DECARBONIZING
COSTA RICA
COUNTRY COMMITMENT 2018-2050

NATIONAL DECARBONIZATION PLAN

GOVERNMENT OF COSTA RICA
2018 -2050

COSTA RICA
BICENTENNIAL GOVERNMENT
2018 · 2022

Acknowledgements

The National Decarbonization Plan is a response to the request of the President of the Republic of Costa Rica, Mr. Carlos Alvarado Quesada, to prepare a strategic document that would offer a Roadmap with key actions to consolidate the process towards the decarbonization of the Costa Rican economy.

The elaboration of this document was led by the Minister of Environment and Energy, Mr. Carlos Manuel Rodríguez and the Climate Change Directorate (DCC) team, technically supported by both a national and an international consultant team, and financed by NDC Invest and DDPLAC programs of the Inter-American Development Bank (IABD). The consultation process was also supported by funds from the German Cooperation through the Climate Action II project.

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We want to thank the participation and feedback of:

- The Office of the First Lady
- MINAE: The Vice-Ministers of Natural Resources; Energy; Environmental Management; and Water and Sea, the Coordinator of the National Environmental Council and the Directors of the following dependencies: IMN, FONAFIFO, SINAC, CONAGEBIO, SEPLASA, DIGECA and SEPSE
- MAG: The Vice-Minister of Agriculture and Livestock and his team
- MOPT: The Vice-Minister of Transport and Public Works and his planning team
- ICE Group: The Executive President and her planning team
- RECOPE: The Executive President and his planning team
- MIDEPLAN: The Minister of National Planning and Economic Policy

- The Minister for Liaison with the Private Sector
- Ministry of Foreign Affairs and Worship
- Central Bank
- COMEX: Ministry of Foreign Trade
- MEIC: Ministry of Economy, Industry and Trade
- MIVAH: Ministry of Housing and Human Settlements
- MINSALUD: Ministry of Health
- INCOFER: Costa Rican Railway Institute
- IFAM: Municipal Development and Advisory Institute
- National Union of Local Governments
- COSEVI: National Road Council
- INAMU: National Women's Institute
- INA: National Learning Institute
- INDER: Institute of Rural Development
- INTA: National Institute of Agricultural Technology
- Technological Institute of Costa Rica
- ARESEP: Public Services Regulatory Authority
- FUNDECOR
- FUNDECOOPERACIÓN
- INCAE-CLADS
- ACESOLAR: Costa Rican Solar Energy Association
- FECON: Costa Rican Federation for Environmental Conservation
- Representatives of the Citizen Consultative Council on Climate Change 5C.
- GIZ's MiTransporte Project
- World Bank PMR Project
- UNDP NDC Support Programme Project
- ICAT Climate Actions Transparency Initiative Project of the UNEP-DTU
- UN Environment
- NDC Partnership
- CANABUS: National Chamber of Buses
- Costa Rica Limpia
- Center for Urban Sustainability
- CANATRANS: National Chamber of Transport
- ASOMOVE Costa Rican Electrical Mobility Association
- Heredia Utility Company ESPH
- Ad Astra Rocket
- Chamber of Industries of Costa Rica
- Costa Rican Institute of Cement and Concrete
- National Chocolate Factory
- FLOREX
- Pelón Group
- ASTEK: Aromas y Sabores Técnicos S.A.
- Cargill
- Green Energy Costa Rica
- CEMEX
- Holcim-Geocycle
- CDG Consulting
- ALIARSE
- Aldi Eco Architecture
- Municipality of San José
- Municipality of Belén
- CEGESTI: Foundation Center for Technological Management and Industrial Computing
- Municipality of Coronado
- EBI Costa Rica
- Municipality of Montes de Oca
- FORTECH
- ACEPESA: Central American Association for the Economy, Health and the Environment
- Municipality of Curridabat
- Municipality of Desamparados
- Municipality of La Unión
- Municipality of Alajuela
- CIRAD: Center for International Cooperation in Technological Research
- CORFOGA: Livestock Corporation
- CATIE: Tropical Agronomic Research Center and Teaching
- EARTH University
- ICAFÉ: Costa Rican Coffee Institute
- National Chamber of Milk Producers
- UNESCO: United Nations Educational, Scientific and Cultural Organization
- FAO: Food and Agriculture
- National Forestry Office
- ECLAC: Economic Commission for Latin America and the Caribbean
- Grüter Consulting
- Federated College of Engineers and Architects
- AIVEMA: Association of Vehicle and Machinery Importers
- CANATRAC: National Chamber of Freight Forwarders
- JASEC: Electricity Service Administrative Board Municipal of Cartago
- BDA: Business Alliance for Development
- ECA: Costa Rican Accreditation Body
- COOPESANTOS
- COOPELESCA
- Tetra Pak
- Bac Credomatic
- ASEGIRE: Association of Entrepreneurs of Integral Management Electronic Waste
- Costa Rican Association of the Soil Sciences
- UCI: University of International Cooperation
- Costa Rica Forever Association
- LAICA: Sugar Cane Industrial Agricultural League
- Agrícola El Cántaro S.A.
- IUCN: International Union for the Conservation of Nature

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Acronyms

AFOLU	Agriculture, forestry and other land uses
AGDP	Agricultural Gross Domestic Product
ARESEP	Public Services Regulatory Authority
AyA	Costa Rican Institute of Aqueducts and Sewers
BANVHI	Housing Mortgage Bank
BAU	Business-as-Usual
BCCR	Central Bank of Costa Rica
°C	Degree Celsius
4C	Scientific Council on Climate Change
5C	Citizen Advisory Council on Climate Change
CFIA	Federated College of Engineers and Architects of Costa Rica
CINDE	Investment Promotion Agency of Costa Rica
CO2	Carbon Dioxide
COMEX	Ministry of Foreign Trade of Costa Rica
CONACE	National Energy Conservation Commission
CONAGEBIO	National Commission for Biodiversity Management
CORFOGA	Livestock Corporation
COSEVI	Road Safety Council
CR	Costa Rica
CTP	Public Transport Council
DCC	Climate Change Directorate
DIGECA	Directorate of Environmental Quality Management
DINADECO	National Directorate of Community Development
ECA	Costa Rican Accreditation Body
EGBC	Low Carbon Livestock Strategy
EIA	Energy Information Administration
EPA	Environmental Protection Agency of the Unites States
LCA	Life Cycle Assessment
FDI	Foreign Direct Investment
FONAFIFO	National Forest Financing Fund
GCF	Green Climate Fund
GEF	Global Environment Fund
GMA	Greater Metropolitan Area
GMAS	General Algebraic Modeling System
GHG	Greenhouse gases
GTFS	General Transit Feed Specification
ICAFE	Coffee Institute of Costa Rica
ICE	Costa Rican Electricity Institute
ICT	Costa Rican Tourism Institute

IDB	Inter-American Development Bank
IFAM	Municipal Development and Advisory Institute
IMN	National Meteorological Institute
INA	National Institute of Apprenticeship
INAMU	Women National Institute
INCOFER	Costa Rican Railway Institute
INCOP	Costa Rican Institute of Pacific Ports
INDC	Intended Nationally Determined Contributions
INDER	Institute of Rural Development
IWO	International Work Organization
INTECO	Technical Standards Institute of Costa Rica
INVU	National Housing Institute
IPCC	Intergovernmental Panel on Climate Change
IWM	Integrated Waste Management
LAICA	Sugar Cane Industrial Agricultural League
LPG	Liquefied Petroleum Gas
MAG	Ministry of Agriculture and Livestock
MEIC	Ministry of Economy, Industry and Commerce
MEP	Ministry of Public Education
MICITT	Ministry of Science, Technology and Telecommunications
MIDEPLAN	Ministry of National Planning and Economic Policy
MINAE	Ministry of Environment and Energy
MINSALUD	Ministry of Health
MIVAH	Ministry of Housing and Human Settlements
MTCO2eq	Million tonnes of carbon dioxide equivalent
MOPT	Ministry of Public Works and Transport
MRV	Measurement, Reporting and Verification
NAMA	Nationally Appropriate Mitigation Actions
NDC	Nationally Determined Contribution
NOx	Nitrous Oxides

NO2	Nitrogen dioxide
NGO	Non-Governmental Organization
GWP	Global Warming Potential
PGAI	Institutional Environmental Management Plan
GDP	Gross Domestic Product
Gg	Megatons
OAW	Organic Agricultural Waste
PIMUS	Integrated Plan for Sustainable Urban Mobility
PM10	Suspended Particle with an aerodynamic diameter up to 10 µm
PM5	Suspended Particle with an aerodynamic diameter up to 5 µm
NAP	National Adaptation Policy
PBAE	Ecological Blue Flag Program
PITTA	Programa de Investigación y Transferencia de Tecnología Agropecuaria
PNDIP	National Development and Public Investments Plan
PPCN	National Carbon Neutral Program
PROCOMER	National Promoter of Trade
PES	Payment for Environmental Services
R&D	Research and Development
RECOPE	Costa Rican Oil Refinery
REDD+	Emission Reduction of greenhouse gases from the forests Deforestation and Degradation, through conservation and the increase of CO2 catches
RITEVE	Vehicles Technical Revision
SBD	Development Banking System
SEPLASA	Environmental Planning Secretariat
SEPSE	Energy Subsector Secretariat Planning
SETENA	National Environmental Technical Secretariat
SME	Small and Medium Enterprise
SIMOCUTE	National Monitoring System of Land and Ecosystem Cover and Use
SINAC	National System of Conservation Areas
SINAMECC	National Climate Change Metrics System

SINIA	National Environmental Information System
SINIGIRH	National System of Integrated Management of Water Resources
tCO2	Tons of carbon dioxide
tCO2eq	Tons of carbon dioxide carbon equivalent
TELCA	Limon's' Electric Freight Train
TIMES-CR	Linear optimization of energy modelling system
UCR	University of Costa Rica
UGL	Union of Local Governments
UN	United Nations
UNFCCC	United Nations Framework Convention on Climate Change
WHO	World Health Organization

Presentation

This Plan summarizes the strategic actions that the Bicentennial Government has identified to implement the decarbonization of the Costa Rican economy. Decarbonization and resilience are recognized as the means to transform the current economic development model into one that is based on bioeconomy, green growth, inclusion, and on enhancing the well-being of all citizens.

The definition of the key actions was carried out based on the paradigm of transformational change - in contrast to the logic of incremental change - which is required to eradicate the use of fossil fuels in our economy. To bring the concept of decarbonization into practice, the implemented methodology is anchored in a long-term vision of Costa Rica.

Costa Rica aims for a decarbonized economy with net-zero emissions in 2050, in a manner consistent with the long-term goal of limiting the increase of average global temperature to 1.5°C above pre-industrial levels. According to the best available science, the adoption of this objective has clear consequences, and a zero-emissions global economy must be reached by mid-century. As such, this would require an advanced level of implementation in order to effectively achieve the main transformational processes by 2050.

A "backcasting" approach was applied based on this long-term goal, taking national circumstances into account to identify public policy and action packages that must begin implementation immediately to reach the 2050 target. The actions are divided into three major stages: a) **foundations stage** (2018-2022), b) **inflection stage** (2023-2030) and c) **transformation normalization stage or massive deployment** (2031-2050).

Having a 2050 time horizon sets long-term goals that clarify the actions that have to be implemented in the short-term, including the decisions that must be avoided in order not to divert from the country's goal. This time horizon does not imply a postponing of actions, but a prioritization.

This approach is different from the classic prognosis typically carried out by I public management processes. The Plan is, hence, a strategic and pragmatic input for the President and his Governing Council. As such, it is a starting point to provide feedback on short-, medium- and long-term planning processes that will be promoted by the Government. The planning and elaboration process of the Decarbonization Plan will thus immediately contribute to the elaboration of the key milestones in the National Development and Public Investments Plan (PNDIP 2018-2022) that have to be implemented during this four-year period. This exercise has allowed an alignment with and improvement of the consistency of the PNDIP and the Nationally Determined Contribution (NDC) – with the latter being defined as the commitment presented by the country to the international community in the promotion of goals set by the Paris Agreement.

The Plan will also serve as a starting point for the elaboration of the long-term plan called "Strategic Plan Costa Rica 2050". This Plan will be led by the Ministry of National Planning and Economic Policy (MIDEPLAN) and will allow a fostering of the vision pertaining to the economic development model of Costa Rica by 2050. This process will deepen quantitative and qualitative scenarios and be facilitated through consultations with various actors from the private sector, Academy, and the citizens.

It is crucial to read this Plan in conjunction with other climate policies on emissions reduction and adaptation to climate impacts. Given the country's high vulnerability to such impacts, it is worth highlighting that the National Adaptation Policy (NAP) that was published in May 2018, as well as the National Adaptation Plan that is currently being elaborated, will provide the country with tools to improve resilience in key areas – and this would include: infrastructure, productive and fishing systems, tourism, water resources management, biodiversity and health.

In this context, the Decarbonization Plan, the National Adaptation Plan and Policy, and the Strategic Plan Costa Rica 2050 will constitute a new set of climate and development policies aimed at transforming Costa Rican economic, social and territorial models. It will seek to create decarbonization and resilience opportunities that will facilitate the effecting of a prosperous, sustainable and inclusive Bicentennial Costa Rica.

Carlos Manuel Rodríguez
Minister of Environment and Energy

Section I:
Executive Summary

Costa Rica aspires to be a modern, green and emission-free economy - and to strengthen its leadership - In 2021, the country will celebrate its Bicentennial, and the current administration has proposed to lay the foundations of a new Costa Rican economy of the 21st century. In his inaugural speech on May 8th, President Carlos Alvarado expressed the aspiration of the country becoming a decarbonized bicentennial Costa Rica. ("Decarbonization is the greatest mission of our generation, and Costa Rica must be among the first countries of the world to achieve it, if not the first"). Among the major changes facing the world economy, including the "fourth industrial revolution", the need to move towards a sustainable economy, one with an economic development approach that does not damage the natural capital, has been highlighted; this will also inform infrastructure investments to remain competitive. While the transition to a zero-emissions economy requires a deep transformation, it is worth noting that Costa Rica has already made significant progress during the previous decades, including an almost emissions-free electricity grid and very low rates of deforestation. Hence, decarbonizing is not a new concept for the country, even if the progress made to date has happened under a different name.

Costa Rica commits to becoming a decarbonized economy with net-zero emissions by 2050 - This vision is the long-term goal underlying this National Decarbonization Plan. The target is consistent with the best available science, which have warned of the dangers of an increase of the average global temperature beyond 1.5°C above pre-industrial levels. This plan is consistent with that temperature target.

