measure for resilience is the magnitude of the disturbance required to irrevocably move an ecosystem to an alternative state. Resilience decreases ecosystemic sensibility to those changes.

ECOSYSTEMIC RESISTANCE TO CLIMATE CHANGE: It describes an ecosystem’s capacity to persist essentially unaltered despite environmental changes. Resistance decreases ecosystemic sensibility to those changes.

EMISSION SOURCES: Every process, activity, service, or mechanism that liberates greenhouse gases or compounds to the atmosphere.

EMISSIONS: Liberation of greenhouse gases and/or their precursors and aerosols in the atmosphere, including in their case greenhouse compounds, in a specific time and zone.

ENVIRONMENTAL SERVICES: Both tangible and intangible benefits generated by ecosystems, necessary to the survival of natural and biological systems altogether and which provide benefits to humankind.

EXPOSURE: Presence of people; life; environmental resources and services; economic, social, or cultural infrastructure or assets that may be harmed in diverse ways.

EXTERNALITIES: The positive or negative impact caused by the provision of a good or service, and that also affects third parties. Externalities occur when the cost paid for a good or service is different

to the total cost of the damage and benefits involved in its production, in economic, social, environmental, and health terms.

FOREST MANAGEMENT: The process that comprehends the group of actions and procedures whose objective is the ordinance, cultivation, protection, conservation, restoration, and exploitation of environmental services and resources of a forest ecosystem, anchored to the consideration of ecological principles, while respecting the functional integrity and interdependence of resources without it diminishing the productive capacity of ecosystems and existent resources.

GREEN ECONOMY: That which must improve the human being’s wellness and social equity, as well as it significantly reduces environmental risks and ecological scarcities. In its most basic form, a green economy has low carbon emissions and uses natural resources efficiently.

GREEN SHOPPING: This concept refers to the way of utilizing our power as shoppers to benefit the environment by buying products that have a lesser impact on the environment (environmentally friendly). It considers environmental and social factors, as well as total costs associated with every buy. This implicates taking into account what the products are made of, where do they come from, how are they manufactured, and how to dispose of them, meaning its cycle of life. It also implicates taking in account the buyer’s real need for the product.

GREENHOUSE COMPOUNDS: Greenhouse gases (GHG), their precursors and particles which absorb and issue infrared radiation to the atmosphere.

GREENHOUSE EFFECT: Greenhouse gases effectively absorb the infrared radiation issued by the surface of the Earth, by the atmosphere itself. Atmospheric radiation is issued in every direction, particularly toward the surface of the Earth. Because of that, greenhouse gases retain heat within the surface-troposphere system. This phenomenon is known as Greenhouse Effect.

GREENHOUSE GASES: Those gaseous components of the atmosphere, both natural and anthropogenic, which absorb and emit infrared radiation.

HYDROMETEOROLOGICAL OR CLIMATE EVENT: Those that may be considered dangerous if the conditions of vulnerability and exposure turn them into a threat.

INTEGRAL RISK MANAGEMENT: Group of actions pointed toward the identification, analysis, evaluation, control, and reduction of risks, considering them by their multifactorial origins and in a permanent building process that involves the three levels of government, as well as the sectors of society. This facilitates the carrying out of actions directed to the creation and implementation of public policies, strategies, and procedures integrated to the achievement of sustainable development guidelines that fight against the

structural causes of disasters, and that also strengthen the capacities of resilience or resistance of society. It involves the stages of: identification of risks and / or their forming process, prevision, prevention, mitigation, preparation, aid, recovery, and rebuilding.

INVENTORY: Document that contains the estimate of anthropogenic emissions by their sources and of absorption by sinks.

METRIC TONS OF CARBON DIOXIDE EQUIVALENT (MTCDE): Unit of measurement of greenhouse gases, expressed in tons of carbon dioxide.

MITIGATION: Application of policies and actions destined to reduce source emissions or to improve gas sinks and greenhouse compounds.

NATURAL RESOURCE: The natural element susceptible to be used for the benefit of mankind.

PRESERVATION: Ensemble of measures and policies created to maintain the conditions that propitiate evolution and continuity of ecosystems and natural habitats, as well as to conserve viable species populations within their natural environments, and the components of biodiversity out of their natural habitats.

RADIATIVE FORCING: Variation, expressed in $W\ m^{-2}$, of net irradiation (descending minus ascending) in the tropopause, due to a variation of the external cause of climate change; for example, a variation in the concentration of carbon dioxide or of solar radiation.

REFORESTATION: Induced establishment of forest vegetation in woodlands.

RENEWABLE ENERGIES: Those which utilize power usable by humanity, naturally regenerate, and therefore are periodically or continuously available, and are as follows: a) wind; b) solar radiation, in all its forms; c) the movement of water in both natural and artificial channels; d) oceanic energy in all its forms: tidal, thermal, waves, from oceanic currents, and from salt concentration gradients; e) heat of geothermal deposits; f) bioenergetics, determined by the Law of Promotion and Development of Bioenergetics, and g) any others that are determined by the Secretariat.