The Paris Agreement sets a global milestone, and Costa Rica can be a pioneer in this new international system - By establishing a goal that limits the increase in temperature to a range between 1.5 and 2°C, the Paris Agreement globalized a new logic of decarbonization: Parties commit to zero-emissions by the second half of the century. While most of the national commitments to the Agreement (or "NDCs") propose emissions reductions that are not up to the climate challenge, Costa Rica committed itself to a goal consistent with the decarbonization objectives of the Agreement. In this international context, President Alvarado's call to lead has a practical meaning: Costa Rica may be a decarbonization "laboratory" for the world to reinforce what has been learned to date, and to progress in areas where others seek innovative examples. Now, the decarbonizing of the Costa Rican economy will require a strong planning effort, particularly one with a long-term vision and actions in several stages.

Developing a decarbonization plan requires new planning methodologies to achieve transformational changes - Through the Intergovernmental Panel on Climate Change (IPCC), the scientific community tells us that global emissions in 2050 should be net zero to reach the global goal of decarbonization and the 1.5°C target. This process must be achieved alongside a growing world economy: if the economy triples (an annual growth of 3% is expected for 40 years), the emissions intensity per Gross Domestic Product (GDP) should fall by more than 80%. It is clear that, despite the uncertainties of these estimates, the required change cannot be achieved through incremental adjustments alone, but will require substantive technological, institutional, and economic changes. Thus, most of the energy and transport sectors activities, among others, must

be carried out with technologies different from the ones currently in use. This exemplifies the scale of the planning challenge that underlies a decarbonization strategy and the need to implement new methodologies to do address it.

Decarbonization planning requires establishing clear long-term goal which makes it possible to identify a general pathway and then deduce the necessary actions in the short- and medium-term to reach the goal. - Planning for decarbonization guides us in the process of establishing goals towards achieving it in every sector between today and 2050; and to generate narratives of sectoral change though technological transformation, shifting from the existing state to the desired one. Based on the above, the work begins by determining what changes - institutional, market, price, regulatory, among others - must be realized to fulfill the trajectory and allow it to permeate into the daily logic of the citizens, businesses, and investors. Simultaneously, just transition measures must be implemented so that people, communities and businesses that have to reorient their activities have the necessary support to do so. The actions are presented in the three stages: foundations (2018-2022), inflection (2023-2030) and massive deployment (2031-2050), each with different levels of detail.

Thirty years is a short time for a transformation of this magnitude. As such, no time can be wasted: the actions that must be avoided have to be identified – To do so, it must be highlighted that many investments have a lifespan that goes from 15 years (a car) to 40 years (a thermoelectric generator). Thus, the next investment or purchase made in an economic sector might still be operating by 2050. This means that some investment options, while able to reduce emissions in the short-term, should not be carried out because they would prevent the fulfillment of the final goal. In other words, there are investments that will not achieve the reductions in the scale required to decarbonize the economy during their lifespan. These investments, such as technologies that partially reduce the emissions from burning fossil fuels instead of totally eliminating them (an example is the shift from coal, bunker, fuel oil, or diesel, to natural gas in electricity generation or industry), will represent "lock-in" emissions (or committed emissions) and should be avoided, not only because they delay the transformation, but also due to the fact that they will compete for financing with truly decarbonized activities and ultimately result in a higher overall cost of decarbonization.

The national economy has the structural forces - in education, openness and natural capital - to face change. However historical shortcomings in infrastructure and fiscal constraints can slow the transition - Macroeconomic stability and openness have made Costa Rica into a country that is increasingly oriented towards the export of goods and services. The country has been efficiently converting its GDP growth into social progress, while the investment in natural capital has protected biodiversity and increased income from ecotourism. On the other hand, decades of little investment in infrastructure limit urban and rural mobility. In the absence of a strong public transport system, there is an increase of carbon emissions due to the burning of fossil fuels intensifying in the wake of a growing vehicle fleet.

Of the economic sectors, the critical emissions come from the transport sector, which faces a backlog of infrastructure and standards. The electric sector is already zero-emissions and can lead the change but will need to reduce in its costs - The vehicle fleet, dominated by private vehicles, has tripled in the last 30 years without proportional investment in infrastructure, illustrates the country's transport issues. Urban public transport suffers from routes that do not correspond to the demand, leading to a greater use of private vehicles, which, in turn, creates an increasing demand for gasoline imports. Transport is the sector with both the highest and fastest rising emission levels. In contrast, the electricity sector, which is another major emitter for many countries, is nearly 100% renewable. This puts the electrification of transport - public and private - as a clear measure of decarbonization, which must be achieved by keeping electrical generation clean and affordable.

Planning decarbonization involves every sector of the economy. The plan proposal is structured along 10 decarbonization axes that are derived from the pattern of the country's greenhouse gas emissions - The axes correspond with the four major emission sources: energy (transport - collective, private and freight, electric system, residential and commercial sector and industrial sector), industrial processes, residues, agriculture, forestry and other land uses (cattle, agriculture and forests). For each axis, the Plan suggests a vision of transformation , as well as the measures for change, which are divided into short-, medium- and long-term.

For each axis, the Plan contemplates policy packages that combine concrete planning, institutional or regulatory measures, project implementation, access to financing, ensuring citizen support, and avoiding lock-in - Decarbonization may face a series of barriers and in order to overcome them, the improvement areas must combine sets of complementary measures that can ensure a change in a coordinated and sequential way. Detailed policy packages are presented for each of the 10 axes in coordinated and orderly arrangements (which are complemented by implementation schedules ranging in the short-, medium-, and long-term, and can be found in the annex).

Decarbonization planning requires a clear model of governance, cross-cutting measures and impacts identification. - Defining the institutional requirements of decarbonization is crucial to responding with certainty to the question: what instance is responsible for decarbonizing the economy? Moreover, cross-cutting strategies must be explicit in order to enhance change. Hence, eight cross-cutting areas were identified: a) Comprehensive Reform for the New Institutionality of the Bicentennial, b) Green Tax Reform, c) Funding Strategy and Investment Attraction, d) Digitalization and Knowledge-based Economy Strategy, e) "Just transition" Labor Strategies, f) Inclusion, Human Rights and Gender Equality, g) Metric and open data systems to evaluate the goals progress, and h) Education and Culture Strategy that contributes to the transition to a Bicentennial Costa Rica leader in the substitution of fossil fuels with renewable energy. Additionally, an impact analysis was advised to be carried out to support the management of the dimensions: a cost-benefit analysis of the main actions to identify the reforms' positive and negative impacts – along with suggesting measures to minimize or avoid the negative aspects, while identifying the escalation of the development benefits that are associated with decarbonization. More particularly, to analyze both the impacts of decarbonization in the labor market and the best practices of a "just transition" towards the fourth industrial revolution and decarbonization, is offered.

Given the need to start the decarbonization pathway with concrete activities, 5 priorities for action are identified from the sets of sectoral actions, and cross-cutting measures, to be implemented from 2018: a) Triggering the transformation of public transport, b) Accelerating and scaling up transformation actions of the higher-emitting activities of the agricultural sector c) Laying the foundations of the electrification of the economy - not only in the transport sector but also in the industrial sector, d) Avoiding technological pathways in energy and transport that can contribute to a partial reduction of emissions but do not lead to "zero-emissions", e) Starting the process of two cross-cutting reforms in 2018, without which the decarbonization of the Costa Rican economy will be unfeasible: The structural reform for a new national institutionality that will lay the foundations for a new system of sustainable consumption and production; and a green tax reform to promote actions towards sustainable development and growth without emissions, thereby reducing the negative externalities that deteriorate the natural capital.

Section 2 -
Costa Rica aspires to have a green, resilient and equitable economy without emissions.

Costa Rica will celebrate its Bicentennial in 2021, and the Alvarado administration has set put to lay the foundations of a new Costa Rican economy, one in tune with the twenty-first century. A successful transition will have to take advantage of the new opportunities presented to create prosperity, face risks and successfully navigate the deep transformations that are coming along with the "fourth industrial revolution" - a revolution accelerated by a fusion of technologies that will combine the physical, digital, and biological spheres[1].

One of the great tasks of Bicentennial Costa Rica will be to modernize the infrastructure so that economic growth is achieved without increasing pollution or damaging the natural capital. This significant Costa Rican transformation has to take place in an international context that already recognizes the need to make an unprecedented transition from a global economy anchored in fossil fuels - and vulnerable to climate impacts - towards a zero-emissions economy driven by renewable energy and resilient to the impacts of extreme climate conditions.

No country has the exact formula to carry out this transformation. In his inaugural speech on May 8th 2018, President Carlos Alvarado set forth the aspiration to become a decarbonized and resilient bicentennial Costa Rica. The world took notice of the specific call to make Costa Rica a leader: "Decarbonization is the great task of our generation, and Costa Rica must be among the first countries in the world to achieve it, if not the first." However, the leadership gaps in decarbonization are profound - there is resistance to change - and while the country can fill this gap with pioneering actions, it is not fortuitously that his speech had an international resonance.

Costa Rica as a leader in decarbonization

The Paris Agreement globalized a new logic of decarbonization, a term that refers to the process of separating economic growth from increased emissions, in order to achieve a balance between emissions and carbon sequestration that guarantees life on the planet. Although the term is still not well known outside expert circles, the actions needed to achieve decarbonization in certain sub sectors are not new to Costa Rica. Indeed, decarbonization has been successfully implemented for decades, especially in the electricity and natural resources sectors, although it was not called as such at the time. Guided by the search for energy security, investments in local renewable sources to generate electricity have already been made for decades. Today, the Costa Rican electricity system is one of the few decarbonized systems in the world: In 2017, 99.5% of the electricity in the country was generated without using fossil fuels - the highest percentage in 30 years. Another big bet - forest protection and payment for ecosystem services - sought to protect biodiversity. This investment allowed for Costa Rican historical protection of forests to remain a central piece of the country's biodiversity and climate commitments. . Both the economy and the population grew while large emissions in the electric and forestry sectors were avoided.

That is why President Alvarado's call makes sense for Costa Rica. The

1 Ver *"The Fourth Industrial Revolution: what it means, how to respond"* World Economic Forum (2016) https://www.weforum.org/agenda/2016/01/the-fourth-industrial-revolution-what-it-means-and-how-to-respond/

process of decarbonization is at a stage in our country that some countries aspire to have in 30 years. Consolidating Costa Rica as a leader in decarbonization adds value to the country, first and foremost, and contributes to the efforts of the international community. In Costa Rica, the world benefits from having a "decarbonization laboratory" that can reinforce what has been learned to date and demonstrate progress in other sectors, in which other countries are looking for successful examples that they can emulate.

The green economy goes beyond the climate agenda. However, it is worth noting that the Paris Agreement - with its clear goals and binding nature – left a definitive imprint in the approach to decarbonization: it is no longer a question of discretionary commitments or incremental improvements. The obligations, ratified by the world's Congresses and Parliaments, transcend the improvements scope applied to the released technologies (for example, the measures for "cleaner" fossil fuels). A major transformation is thus necessary (for example, this could include setting a deadline to stop operating coal plants or a date from which only zero emission buses should be allowed).

The country will not be alone. Being a pioneer will have benefits. Many countries, cities, and companies have already initiated innovative decarbonization processes in specific sectors, and many technologies are progressing faster than expected. There are opportunities to attract investment to the country. There is evidence of job creation which, in addition to the reality of the fourth industrial revolution, will force Costa Rica to examine new parameters to prepare a winning workforce for the coming economy: digital, green and resilient. What jobs will be necessary in this type of economy? This question will be one of the greatest of our society and one of the pillars that will be integrated into the education of the new generation of children of the bicentennial. Disruptions will also occur. Thus, this transition must be gestated with the vision of building an inclusive and socially fair Costa Rica. However, the country cannot allow itself to be left behind, as this would diminish future competitiveness.

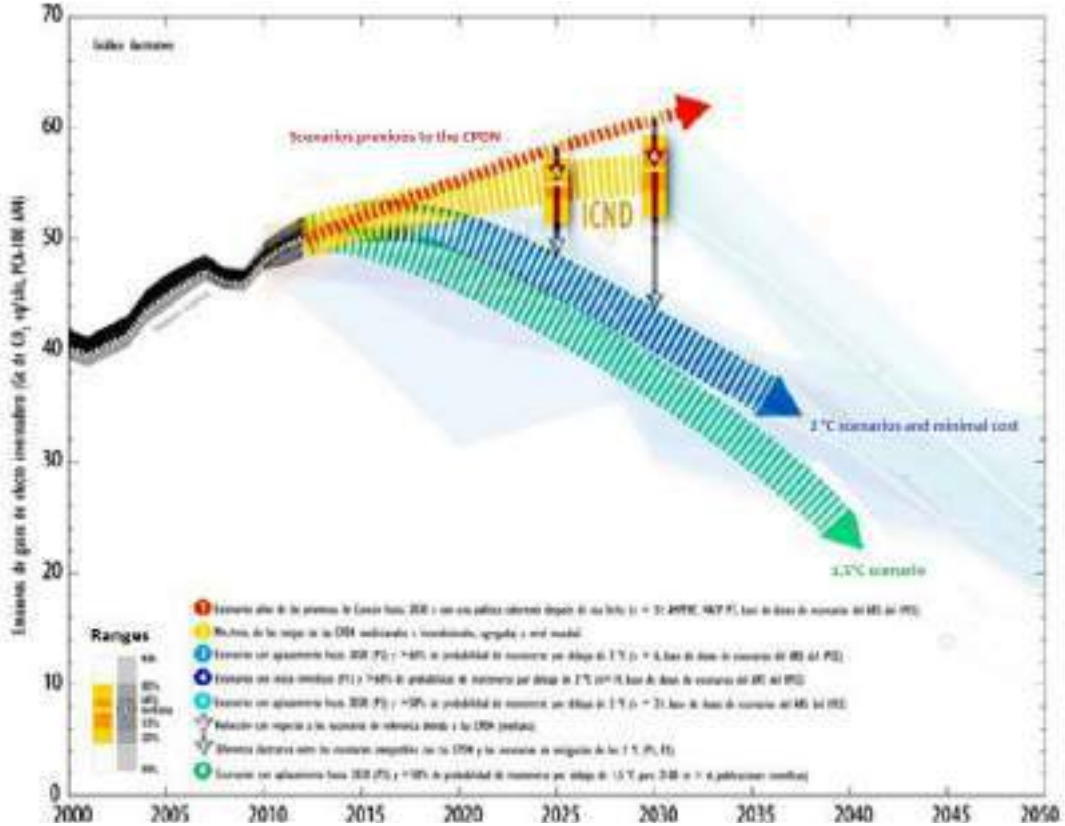
Costa Rica towards the Paris Agreement

Most countries have announced their plans to comply with the Paris Agreement. These plans (or nationally determined contributions, "NDCs") are, in general, of insufficient ambition to achieve the goal of containing the global temperature increase well below 2°C with respect to pre-industrial average and aiming toward 1.5°C. This is due to the fact that, in general, these plans have been developed with an incremental approach, rather than a transformative one. The mitigation goals of several Latin American countries - reducing 20-30% against an inertial scenario[2] - imply that emission levels of 2030 could be comparable to the current ones. While this undoubtedly represents an important effort to stop the increase in emissions, it is insufficient.

In the framework of the previous analysis, compliance with the current NDCs will be problematic in many countries as it will create an important lock-in[3] that will hinder the Agreement's compliance. Fortunately, the Agreement includes an ambition mechanism that asks for NDCs to be updated on a regular basis. In addition, governments have to strive to formulate "long-term, low emission development strategies" that will comply with the Agreement. As such, if countries carry out these strategies with decarbonization planning methodologies, like the one outlined in section 5, the steps to be followed in the short-, medium-, and long-term will be clear, and these countries will be able to update their NDCs by 2020 to better align themselves with the goal of the Agreement[4].

[2] In other words, it would be certain if no measure of decarbonization is adopted
[3] Referring to the compromised emissions which are anchored in the economy
[4] Article 4, paragraph 19 of the Paris Agreement

Figure 1: Most governmental goals are incremental, and their sum is insufficient to comply with the Paris Agreement Goal.



Source: Synthesis report on the accumulated effects of the INDCs, United Nations Framework Convention on Climate Change (UNFCCC) Secretary, 2nd of May 2016

In this context, Costa Ricans should be proud to have already offered a national contribution compatible with the goal of the Paris Agreement. That being said, organizing and implementing the next versions of the NDCs will require a strong planning effort, as part of a long-term strategy. This plan is the first step of that process in terms of mitigation, which will be complemented with the National Adaptation Plan in terms of adaptation and with the Costa Rica Strategic Plan 2050 as a general framework. The next section explains what decarbonization planning is and emphasizes the goal of transformation that provides the basis for its methodology.

Section 3:
The Costa Rican economy and public policy created a pattern of emissions that reflects great successes, but also new challenges

The economic structure and public policies determine the emission sources of a country. Therefore, there is no generic formula for the decarbonization of an economy. In fact, as previously mentioned, the generation of electricity from fossil fuels is a large part of emissions in most countries.In Costa Rica, however, this is not the case and the biggest portion of carbon emissions originate in the transport sector, a fact which has implications for the national strategy.Understanding the Costa Rican greenhouse gas emissions inventory and its relation to the national economic structure is absolutely necessary.

Our economy is open and increasingly oriented towards the export of goods and services. Macroeconomic stability - a low inflation and a stable exchange rate - and a competitive international export sector are among its major strengths. The country has historically been one of the most efficient in converting its GDP growth into social progress: other countries have required higher levels of income per capita to achieve the level of social development achieved in Costa Rica. In addition, investments in health and education have also been significant.

The focus on the sale of services has led to more than US$ 3,600 million in revenue from tourism in 2016, accounting for 45% of all service exports, a higher income generation than from the country's main export products such as bananas, business services and medical products[5].

The investment in natural capital – with a high conservation of biodiversity and national parks – has been rewarded by the income from ecotourism services and a country brand titled "Essential Costa Rica", with great emphasis on the attribute of "green country" as a differentiator.

However, the economic model also faces vulnerabilities in several fields. In the short-term, an unsustainable fiscal deficit requires an urgent political agreement in order to carry out a reform of the fiscal system. Without it, employment and production will be impacted. Another vulnerability lies in the structural disconnection between growth and employment generation, as successful sectors with external orientation do not generate enough linkages with local sectors. The unemployment rate is currently at its highest in the last three decades. Moreover, the challenge of low productivity of the economy remains unsolved.

The large investments in education, health and natural capital contrasts with the low investment in infrastructure (a problem which will be difficult to correct in the current context of acute fiscal deficit). As such, the infrastructure deficit undermines the foundations of the economy in general and the green economy in particular, as it has resulted in an inefficient and unsustainable transportation model that generates congestion and pollution. Despite great advances in access to potable water and sewerage, the wastewater treatment infrastructure has been neglected, a situation which if further compounded by urban and real estate growth - as well as by tourism. In addition, another infrastructure gap is the poor management of solid waste.

The vulnerability of the infrastructure in the face of climate impacts also exacerbates the above-mentioned challenges. In 2017, the General Comptroller of the Republic estimated that the cost of attending extreme weather events will be approximately 2.5% of the GDP in 2025. A successful green economy will indubitably require an infrastructure investment

[5] Estado de la Nación 2017 of the Estado de la Nación Program, Costa Rica

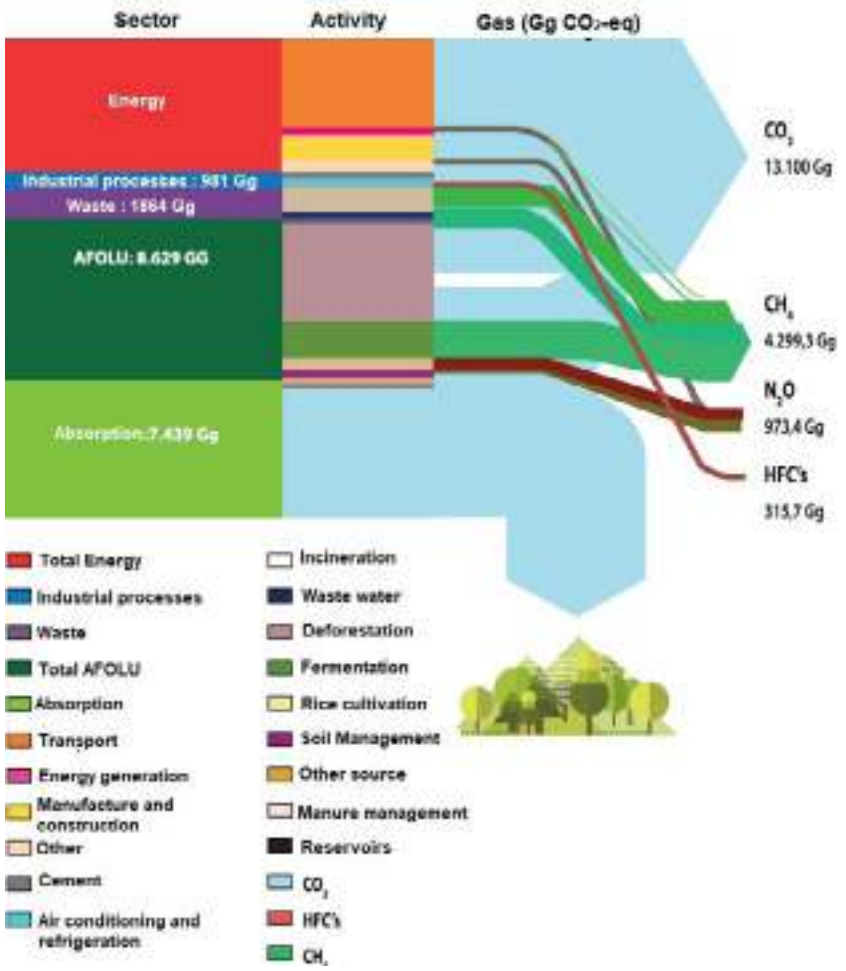
approach with the dual objective of simultaneously improves the national economy, along with environmental and climatic performances[6]. The decarbonization agenda has to contribute towards generating new resources and new "green" jobs. This focus is developed in section 6.

Decarbonization challenges in Costa Rica

Greenhouse gas emissions in Costa Rica are increasing. It has been estimated that if measures are not taken, Costa Rica's emissions will increase annually by 2.4%. Between 2015 and 2030, emissions will have increased by 60%, and would have increased by 132% in 2050, reaching a level of 29.6 million tons of CO2 equivalent[7].

According to the data of the national inventory of greenhouse gas emissions and carbon absorption, emissions were equivalent 11.2 million tons of CO2 in 2012, (compared to 9.6 million in 2010 and 7.6 million in 2005)[8].

FIGURE 2: Sectoral contribution to the carbonization in Costa Rica based on the 2012 Inventory.



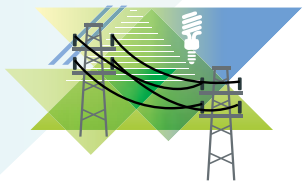
Source: National Inventory of Greenhouses Gases and Carbon Absorption 2012

[6] A set of actions to close this gap are elaborated in "Bridging Costa Rica's Green Growth Gap" (2015) GIZ, ODI & CDKN.

[7] Referring to *"Opciones de Reducción de Emisiones de Gases de Efecto de Invernadero en Costa Rica: Análisis Sectorial Potencial de Mitigación y Costos de Abatimiento 2015-2050" (2015) Luis Rivera, Germán Obando y Francisco Sancho.* Report prepared by Dirección de Cambio Climático of the MINAE of Costa Rica with the support of the Partnership for Market Readiness y ESMAP
https://www.researchgate.net/publication/308611634_Opciones_de_Reduccion_de_Emisiones_de_Gases_de_Efecto_Invernadero_en_Costa_Rica_Analisis_Sectorial_Potencial_de_Mitigacion_y_Costos_de_Abatimiento_2015-2050

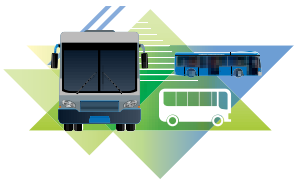
[8] The official inventory can be access here:
https://unfccc.int/files/ghg_data/ghg_data_unfccc/ghg_profiles/application/pdf/cri_ghg_profile.pdf

The following segment presents the inventory categories, and the challenges within each category associated with the economic activities.



Emissions Source 1:
Energy

The carbonization of the Costa Rican economy is primarily driven by the burning of fuels of private, public, and freight transportation. Between 2000 and 2010, the value of oil imports as a percentage of the GDP doubled. Diesel accounts for almost 40% of Costa Rica's hydrocarbon purchases. This transport model carbonizes the country. The carbon generated by the combustion of gasoline and diesel growing by 43% between 2002 and 2012.

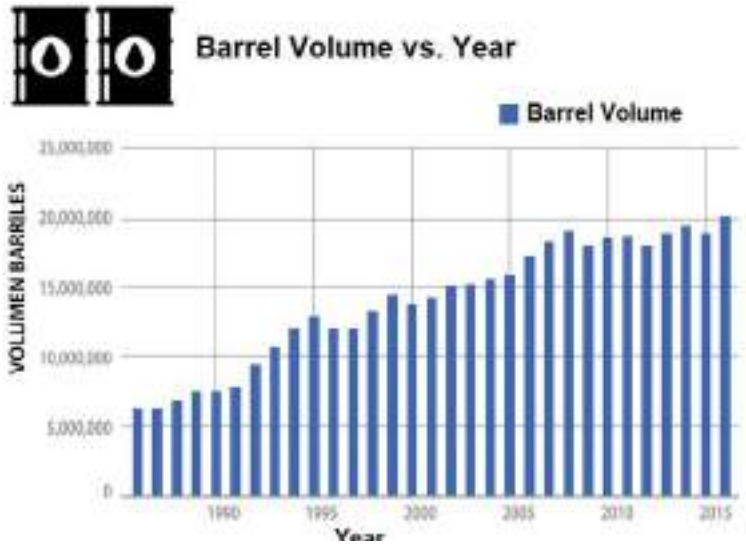


Public transport - As the economy grew, the importance of private transport has risen. The country went from 418,048 units in 1994 to 1,347,000 in 2015, of which 834,000 are private/ light-duty vehicles. The investment in public transport infrastructure has been low, given that most of the budget of the Ministry of Public Works and Transport are invested in roads and in supporting the use of private vehicles. Public transport governance is weak and has prevented the improvement of bus operators' standards (for example, the absence of electronic payment and exclusive lanes). According to the analysis of the Integrated Plan for Sustainable Urban Mobility (PIMUS)[9], there are 252 bus routes in the Greater Metropolitan Area (GMA), mostly within the center-periphery, served by 41 companies and 1,842 buses. A, a bus trip has on average duration that is 70% greater than a car trip (given that 40% of trips require a transfer, usually remote, to which waiting times are added). This inefficiency is explained by the lack of integrated payment, inadequate routes that don't cater to the demand, and an uncoordinated system. Achieving improvements in public transport would reflect democratic improvements, as the services of large and socially more vulnerable populations are improved.

Light-duty vehicles fleet - The growth of the vehicular fleet in Costa Rica has led to a high dependence on fossil-fuels. In twenty years (1996-2016), the country went from purchasing 6,424,561 barrels of oil to 20,208,666, representing a costly increase in both the oil bill and polluting emissions. The country's fleet is old: vehicles are 15 years old on average (in comparison to Europe and the United States of America (USA), which are 7.4 and 11.6 years old, respectively). The private fleet consumes 50% of the total energy used in the transport sector, as compared to the 10.13% consumed by collective transport - which mobilizes more people. The burning of fossil fuels not only increases the carbonization of the country, but also damages air quality PM2.5 levels exceed the internationally recommended levels and the NO2 levels at the GMA and exceed the limits of the World Health Organization (WHO) in many of the locations where it was measured.