RESILIENCE: Capacity of natural or social systems to either endure or recover from climate change derived effects.

RESISTANCE: The capacity of natural or social systems to prevail when faced by the effects derived from climate change.

RESTORATION: Ensemble of activities that tend to the recovery and re establishment of the conditions that propitiate evolution and continuity of natural processes.

RETURN PERIOD: Estimate number of years which an event will take to recur.

RISK ATLAS: Dynamic document whose evaluations of risk in vulnerable regions or geographic zones consider current and future climate scenarios.

RISK REDUCTION: Preventive intervention of individuals, institutions, and communities that allows to eliminate or reduce, through preparation and mitigation actions, the adverse impact of disasters. It considers the identification of risks and the analysis of vulnerabilities; resilience and response capacities; the development of a civil protection culture; public commitment and the development of an institutional frame; implementation of environmental protection measures; soil use and urban planning; critical infrastructure protection, alliance generation and development of financial instruments and risk transfer; and the development of alert systems.

RISK: Damage or probable losses over an affectable agent, result of the interaction between its vulnerability and the presence of a disturbing agent.

SHORT-LIVED CLIMATE POLLUTANTS: Substances such as methane, black carbon, tropospheric ozone, and several hydrofluorocarbons (HFC) have a significant impact on climate change in the short term, and they also have a relatively short lifespan in the atmosphere, compared to that of carbon dioxide and other gases.

SUSTAINABLE DEVELOPMENT: The process that is evaluable through environmental, economic, and social criteria and indicators, and which tends to improve the quality of life and productivity of people, while is also grounded on appropriate measures set to preserve ecological balance, environmental protection, and responsible use of natural resources in a way that doesn't compromise the fulfillment of future generations' needs.

SUSTAINABLE USE: The utilization of natural resources in a way that respects functional integrity and charge capacities of the ecosystems from which those resources came from, for indefinite periods.

VULNERABILITY: Level at which a system is susceptible, or is incapable of standing the adverse effects of climate change, including climate variability and extreme phenomenons. Vulnerability is measured in function of character, magnitude, and velocity of the climate variation to which a system is exposed, its sensibility and adaptation capacity.

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ACRONYMS AND ABBREVIATIONS

NPA	Natural Protected Area
FPA	Federal Public Administration
BC	Black Carbon
BMU**	The Federal Environmental Ministry (Germany)
CCA-UNAM*	Atmosphere Science Center, National Autonomous University of Mexico
C3	Climate Change Council
SLCP	Short-lived Climate Pollutants
CFC	Chlorofluorocarbons
CH₄	Methane
ICCC	Intersecretarial Commission on Climate Change
CICESE*	Scientific Research and Superior Education Center, Ensenada, Baja California
UNFCCC	United Nations Framework Convention on Climate Change
CO₂	Carbon Dioxide
CO₂e	Carbon Dioxide Equivalent
COP	Conference of the Parts of the UNFCCC
COTECOCA*	Agostadero Technical Consultant Commission of Coefficients
VOC	Volatile Organic Compounds
GHG	Greenhouse gases
GGGI	Global Green Growth Institute
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH (Germany International Cooperation for Development)
HCFC	Hydrochlorofluorocarbons
HFC	Hydrofluorocarbons
IMTA*	Mexican Institute of Water Technology
NEI	National Institute of Ecology (now known as NIECC)
NIECC	National Institute of Ecology and Climate Change
NIGHGE	National Inventory of Greenhouse Gas Emissions
INEGI*	National Institute of Geography and Statistics
SVI	Social Vulnerability Index
GLCC	General Law on Climate Change
MRV	Measure, Report, and Verification
M&E	Monitoring and Evaluation
NAMA*	National Appropriate Mitigation Actions
N₂O	Nitrous Oxide
NOAA	National Oceanic and Atmospheric Administration
O₃	Ozone
PECC*	Special Program on Climate Change
GDP	Gross Domestic Product
IPCC	Intergovernmental Panel on Climate Change



PJ	Petajoule
REDD+	The United Nations Collaborative Programme on Reducing Emissions from Deforestation and Forest Degradation in Developing Countries (including the conservancy of forests, sustainable management, and increase in reservoirs or carbon storage)
SAGARPA	Secretariat of Agriculture
SCT	Secretariat of Communications
SE	Secretariat of Economy
SECTUR	Secretariat of Tourism
SEDESOL	Secretariat of Social Development
SEGOB	Secretariat of the Interior
SEMAR	Secretariat of Navy
SEMARNAT	Secretariat of Environment
SENER	Secretariat of Energy
SEP	Secretariat of Education
SHCP	Secretariat of Finance
SINACC	National System on Climate Change
SRE	Secretariat of Foreign Affairs
SSA	Secretariat of Health
AAGR	Average Annual Growth Rate
UNEP	United Nations Environmental Programme

* For their abbreviation in Spanish

** For their abbreviation in German

This publication is possible thanks to the support of the United States Agency for International Development (USAID). Its content remains responsibility of its authors and does not necessarily reflect the point of view of neither USAID nor the Government of the United States of America.