[9] See the documents generated in the framework of the IDB GEF Sustainable Mobility Project for the Integral Plan for Sustainable Urban Mobility (PIMUS) for the Metropolitan Area of San Jose, Costa Rica, of MINAE, Ministry of Housing and Urban Settlements and MIDEPLAN (2017) http://pimuspreguntas.com/preguntas

FIGURE 3: Oil barrel annually imported in Costa Rica (1985-2015)

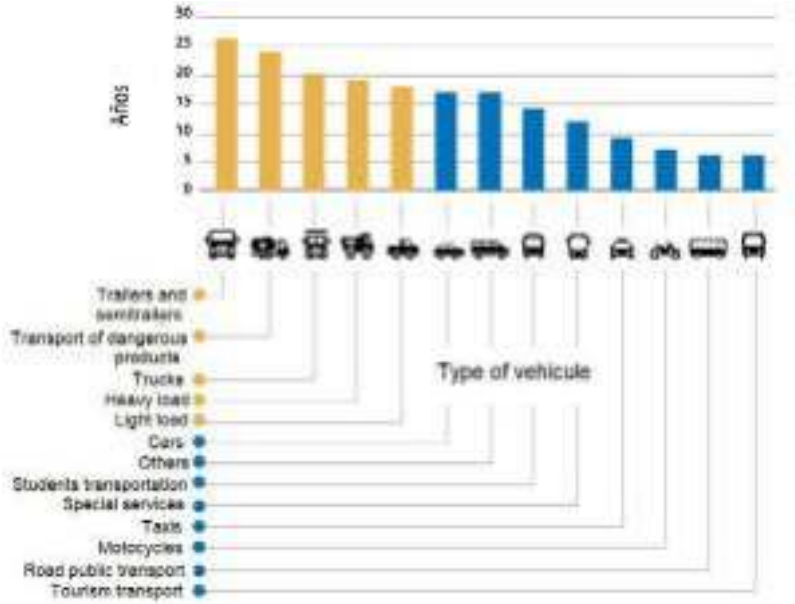


Source: RECOPE

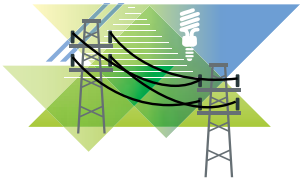
The cargo transport - heavy and light - In an open economy, the system involved for cargo transportation in products distribution is fundamental for the country's competitiveness. However, the sector also generates negative externalities given that urban areas are impacted by freight transport, especially the GMA, from the cargo transit that leaves, or returns to this area. The generation and attraction of the freight transport in the San José Metropolitan Area mainly originates from industries, logistics centers, urban centers and entry or exit points of merchandise, such as ports or international crossings. There is an accelerated increase of emissions from the combustion of diesel, and a lack of national regulation for this sector in terms of carbon emissions and short-lived pollutants (such as PM, NOx), resulting in public health issues and premature deaths. Of the total energy consumption of the transport sector in Costa Rica, 36.5% originates from freight transport. Although the sector represents 15% of the vehicle fleet, it is excluded from the obligations of the Decree that regulates transport emissions since 2016, as the sector has expressed concern regarding competitiveness loss against Central American companies that do not have equivalent environmental requirements.

It is important to mention that a large part of freight transport, mainly the heavy one, passes through Central American regulations and plans, so the challenge of decarbonization and decontamination this sector – as opposed to the decarbonization axis 1 and 2 - will require efforts to modernize the region. The Costa Rican freight transport fleet is the oldest among national sub-fleets registered in the Vehicles Technical Revision (RITEVE) yearbook (Figure 4) with an average of 22 years old, a 6-year average above the average of all vehicles and higher than in other countries (for example, 12 years old in Europe and 14 years old in the USA).

FIGURE 4: Average age of annually revised vehicles



Source: Yearbook of the Vehicle Technical Revision. 2017, MOPT-Riteve (2018) (elaborated by Ana Lucía Moya, DCC)



The electricity system - Costa Rica presents a significant advantage: the electricity matrix is based on renewable sources and diversified (hydro, wind, geothermal, solar, biomass), which allows electricity supply to have virtually zero-emissions. During the last four years, the percentage of renewable generation has exceeded 98% of power supply. These circumstances facilitate the transition from the use of hydrocarbons in the transport, industrial and other sectors to the use of electricity, thereby contributing to the decarbonization of the country's energy sector.

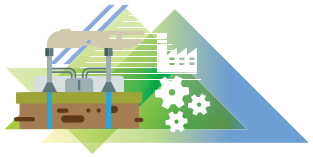
The country has an electricity coverage of 99.4%, and a robust, reliable, and flexible electricity system.
One of the challenges would be in guaranteeing the electricity supply keeps competitive prices, while maintaining a renewable, efficient and reliable matrix. Therefore, a restructuring of the system has to be promoted in order to allow it to face new challenges that arise from the demand increase, as transportation and other sectors are electrified.

The configuration of the electrical system in 2050 will have to be characterized by its sustainability, flexibility and "intelligence", and through allowing the integration of storage systems, distributed generation and demand management.

The commercial and residential sector -In these sectors, the emissions arise from the daily use of a series of services that serve towards adapting spaces to our use. It is necessary to profoundly modify how we invest in lighting, ventilation, air conditioning, refrigeration, cooking, and other technologies related to our building use. The first step will be to make these buildings more efficient, which depend on the buildings covers as well as the standards of the apparatus used. Significant advances in the design and implementation of regulations in these areas will be required in order to influence the markets more effectively and to begin to reverse current inefficiencies. In addition, it will be necessary to leave a modular thinking to move to an integral design of functional systems.

Industry - This sector is described in the following section:

Source of emissions 2: Industry



Energy in industry - The country has to take advantage of its relative strengths in education, governance, and macroeconomic stability to encourage investments and operations in high value-added industrial sectors, leading to sustained leadership within Latin American in new and more efficient manufacturing models. However, to stop and reverse emission increases from the sector, energy uses that have the technical option to be electrified should implement it, as this would bring benefits ranging from the increased competitiveness of renewable electric energy that will be achieved in the line of action 4 of decarbonization. Simultaneously, alternative sources to fossil fuels, such as biomass resulting from agricultural processes, have to be sought to supply energy for the processes that cannot be electrified. As a first step, a reduction in investment and the use of fossil fuel-based technologies has to begin from this point forth.

Processes in industry – Several industries produce greenhouse gases due to the transformation processes that they entail and independently from their energy use. A typical case is cement,

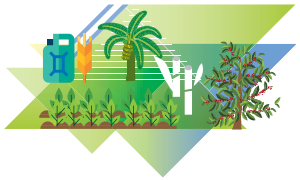
which in addition to requiring energy to burn raw material, releases CO2 through the chemical process that is carried out. Avoiding emissions of this nature has technological solutions on occasion, and several sectors have implemented innovation programs globally. Simultaneously, there must be willingness to replace processes, and even products, such as wood in construction or reinforced resins in automotive applications, to reduce the global demand for certain materials. Finally, recognizing that the industrial sector should have some emissions allocation in the long-term inventory while these transitions are gradually handled is necessary, since the pathway to zero-emissions is less clear for this sector than it is for others, such as in the case of electricity generation.

Source of emissions 3:
Waste[10]

Waste - Waste management in Costa Rica employs landfills that lead to the generation of methane from organic waste. The separation, recovery and treatment of organic waste with techniques such as compost requires organization, scale and coordination between the different municipalities and central level actors (such as the Ministry of Health (MINSALUD), Ministry of Environment and Energy (MINAE) and Municipal Development and Advisory Institute (IFAM), along with changes in citizen behavior required to achieve this at a manageable cost. It will also be crucial to consolidating the management of sanitary landfills to encourage the capture of methane either through active or passive techniques.

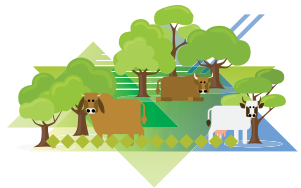
[10] Although it is an important issue in Costa Rica and for the green growth agenda, it does not address the issue of wastewater treatment since they represent relatively small emissions.

[11] AFOLU: Agriculture, Forestry and Other Land Use



Source of emissions 4:
Agriculture, Forestry and Other Land Uses (AFOLU)[11]

Agriculture - In the agricultural sector, greenhouse gas emissions mainly come from four productive activities: coffee, sugarcane, and musaceas (predominantly bananas) in relation to nitrous oxide emissions; and rice cultivation, for methane emissions. From a productive landscape point of view, this sector has the capacity to absorb, capture and conserve carbon through agroforestry systems, precision agriculture, and forest conservation. The agricultural sector has taken a leadership role in the development of climate strategies, as it is also one of the most vulnerable sectors to climate change impacts. The challenge is to move from actions focused on two subsectors (coffee and livestock) to a sectoral approach (the set of agricultural and livestock activities). A pioneering step has been seen in the adoption of the sectoral agreement on emission reduction adopted between the Ministry of Agriculture and Livestock (MAG) and the MINAE, which was signed at the beginning of 2018. It's biggest challenge is its operationalization, especially in terms of escalation, metrics and financing.



Livestock - In the livestock sector, greenhouse gas emissions stem from enteric fermentation and excreta handling, and this corresponds to methane emissions. To a lesser extent, pastures fertilization, a primary but not exclusive practice for cattle bovine milk, has an impact on nitrous oxide emissions. It is a sector that has also the capacity to absorb, capture and conserve carbon to some extent, through the management of pastures, soil conservation, forests and silvopastoral systems. This sub-sector has a Low-Carbon Livestock Strategy and a program called the Nationally Appropriate Mitigation Actions (or NAMAs) implemented in its pilot phase. Its main challenge

is to eliminate the set of barriers (scaling of the NAMA in its next phases).

Deforestation and Absorption

- Historically, Costa Rica has operated its national system of protected wild areas and program of Payments for Environmental Services (PES), which, in totality, covers 35% of the country and 70% of the forests. The achievements in the field of ecosystem and biodiversity conservation must be sustained over time in a context of profound resource constraints and public management. According to the General Comptroller of the Republic, the majority of public entities associated with the protection of biodiversity do not have adequate Institutional Performance Index ratings, except for the National Forest Financing Fund (FONAFIFO). As the threats to biodiversity increase over the years, a gap is created, and accordingly, investments must be carried out in a better institutional management context - one that guarantees the protection of the natural capital. The forest plays a vital role in guaranteeing the provision of ecosystem goods and services, and also functions as a net emission sink for the country (7.4 MtCO2eq according to the official inventory). Consequently, it would be necessary to maintain and even increase the level of forest cover to at least 60% of the national territory.

Section 4:

The goal of decarbonization planning is to go beyond an environmental agenda: it is to transform the economy

The magnitude of the challenge assumed by the world upon the entry into force of the Paris Agreement calls for a structural transformation of economic activities. This transformation is also a great opportunity for boosting the economy and to generate prosperity under green and circular growth approaches. Today, the great imperative in Costa Rica - due to the Paris Agreement and the call from President Alvarado – would be to transform the emissions pattern of the economy into a net-zero emissions, or negative emissions (i.e., removals) society, in sectors where it is possible - and very low emissions where it is not possible to reach zero. In practice, this means that each sector will be transformed toward zero emissions, yet at different speeds. For example, the Costa Rican electric sector has almost achieved zero emissions, the transportation sector will achieve it as it adopts zero-emissions technologies that are already commercially viable, and the agricultural sector will probably be low in emissions for several decades while technical and technological changes continue to improve.

Table 1

The decarbonization logic of the Paris Agreement

Ratification. In December 2015, the Paris Agreement was adopted, which entered into force in the record time of less than a year after. In July 2018, 179 of the 197 signatory parties of the United Nations Framework Convention on Climate Change have ratified the Agreement, and collectively and bindingly committed themselves to maintain the increase of the Earth's average temperature to 1.5 °C and 2 °C above the pre-industrial era.

The goal of 2°C and the year 2050. To understand what the fulfillment of this international commitment implies, it must be remembered that climate change is the result of the effects of the greenhouse gases (GHGs) that is emitted into the atmosphere by human activity. Since the already accumulated emissions have caused a significant increase in temperature with respect to its value in the pre-industrial era, it is now necessary to rapidly reduce emissions to stop the warming process. Concretely, the IPCC has established that in order to have a 66% probability that the average temperature does not exceed 2°C of the pre-industrial era, global emissions will have to be nil in the second half of the century, and approximately between 40% and 70% smaller in the year 2050 than they were in 2010.

Intensity emissions of the GDP. This reduction is undoubtedly very important in absolute terms, since emissions have almost continuously increased since the industrial era, being driven by industrialization and urbanization of the increasing population and national GDP. However, the emissions reduction required by the Paris Agreement in relation to GDPs is even more ambitious. If we assume that the global economy of 2050 could have a GDP of three times its value of 2010, and requires the total emissions be half its amount, this would imply an approximate reduction of five sixths (that is, 83%) of the emission intensity per unit of GDP.

More information on the science requirements to mitigate climate change in IPCC document: *IPCC Fifth Assessment Report, Working Group III, Summary for Policymakers*

Therefore, it is necessary to apply a planning methodology in order to guide the transformation as well as the consequent set of actions in the short, medium and long-term. This document lays the foundations for the "Planning of decarbonization" in Costa Rica, anchored in a vision of transformation of each sectoral axis that defines the measures of change that must be executed between 2018 and 2050, and is organized in three phases (explained in section 5). Additionally, actions that should be avoided due to them being incompatible with the decarbonization required in the Paris Agreement are identified.

TABLE 2

Fulfilling a goal by 2050 does not mean postponing actions, but developing fundamental transformations with urgency

With the entry into force of the Agreement, the question for society, companies, and governments - including local ones – would be: what changes will be necessary to reduce emissions by 80 to 90% per unit of GDP worldwide? Simultaneously, it is crucial to evaluate the difficulties involve in achieving it. How much investment will be necessary and who will carry it out? It will also be crucial to improve the capacity to account for the benefits and costs associated with these measures in order to make a balance and identify a strategy to manage the impacts.

The sectorial analysis of the changes suggests that between 70 and 80% of global emissions in recent decades come from energy consumption – and these come, for example, from the need to generate electricity, to boost transport, industrial and commercial activities and to provide heating during winter. Technological options to reduce emissions from energy to almost zero (with possible exceptions in industry, transport and aviation) already exist. Non-energy emissions come from agriculture, livestock activity, forests and soils management, industrial processes, and waste management. While there is a potential for significant reduction and research to improve practices are making remarkable progress in the agriculture and livestock sectors, there are still no technologies and practices available reduce emissions to the level of almost zero in a similar fashion to what has been achieved in the energy sector.

Given the above, decarbonizing the energy sectors as extensively as possible is crucial in order to reach zero-emissions in several sectors to ensure that the agreed limits in the future is not exceeded, since the other sectors have no technical potential to achieve the 80 to 90 % reduction for now. In summary, to meet the goal, energy, transportation, urban, and rural production and lifestyle systems require transformations and deep structural changes in every aspect.

Fundamental to this process is the energy efficiency required to not demand more energy than necessary, and the electrification of energy consumption, since it is easier to generate and distribute zero-emissions electricity than to find solutions to capture or eliminate emissions in millions of small sources, such as internal combustion engines or boilers and stoves that currently use fossil fuels and generate emissions.

Establishing a goal by 2050 does not mean that action is postponed until that date. On the contrary, there is an urgency to implement the changes immediately. That is as it would be a mistake to think that we can act in the future as we have 32 years to reach the goal. To do so, it is essential to adopt an approach that takes into consideration the lifespan of technological investments. For example, in terms of energy generation and use, the lifespan varies between 15 years (for example, a car) to 40 years (for example, a thermoelectric generator). Other important infrastructure investments, such as bridges, roads, and dams, can have even longer lifespans. For this reason, and depending on the sector, the next investments or purchase or the one after that is made may be operating in 2050. The planning impact is straight: 2050 is much closer than it seems since it will occur in the lifespan of one or two assets, which is a short time period to carry out a fleet replacement by different technologies. Later, this point is revisited to illustrate the risk of "transition technologies" that may delay the adoption of zero-emissions technologies that have to and can be driven with immediacy.

A new tool: Planning for decarbonization

Since the implementation of fundamental changes in multiple areas in such a short time is unusual, achieving this structural transformation presents a challenge for planners at government, municipality and company level. Each country must prepare for a new stage of its economic development and decarbonization, and in order to effectively do so, new planning tools have to be implemented.

Understanding the challenges requires the use of new tools[12]. Hence, the implementation of a decarbonization planning strategy is presented here. Given the depth of the climate challenge, the objectives would not be met through a traditional "incrementalist" approach that is focused on minimal and gradual improvements. It will also not be achieved with the exclusive use of traditional approaches that are based on optimization models (for example, to only foresee the "optimization" in the consumption of gasoline by state fleets being made to use less fuel would be insufficient). The methodology starts by recognizing that a political decision is required, one that involves a reconfiguration and structural changes of the economy. For instance, under this vision, the question related to the state fleets would be: how can they be transformed so that the state fleet stops consuming fossil fuels?

The planning is composed of two stages: What technological and market changes must occur? And what institutional, fiscal, regulatory and social changes must be achieved to enhance these technological changes?

Planning for decarbonization sets the tone to answer both questions. Its main elements are:

- To establish goals between the present and 2050 in all sectors that are, in aggregate, consistent with net zero emissions by 2050..
- To generate narratives of sectoral change, to be able to communicate the transformation in a common language to all actors.
- To draw a transformation pathway to move from the current state to the desired one in 2050, with detailed technological pathways and market conditions in every sector. In the case of Costa Rica, especially for the energy sector, optimization models have been used, which have allowed a definition of the most cost-effective routes that are coherent with the transformational vision and are able to avoid lock-in processes.
- To identify short- and medium-term actions to facilitate compliance with the pathways,

[12] See for example "2050 Pathways, a Handbook" de Jim Williams (SDSN) y Henri Waisman (IDDRI) in https://www.2050pathways.org/wp-content/uploads/2017/09/2050Pathways-Handbook-1.pdf

emphasizing the institutional, regulatory and fiscal changes that will be required so that the technological transformation pathway can be fulfilled in expected times.

- To establish just transition measures, thereby allowing people, communities and companies that have to reorient their activities and make adjustments to have the necessary support to do so without losing sight of the diverse, often positive, impacts that it will have on the consumers and other sectors of the society.

Achieving decarbonization of Costa Rica requires a large number of specific actions, aligned with the vision of a coherent change sustained over a period of three decades. A strategic and concise plan such as this one presents initial actions and indicates the route that should be followed to continue the process. That is, the planning elements that must be considered are provided in this initial roadmap.

It is important to consider that this planning exercise is conceived as a flexible tool, since not all the necessary solutions required to achieve decarbonization in every sector are available yet, nor have they all been identified. It is a given that in the coming decades, there will be many cases of disruptive technological, economic and social changes that will force an update of the plan. Based on this vision, section 5 offers more concrete actions in the short-term, which are expanded upon in the Action Plan 2018-2022 located in the Annex, and more generic actions are offered towards the long-term, with the consideration that the Plan will remain relevant through periodic updates. It is important to re-emphasize that this document will be part of a broader development planning process that MIDEPLAN will lead with the Costa Rica 2050 Strategic Plan and will also feed into the process of updating the NDC to be presented in 2020.

Planning for decarbonization provides actions distributed into three stages of change

This Decarbonization Plan is structured in three major stages.

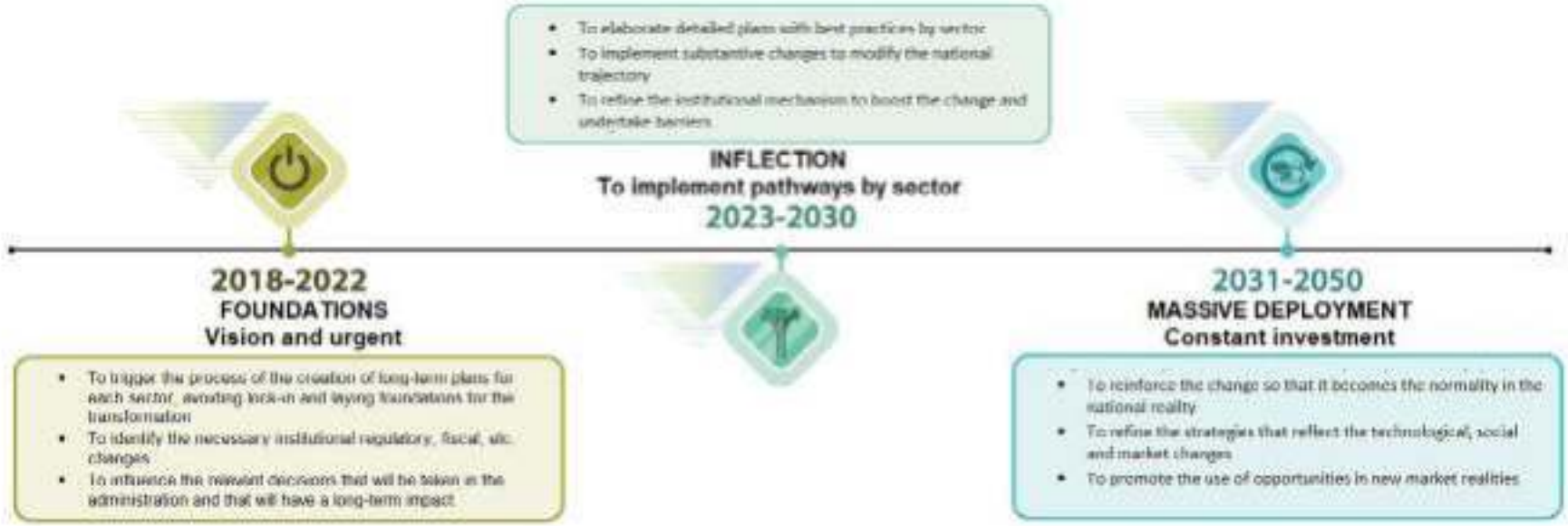
The first stage of **foundations (2018 - 2022)** covers the Presidential period of the Alvarado Administration and contains urgent and foundational actions, necessary not only for their immediate impacts, but also for generating conditions for a substantive transformation. Simultaneously, a blind spot in current debates is taken into consideration: the importance of avoiding decisions that seem to be beneficial in the short-term, but when taking into account their impacts in the medium- and long-term, hinder or delay progress towards the decarbonization goal. The actions of this period have been developed in an Action Plan and are presented in the annex.

The second stage of i**nflection (2023-2030)** covers the remaining eight years of the 2020s, which is when the pathway change towards transformation must take place. Visions of change will focus on elements which will be agreed upon and detailed with various ministries and stakeholders. The interdependencies between different sectors will be carefully examined. With this knowledge and support, decisive interventions that will redirect the markets towards zero-emissions will be completed. The need for a set of actions and multiple adjustments for this evolution is thus recognized. In addition, deep institutional changes will be implemented to reduce the barriers for change.

For the third stage of **normalization of the change or mass deployment (2031 - 2050),** the current knowledge available will inevitably be more limited as we do not know what the world will be like in the future. However, we do know that during this period, action implementation will be easier to appropriately execute as old assets, for example, equipment and facilities that have ended their usable lifespan, and will be replaced with new ones that will already be equipped with decarbonized technologies (the success of this stage will not be possible without having achieved profound changes in the

previous stages for this condition to be true). A constant drive must be maintained to achieve deep emissions reductions. For this stage, other countries would also be seeking to decarbonize their economies, there will be a greater market of zero-emissions technologies which will contribute to the transformation and will provide opportunities to the leading countries.

Figure 5: The three temporal stages of the Decarbonization Plan



Short-term Actions that should be avoided because they will delay a long term transformation must be identified

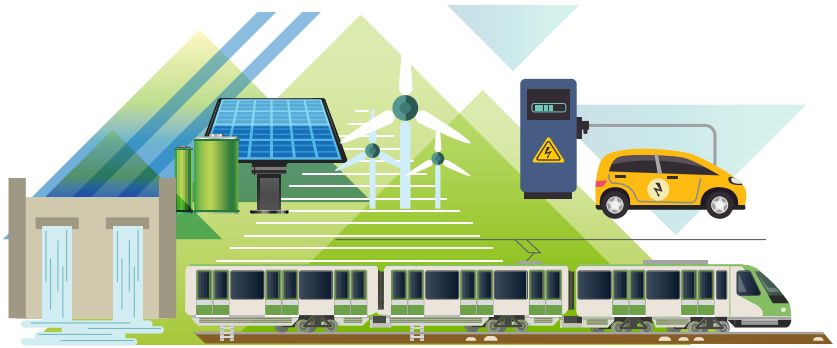
Creating an economy compatible with the Paris Agreement has consequences for the measures that must be adopted, along with those that should not be adopted. Specifically, there are investments that will reduce some emissions in the short-term, but not enough to reach net-zero and fulfill the long-term goal. These are investments with long lifespans, and should therefore be avoided, since they will represent emissions that will impede timely change, postponing it beyond 2050. This problem is commonly referred to as "lock-in".

The need to assess whether a measure is aligned with the Paris Agreement or not, in which case it should be avoided, applies to new actions, but it also crucially applies to plans conceptualized before the agreement was signed. As explained above, this creates a watershed moment: before its entry into force, a measure that reduced emissions was considered an improvement. However, with its entry into force, the question is no longer a case of whether a technology improves, but whether the sum of the improvements is aligned with the trajectory of the decarbonization required to comply with the goals of the Agreement. It is a decisive change of focus that has direct consequences for investment decisions.

Classic cases of "lock-in" (or committed emissions) occur when introducing technological changes into the energy sectors that allows for partial emission reductions. Examples can be the change of coal, bunker, fuel oil, or diesel, to natural gas in electrical or industrial generation. In these cases, it was previously recognized that reducing emissions with respect to an inertial scenario was already progress. However, the need to reach net zero emissions , the question is no longer whether there is an improvement, but rather whether this progress generates a sufficient level of mitigation required to be able to operate the technology long enough in a carbon-constrained world to amortize the investment made over.

A concrete example would be transportation. The global economy has a few years - 20 or 30 years maximum - to make the transition to zero-emissions transport to meet the goals. This temporary window creates a new challenge for investments in relatively low-carbon (as opposed to zero-emission) assets, for example, investments in natural gas - which have lifespans of 20 to 30 years or more, too long to qualify as a temporary or "bridge" technology, which would be the only reason to justify their acquisition as part of decarbonization effort They are not advisable investments within a transformational decarbonization pathway.

In addition to this limitation, a majority of countries have scarce capital to invest and this requires prioritizing the financing of cleaner and more transformative solutions instead of partial solutions that would delay the transition. Fortunately, many zero or near-zero emission technologies, such as renewable generation and electric transport are now available in the market. If the argument for partial solutions is attempted through short-term financial arguments, it will be necessary to make regulatory and fiscal corrections to redirect the investments so that they will be consistent with the vision of development without emissions.



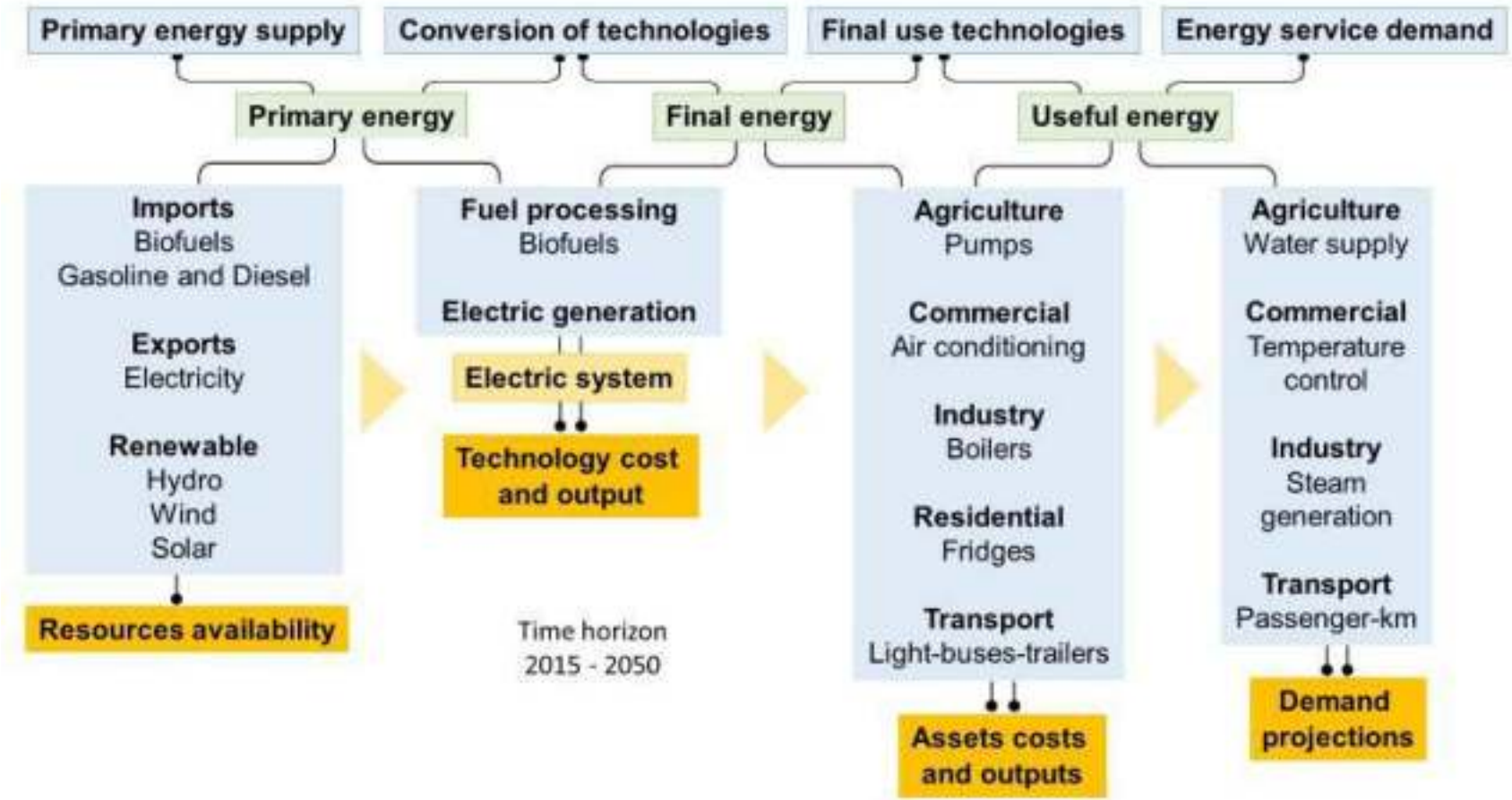
It is important to point out that we are currently working on the consolidation of dynamic models that involve the participation of both academic and institutional actors within MIDEPLAN, the Central Bank, and MINAE. These models, and the use of methodologies such as "robust decision-making", will allow the country to have deeper debates based on better information, science, and data in order to more clearly identify lock-in processes in order to avoid them.

The use of Models in the current process

An energy model with a linear system optimization called TIMES-CR was used as a complementary tool to the planning process based on the construction of the vision and goal of a decarbonized Costa Rica and the definition of policy packages applying a backcasting approach.

The TIMES-CR model is an energy model, initially developed in the United States, which has been calibrated to characterize the Costa Rican energy sector. It has a structure of energy supply dimensioned at spatial and temporal levels, which has different primary sources of energy (for example, wind, solar, hydraulic, gasoline, diesel, etc.) and processes or technologies to transform them (for example , electric vehicles, buses, industrial energy processes, etc.), and thus satisfies the final energy requirement (for example, passenger mobility). Figure 6 shows a simplification of this energy system thus allowing an understanding of the relationships between the types of fuels which are inherent to the model.

Figure 6: TIMES-CR Model structure[13]

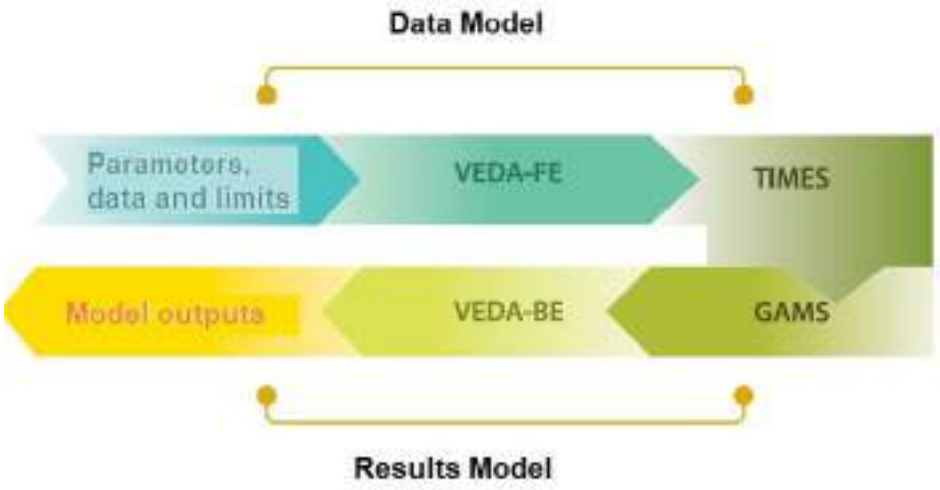


[13] Reference work: Costa Rica – Assessing Mitigation Pathways to Support NDC Implementation (2017).

TIMES-CR is a "bottom-up" linear optimization model to support long-term planning exercises, which considers technological transformation as a starting point. This optimization allows the choosing the lowest cost of investments that are aligned with a defined decarbonization goal.

The analysis is based on energy demands in the model which are linked to the projections of population and economic growth by 2050, as well as elasticities, trends and assumptions regarding efficiencies and costs, among others. These demands are then met with the least-cost option which meets the decarbonization goal and the policies proposed by the government. The main objective of using this model would be to establish a reference line that enables diverse efforts to be aligned in the right direction. Additional analyses pertaining to the management of uncertainty and to the relationships between the energy model and the rest of the sectors will be necessary in order to further refine the decarbonization pathways. [14].

Figura 7: TIMES-CR model process.



[14] The Power and Energy Research Laboratory (EPERLab) of the School of Electrical Engineering of the University of Costa Rica with the support of the IDB is currently working to improve current models with various methodologies under the Deep Decarbonization Pathways program. The energy model in TIMES CR is migrating to a new Osmosys tool, and is complementing new analysis processes under the Robust Decision Making (RDM) methodology. For the Strategic Plan, it is expected to collaborate with MIDEPLAN with a more integral model that incorporates elements and links between water, soil, climate, energy - CLEW.

For this reason, this work is not a forecast of the future, but an analysis of the requirements of the energy system needed to achieve emission goals which, when combined with estimates for decarbonized emissions from the other sectors , would in aggregate be aligned with what is necessary to keep the maximum increase in the average temperature of the planet to 1.5°C above pre-industrial levels. For the analysis, the diagram shown in Figure 7 was used. This starts from a set of input parameters, such as energy demand and technology restrictions that adjust to the national reality. Subsequently, the VEDA-FE module generates a data structure to evaluate each scenario in TIMES, and this contains all the structures and relationships between technologies or processes and fuels. Through a code in the General Algebraic Modeling System (GAMS), the optimization process is performed, and the result of this operation is transferred to the VEDA-BE module for the results visualization and the generation of output files. The process is iterative, and each output is analyzed by modelers in order to validate the coherence between the input data and the results.

The inputs data in the TIMES model, as well as their respective sources, are those shown in Table 1. Many data used to calibrate the model have a high uncertainty in the long-term range. For this reason, the results of this model are a guide that must be refined with robust analysis techniques that contemplate multiple possible scenarios. Modeling aims to guide investment decisions and identify the technology options which are most convenient and aligned with the set goals.

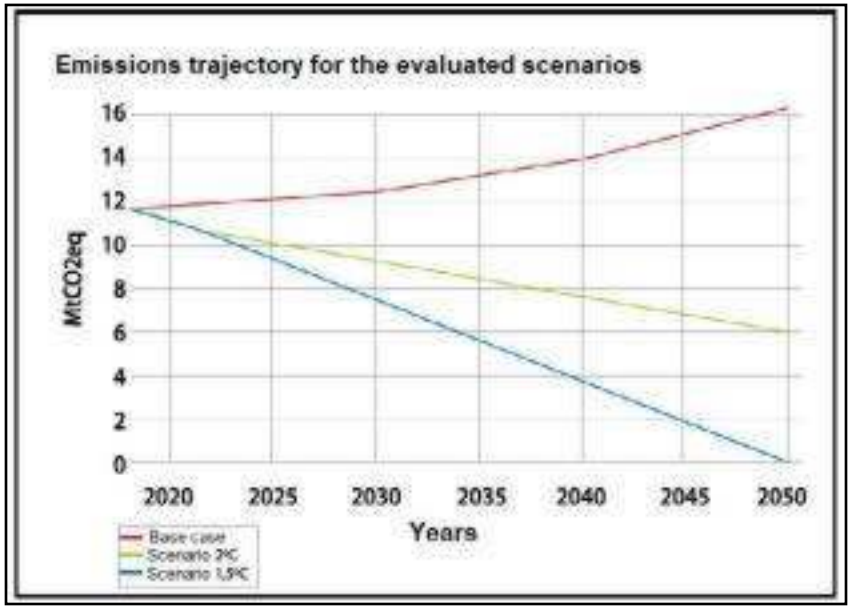
Table 3: Input data and analysis sources

Input data	Sources
Energy balance 2015	Energy Subsector Planning Secretariat (SEPSE).
Estimated economic growth	Central Bank of Costa Rica (BCCR).
Energy elasticities	International Consultants (DecisionWare Group)
Technology costs	U.S. Environmental Protection Agency EPA-US9RT database
Technological efficiencies	U.S. Environmental Protection Agency EPA-US9RT database.
Fuel costs	U.S. Energy Information Administration (EIA).
Non-energy sector	National Meteorological Institute's National (IMN) GHG Inventory (2012)
Energy balance 2015	Data provided by the DCC.

Results of the Model

The results of the model, together with the inputs collected during the consultation processes, allowed a refinement of the public policy packages, both at the level of their vision-goals, and at the level of the specific actions and technologies that are to be incorporated.
To evaluate the policy packages, three scenarios were generated:

- BAU or Business as Usual Scenario: This projects the behavior of the emissions without considering public policy interventions.
- Scenario 2°C: It is a scenario with public policy interventions that are compatible with the NDC's goals of Costa Rica.
- Scenario 1.5°C: It is a scenario with public policy interventions that are compatible with net-zero emissions in 2050 and it is the goal of the National Decarbonization Plan.
- Figure 8 shows the different trajectories of emissions from the base scenario and those corresponding to 1.5°C and 2°C.



A sectoral contribution target by 2050 was established to determine the contributions by sector, and this took into account the proportions presented in the base case and under the premise of a fixed absorption value. In 2012, the maximum emissions of carbon dioxide equivalent (CO2eq) of every sector, which are categorized in the Greenhouse Gases (GHG) Inventory 2012, have a proportion of 64.13% for energy, 8.72% for industrial processes, 10.58% for AFOLU, and 16.57% for waste – this is taking into consideration the forestry sector absorption reported in the GHG inventory. These proportions remain constant, with a varying absorption of 2 Gg of CO2eq to 3.5 Gg of CO2eq in 2030; which will stay steady after 2030. There is a high difficulty in defining the maximum emission capacity for each sector, and this is mainly due to the lack of tools to model the non-energy sector. For example, there is a high uncertainty in the carbon dioxide absorption value of the forestry sector in the future.

Table 4 shows the main results of the simulations, which contemplate the energy system and the other sectors according to the GEI Inventory.

Table 4: Emissions estimates for the generated scenarios

Sector	Reference GHG 2012 Inventory (IMN)	Base case scenario (2050	Scenario 2 °C (2050	Scenario 1.5 °C (2050)
Energy	7,21	9,48	4,54	2,64
Industrial processes	0,98	1,41	0,68	0,39
Agriculture	3,24	5,90	2,82	1,64
Waste	1,86	2,97	1,42	0,83
Net Forest area	-2,05	-3,50	-3,50	-5,50
Total	11,24	16,26	5,96	0,00

The evaluations show that the base scenario has a 45% growth in emissions in relation to the last GHG inventory, and that the scenarios of 2°C and 1.5 C are possible with a definition of clear goals associated with the electrification of transport. There is a more cost-effective transition period provided by technologies where Liquefied Petroleum Gas (LPG) and biofuels seem to play a role in retrofitting the current fleets and have long lifespans, particularly for the cargo transport segment, where zero emissions technological options are still not commercially available.

Figure 9: Sectorial emissions for the 2°C scenario

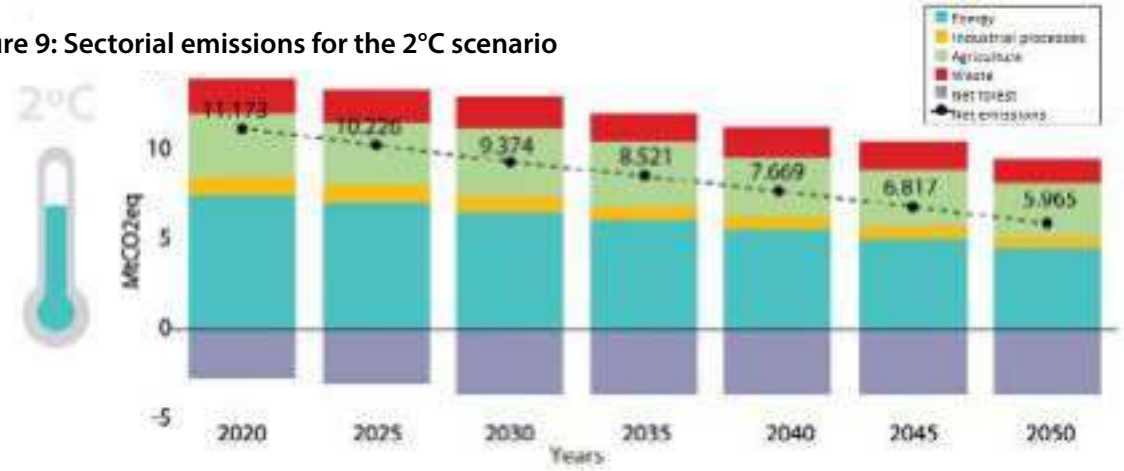
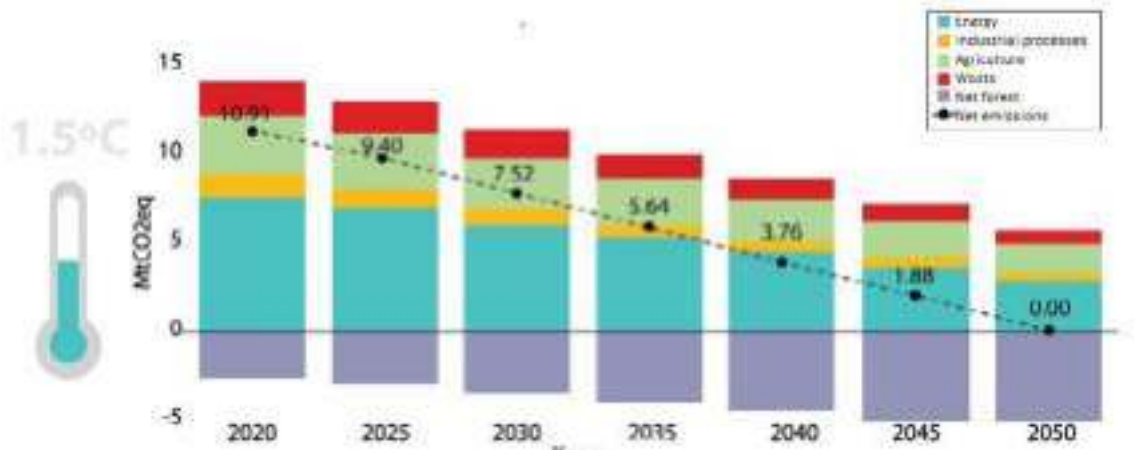


Figure 10: Sectoral emissions for the 1.5°C scenario



Exchange and consultation with diverse actors

The decarbonization planning methodology included a process with stakeholders from sectoral, autonomous, and subnational level institutions, as well as from the private sector, civil society, and Academy.

First, the process included a series of bilateral meetings with key stakeholders and authorities at the level of Ministers and Executive Presidents of central institutions. This exercise made it possible to understand visions, priorities, and establish a frame of reference for the long-term planning process. In this stage, high-level meetings with the President, Minister of Environment and Energy and the various teams they appointed took place. Meetings were also held with the Office of the First Lady, the Minister of MIDEPLAN, representatives of the economic sector, Vice-Minister of Public Works and Transport, Vice-Minister of Agriculture, Vice-Minister of Energy, Directors of MINAE, representatives of the Secretariat of Environment Sector Planning, Executive President of RECOPE, and Executive President of Costa Rican Institute of Electricity (ICE), as well as with representatives of the Chamber of Industries and sectoral experts, among others.

In a second stage, two series of workshops were held, the first during the week of the 22nd to 26th of October and the second during the week of the 13th to 16th of November 2018.

Table 5: Participants in both series of exchange and consultation workshops

	First consultation (Total 154)					Second consultation (Total			
Date	22.10.	23.10.	24.10.	25.10.	26.10.	13.11	14.11	15.11	16.11
Axis	1-3	4-5	6	7	8-10	1-3	4-6	7	8-10
Number of participants	32	24	23	35	40	38	51	40	63

During the first series of workshops, the Decarbonization Plan, the 10 axes and cross-cutting strategies were presented to participants, allowing for the collection of inputs for the design of the more detailed activities that were incorporated into the Action Plan. In the second series of workshops, the actions proposal was strengthened; and an exercise of prioritization and identification of links between the cross-cutting strategies were carried out.

Both series of workshops evidenced the great interest that exists on the part of the stakeholders in seeking co-creation processes.

The workshop sessions were complemented with visits to and presentation of the Plan in various sessions of boards of directors, among them the Public Transport Council, RECOPE, and ICE.

The initial exchange process evidenced the need to continue building during the following stages, whether it is associated with the initial implementation, the process of updating and/or the future adjustment that will be carried out. Workshop supporting materials and feedback can be accessed through the DCC platform at https://cambioclimatico.go.cr

Section 5:
Short-, medium- and long-term goals and actions for the decarbonization of the Costa Rican economy

Through this plan, the Government of Costa Rica defines its goal to be a net-zero emissions economy by 2050. This goal is consistent with science and with the recent IPCC Special Report on 1.5°C. The policy packages presented, and the planning processes developed, are considered as the starting actions, and will have to be complemented and updated in subsequent iterations under the principle of progresion, always consistent with the goal.

It is recognized that decarbonizing all sectors of the economy will take time and that specific actions, aligned to a vision of consistent and coherent change must be executed, and this has to be in accordance with the maturity of zero-emissions technologies over a period of three decades. To initiate this process, this strategic plan is deliberately concise in order to identify ten axes of decarbonization in key sectors, with the initial actions being a part of the pathway that will be negotiated and deepened over time. In other words, there is no intention to list all the necessary measures, but to identify the essential ones, which will be presented in an abbreviated form. They will be further elaborated on in other policy instruments, such as the Costa Rica 2050 Strategic Plan, and in future iterations of Costa Rica's Nationally Determined Contributions and of the Decarbonization Plan itself.

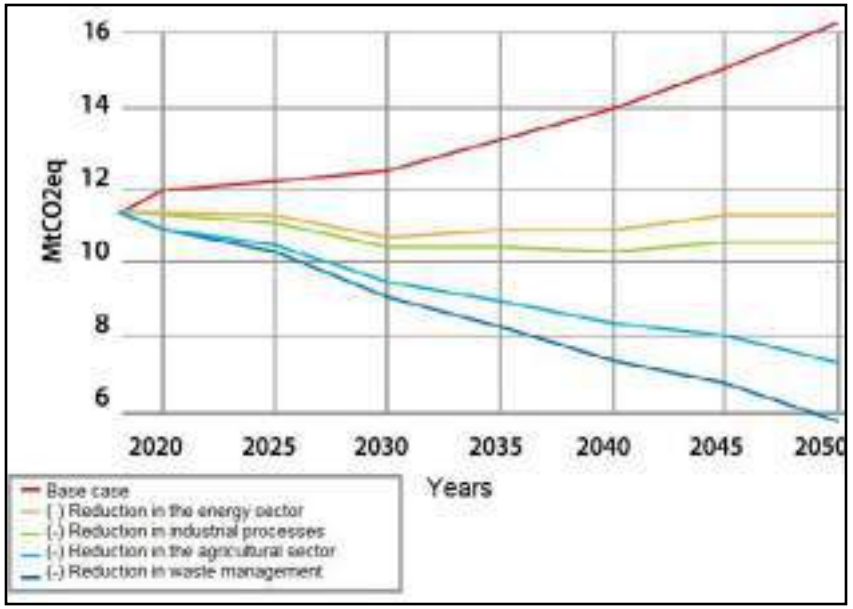
There are uncertainties and factors that will be beyond the control of the country, and these could be strongly associated with disruptive technological processes, mobility, production and electrical distribution schemes, among others. For these reasons, the process and the plan are conceived as an adaptive approach that should be updated as these new conditions arise. This is why more concrete actions are presented in the short-term and gradually become more generic when discussing the long-term.

This section builds on the 10 axes of decarbonization derived from the greenhouse gases inventory. To identify the actions of each axis, the methodology "Decarbonization Planning" described in section 4 was carried out. The actions of change within each line are presented in three temporal stages: foundations (2018 - 2022), inflection (2023 - 2013) and massive deployment (2031 - 2050) - already described earlier - to achieve the vision of transformations that guide each sector. This is complemented with the actions that must be avoided in each axis so that the country does not enter into a technological trajectory from which it will be difficult to exit once an investment is made. This scenario has been elaborated upon in the previous section and it is known as "emissions lock-in".

Cuadro 6: Linkages between the 10 decarbonization axiss and the emissions sources according to the National Inventory

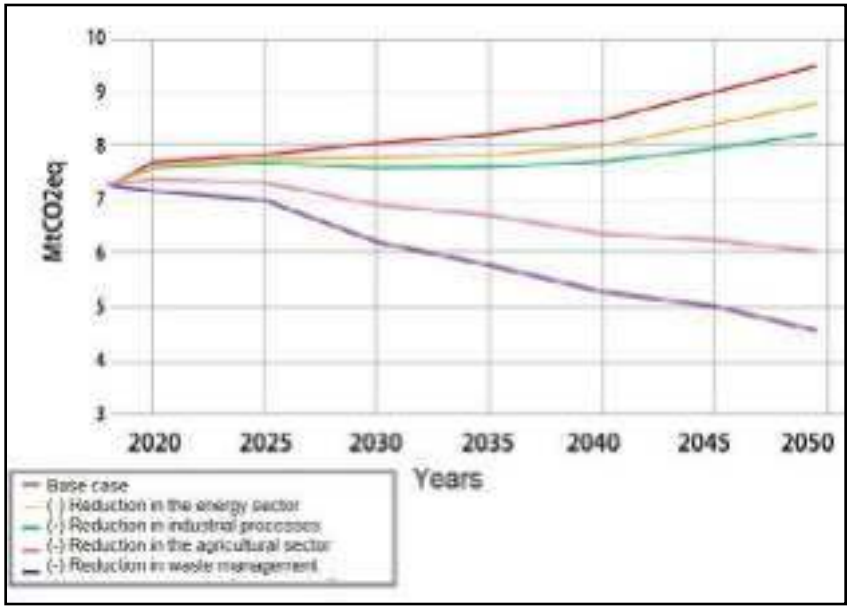
Energy	Industrial processes	Waste	AFOLU (includes absorption)
Axis 1 Public transport	Axis 6 Industry	Axis 7 Residuos	Axis 8 Agriculture
Axis 2 Light vehicle fleet			Axis 8 Cattle livestock
Axis 3 Cargo transport			Axis 10 Forest Biodiversity Ecosystemic services
Axis 4 Electric system			
Axis 5 Commerce and Residence			
Axis 6 Industry			

Figure 11: Trend of emissions reduction by sector according to the interventions of the Decarbonization Plan.



Elaborated based on TIMES model data (EPER-Lab UCR, 2019)

Figure 12: Trend of reduction of emissions of the energy sector according to the interventions of the Decarbonization Plan



Elaborated based on TIMES model data (EPER-Lab UCR, 2019)

Policy packages aimed at coordinating actions and obtaining high-impact results

Decarbonization requires taking coordinated action to advance each result from several fronts. Therefore, this document refers to "policy packages", which are packages defined as a set of measures that does not only plan a change, but also empower, finance and support institutional capacities and eliminate barriers that may hinder their adoption. For this plan, the categories of policy proposals forming the packages are:

- *Planning action and/or preparation of a strategy*. Requires analysis, design, and political agreement.
- *Institutional or regulatory change action*. Requires capacity building and/or approval, as well as an understanding of institutional barriers that need to be overcome.
- *Implementation of project or execution of initiative*. Requires funds and execution capacity.
- *Obtaining/provision of financing*. Requires the preparation of a clear economic proposal and access to markets and financial mechanisms.
- *Citizen acceptance and just transition*. Requires the understanding of the barriers to change and the need for timely action in their undertakings.
- *Prevention of "lock-in"*. Strict decarbonization criteria need to be applied to actions that are incompatible with this plan because they move the country away from the goal.

Table 7: The 10 axes in the decarbonization and cross cutting strategy

10 axes of the decarbonization	Cross-cutting strategies
1. Development of a mobility system based on safe, efficient and renewable public transport, and on active mobility schemes.	
2. Transformation of the light-duty vehicles fleet to have zero-emissions, sustained by renewable energy, not of fossil origin.	
3. Promotion of a cargo transport that adopts modalities, technologies and sources of energy zero-emissions or the lowest emission possible.	A. Comprehensive reform for the new institutionality of the Bicentennial.
4. Consolidation of the national electric system with capacity, flexibility, intelligence, and resilience necessary to supply and manage renewable energy at competitive cost.	B. Green Tax Reform.
5. Development of buildings for different uses (commercial, residential, institutional) under the standards of high efficiency and low emission processes.	C. Funding strategy and investments attraction for transformation.
6. Transformation of the industrial sector through processes and technologies that use energy from renewable sources or other efficient and sustainable methods that have low or zero-emissions.	D. Digitalization and Knowledge-based Economy Strategy.
7. Development of an integrated waste management system based on the separation, reuse, revaluation, and final disposal of maximum efficiency and low GHG emissions.	E. Labor strategies of "just transition".
8. Promotion of highly efficient agro-food systems that generate low-carbon local consumption and export goods.	F. Inclusion, human rights and promotion of gender equality.
9. Consolidation of an eco-competitive livestock model based on productive efficiency and reduction of GHG.	G. Transparency, metrics and open data strategy.
10. Consolidation of a model of management for rural, urban, and coastal territories that facilitates the protection of biodiversity, the increase and maintenance of forest cover, and ecosystem services based on nature-based solutions	H. Education and Culture Strategy: the Bicentennial Costa Rica free of fossil fuels.

In the next sections, the detailed activities of each line of action are presented. These are numbered to ease the reference to the timelines included in the Annex, in which the Action Plan 2018-2022 is presented.

Decarbonization axis 1:

Development of a mobility system based on safe, efficient and renewable public transport and active mobility schemes

Transformation vision:

- *In 2035, 30% of the public transport fleet will be zero-emissions and the Passenger Electric Train will be in operation, running 100% on electricity..*
- *In 2050, the public transport system (Buses, Taxis, Passenger Electric Train) will operate in an integrated way, replacing the private automobile as the first option of mobility for the population in the GMA.*
- *In 2050, 85% of the public transport fleet will be zero-emissions.*
- *In 2050, Compact Cities will have been consolidated in the main urban areas of the GMA and main secondary cities of the country, with an increase of 10% of non-motorized journeys*

Activities to foster change:
2019– 2022

1. To modernize public transport and to create an integrated and intermodal system

Period goals

- 8 main trunk lines in operation.
- At least one public transport mode operates with a system of integrated electronic payment.
- Electric Passenger Train tendered.

Activities

1.1.1 To implement the sectorization of the public transport services, in bus modality, in a manner aligned with the mobility needs of the citizens and firstly focused on the GMA.

- To reorganize public transport routes; set trunk lines into operation in exclusive lanes.
- To modernize the concession scheme for 2021, which will reward efficient and decarbonized service provision.
- To develop a profitable and innovative financial model that promotes efficiency and transparency in the service operation.

1.1.2 To establish and operate an efficient and accessible Electronic Payment system for bus and train services.

1.1.3 To adopt measures that promote intermodality.

- To design and implement intermodal stations (train-bus-taxi-bicycles).
- To design and adjust the schedules for the provision of public transport services in a way that promotes systems integration.

1.1.4 To establish a governance model under the sustainable mobility system approach.

- To strengthen the capacities and transparency of the Public Transport Council and the stewardship of the Ministry of Public Works and Transport (MOPT).
- To articulate joint approaches to land use planning and transport planning.

1.1.5 To progress in the construction of the Electric Train under the most feasible model, connecting Cartago, San José, Heredia and Alajuela.

- To carry out feasibility and environmental impact studies.
- To design the construction plans.
- To prepare international bidding documents for the design, construction and operation phase.
- To bid for the concession of the electric train construction.
- To develop a financial and technical strategy for the construction and commissioning of the Electric Train aligned with a vision of intermodality and sustainable mobility.

1.1.6 To implement campaigns that promotes the use of public transport and intermodality.

2. To promote the decarbonization of the public transport sector through the electrification and adoption of zero-emissions technologies

Period goals

- To implement electric buses pilot on at least 2 public transport routes.
- Bus service concession contracts include specific goals and conditions associated with the use of electric or zero-emission buses.
- To design and officialize the Roadmap for the consolidation of the Hydrogen Cluster.

Activities

1.2.1 To establish the electrification of public transport program, which will include the implementation of three electric buses pilots, financing alternatives and incentives to test the process at the level of transportation companies, considering tariffs that facilitate the inclusion of the technology in the model of service provision.

- To implement three electric buses pilots - launched in June 2018 on the GMA routes.
- To design and approve the tariff scheme appropriate to the use of new technology in public transport, in order to ensure the affordability of the rates.
- To design financing alternatives and incentives for proof of concept at the level of transport companies.
- To define a joint and integral line of action.
- To establish a schedule for the implementation of the fleet electrification.
- To align concession contracts of 2021 with objectives and goals of the Decarbonization Plan and Law 9518: Incentives and Promotion for Electric Transportation.

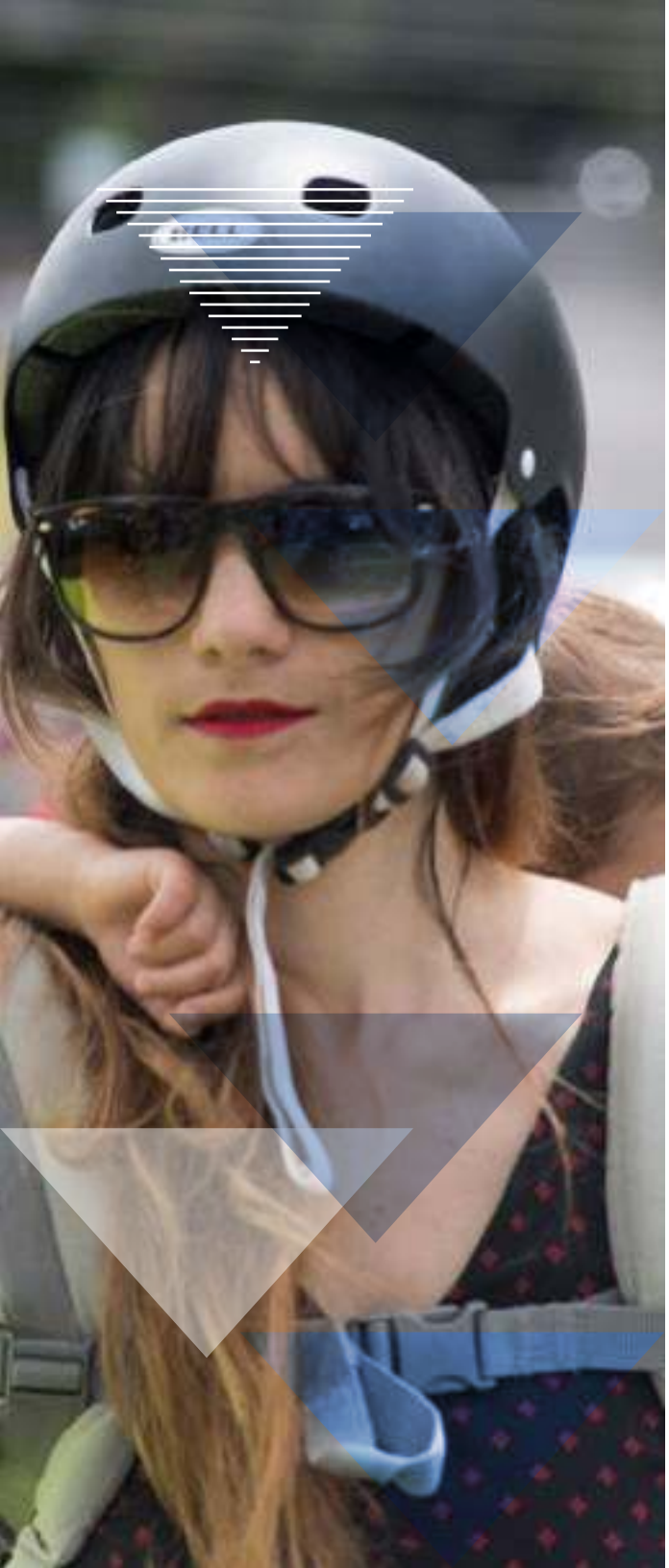
1.2.2 To identify and evaluate the best options to electrify the taxi fleet.

- To analyze the implications of the tariff scheme and identify improvements to facilitate technology adoption in taxis.
- To identify financing scheme to facilitate renewal of the taxi fleet.
- To design a pilot program for the electrification of taxis.

1.2.3 To explore the technical and financial feasibility of creating a public fund to improve the conditions of the transition to electric public transport.

1.2.4 To design a plan to promote hydrogen and other zero-emissions technologies.

- To define the Roadmap to consolidate a Research and Development (R&D) cluster in Hydrogen
- To implement the inter-institutional action plan to promote the use of hydrogen in the transport sector.
- To conduct pre-feasibility studies of the identified key projects, and define a business model
- To design the pilot project of hydrogen public buses
- To publicize the lessons in terms of costs, performance and infrastructure.



1.2.5 To analyze the options for new undertakings and business models to promote shared mobility schemes in the country.

1.2.6 To launch communication campaigns that promotes public transport and zero-emissions.

- To communicate about the benefits of zero-emissions public transport in the long-term and its relationship with the goal of decarbonization.
- To raise awareness about pioneer bus companies with zero-emissions technologies.
- To raise awareness about real-time information of an air quality monitoring system to warn the population about high contamination situations.

3. To promote low-emission urban development schemes through the integration of the "transportation-oriented development" approach into land planning and management instruments.

Period goals

- The implementation of transport-oriented development and low emissions practices in at least 3 municipalities.
- The participation of 16 municipalities in the 2nd "cantonal" category of the National Carbon Neutral Program (PPCN).

Activities

1.3.1 To review and adjust the Regulatory Plans and other territorial management tools in order to promote low-emissions development oriented to transport.

- To adjust the regulatory plans and urban development regulations to ensure that their formulation promotes a low-emission and transport-oriented development.
- To identify the necessary adjustments in the approved regulatory plans of the GMA to comply with the above statement.
- To articulate the urban, residential and commercial development policies with the transportation plans and land use planning.

1.3.2 To promote dense and compact city models.

- To promote cantons densification and compactness around the electric train.
- To design programs and incentives to promote the model of compact cities.

1.3.3 To promote sustainable mobility in cities, with special emphasis on the promotion of active modes.

- To design and implement walkable city plans in the major urban centers of the country, including intermediate cities.
- To design and implement integrated plans to promote the use of bicycles, which consider cyclo-inclusive infrastructure.
- To encourage innovation in the design and implementation of measures that promote sustainability in cities, in both the public and private sector, and in civil society.

1.3.4 To implement demand management measures.

- To expand the plate-based vehicular restriction to other urban centers such as Cartago, Heredia, and Alajuela.
- To promote the development of parking policies on public roads to limit parking areas on them.

1.3.5 To actively involve municipalities in the transition to low-emission development.

- To implement infrastructure construction plans for active mobility (sidewalks, bike lanes) in priority municipalities.
- To increase the number of municipalities participating in the cantonal category of the "Cantonal Carbon Neutral Country Program 2.0", as well as the development of mitigation strategies and pilot projects at a cantonal level in key sectors such as sustainable mobility, electric mobility and waste management.

To avoid "lock-in"

To avoid the promotion and adoption of "transitional" transportation technologies that create barriers for the decarbonization of the transport system in the medium- and long-term. More modelling exercises have to be carried out to ensure informed decision-making.

2023 – 2030

1. To strengthen the modernization of public transport:
   - To consolidate the modernization process in the GMA.
   - To design and implement preliminary plans for the modernization, optimization and integration of public transport in interurban paths and others in intermediate cities outside the GMA.
   - To bid for the operation and to achieve the complete implementation of the Electric Train project between Cartago, San José, Heredia and Alajuela.

2. To implement a transformative plan to expand zero-emissions urban public transport
   - To integrate goals under different scenarios - according to the maturity of the technologies (according to the global deployment of electric buses, other zero emission technologies and dynamic prices).
   - To generate lessons learned based on experiences during the period (2018-2022) about the Electric Train project and outsourced electric buses in 2021 and integrate them into the actions of this stage.
   - To consolidate specific intervention areas to start densification.
   - To determine new pathways for transformation.
   - To identify the requirements to guarantee zero emission energy supply (strong planning link with the line of action 4 about the electrical system).
   - To establish a process to evaluate innovative technological options, including defining a transformative vision adapted to scale for the future uses of hydrogen and fuel cells as a complement to the other zero emission technologies.

3. To elaborate a transformative vision adapted to scale for a zero-emissions rural public transport.
   - To implement pilot projects of electric buses in rural areas.

4. To intensify actions in Sustainable Mobility.
   - To realize concrete urban interventions in cantons where the

5. To innovate and to create integration and management capacities for an intermodal quality system, to explore the creation of an "Urban Transport Authority".

6. To design and implement a funding strategy adapted to scale, taking advantage of the international leadership in decarbonization and sustainable transport to consolidate the fund for disruptive actions in zero-emissions transport.

To avoid "lock-in"

To include in bidding and purchase processes an analysis of the lifespan of the assets, both in fleet and auxiliaries, as well as in infrastructure investments, highlighting their contributions to the country's emissions pathway (committed emissions), and establishing hard thresholds to discard/disqualify proposals that are not consistent with the fulfillment of national goals.

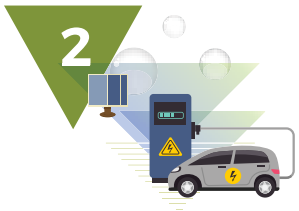
2031 – 2050

1. To consolidate models of resilient cities oriented to zero-emissions: compact, oriented to public transport and non-motorized uses.

2. To expand projects adapted to scale, zero-emissions in public transport and shared mobility: fleets of buses, taxis, and train inside and outside the GMA.

3. To adapt to demographic challenges (to consider the implications of having an aging population that requires specific transport modalities).

4. To implement with flexibility new business models and other disruptive changes.



Decarbonization axis 2:

Transformation of the light-duty vehicles fleet to zero-emissions, boosted by renewable energy, not by fossil origin

Transformation vision::

- *By 2025, the growth of the motorcycle fleet will have stabilized and standards will be adopted to shift to a zero-emissions fleet.*
- *In 2035, 30% of the light vehicles fleet - private and institutional - will be electric. In 2050, 95% of the fleet will be zero-emissions.*
- *By 2050, new models and shared mobility schemes will have been consolidated.*
- *By 2050, the country will have an extensive electric recharge network throughout the country and complementary infrastructure for zero emission technologies (e.g., hydrogen stations).*

Activities to foster change:
2019-2022

1. To accelerate the transition of the vehicle fleet towards zero-emissions technology

Period goals

- The National Electric Transportation Plan and complementary regulations to operationalize Law 9518 are published.
- Zero-emissions fleets acquired in at least 3 public institutions.
- 69 fast recharge centers operating by 2022.

Activities

2.1.1 To publish a National Electric Transportation Plan and generate complementary regulations (guidelines, regulations and standards) to operationalize Law 9518 on incentives and promotion of the electric transport.

- To progress on regulations prohibiting the importation of light-duty vehicles that use fossil fuels.

2.1.2 To promote the implementation of the Sectoral Agreement on Emissions Reduction in the Transport Sector.

2.1.3 To implement transition plans for zero-emissions transport in institutional fleets.

- To adjust state procurement schemes.
- To implement pilot programs to change institutional fleets.
- To consolidate transformation program of commercial fleets in pilot sectors, e.g.: Tourism.

2.1.4 To consolidate programs for the repair and maintenance of zero-emissions vehicles.

- To expand the INA capacity building programs in repair and maintenance of electric vehicles.

2.1.5 To consolidate the "Fast Charge Network" for electric transport.

- To set up fast recharge centers distributed throughout the country.
- To analyze business models that encourage the private sector to accelerate the consolidation of fast recharging points.

2. To improve the efficiency of the combustion fleet.

Period Goals

- Incorporation of 5% to 10% of ethanol in both gasolines.
- Roadmap for production and use of biodiesel.
- Eco-Labeling for vehicle efficiency designed.

Activities

2.2.1 To launch zero-emissions transport promotion campaigns.
To develop educational campaigns to cut down myths associated with electric technology in vehicles.

2.2.2 To design financing mechanisms for the energy transition, including banking and insurance facilities for zero emission technologies.

2.2.3 To launch vehicle scrapping pilot program.

- To define a "roadmap" for the implementation of the scrappage model and business scheme.

2.2.4 To design a roadmap for the efficient management of electric vehicle batteries at the end of their life cycle.

- To analyze possible business models under the circular economy approach.

2.2.5 To consolidate the development of the national biofuels industry.

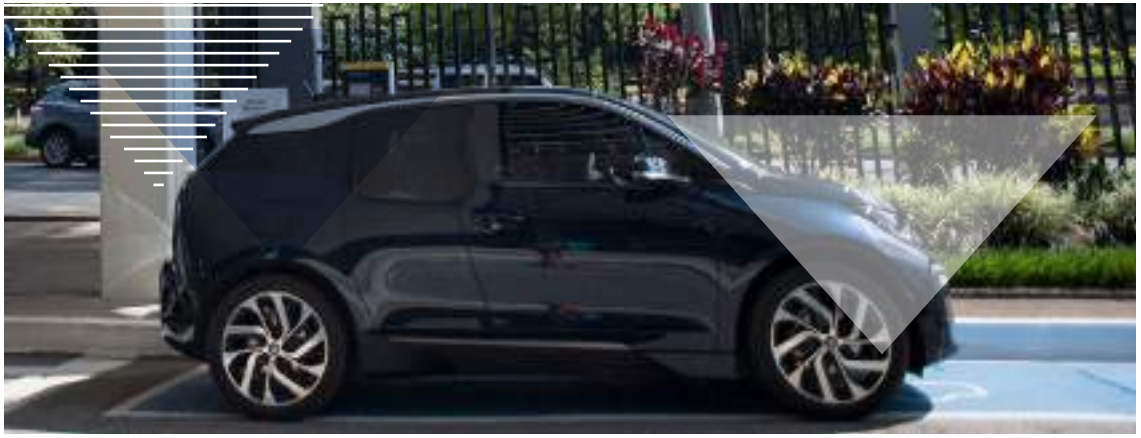
- To implement the National Biofuels Strategy.
- To implement demonstration projects with the MAG.
- To analyze potential vertical integration of RECOPE in agroindustrial chains, for example palm trees.
- To mix ethanol of national origin with gasoline.
- To mix biodiesel of national origin with diesel.

2.2.6 To design LPG Use Roadmap for specific niches coherent with global decarbonization goals.

- To design adequate standards and regulations to regulate LPG conversion processes in the existing fleet.

2.2.7 To update regulations to improve the quality of fuels.

- To adjust Central American regulations.



2.2.8 To improve and update the energy efficiency regulations for the transport sector by updating the standards for the import and circulation of internal combustion engine vehicles, improving fleet standards.

- To implement an eco-labeling in electric and combustion vehicles to make visible the vehicles efficiency.

To avoid "lock-in"

To avoid the promotion and adoption of transport technologies called "transitional" that create barriers for the decarbonization of transport system in the medium- and long-term.

2023 – 2030

1. To promote price parity (linked to the green tax reform and carbon pricing strategies) and to implement policies to discourage and reduce the purchase and use of internal combustion vehicles to reach the goal of zero sales of this technology.

2. To strengthen the massive deployment of smart grid to extract value and improve the prices for storage and demand management (linked to the line of action 4).

3. To give universal access to financing and insurance plans favorable to the purchase of zero-emissions vehicles, including for commercial uses (for example, for taxis).

4. To establish regulations so that the purchases of light vehicles for the Government are electric or zero-emissions.

5. To implement programs to promote an attractive market for the early adoption of zero emission technologies to attract assemblers to the country.

6. To significantly increase sectorial electrification programs, for example: tourism and commercial fleets.

7. To strengthen user education.

Avoid to "lock-in"

To avoid investments in infrastructure that favor the use of private vehicles rather than public transport as reducing the growth of the light vehicles fleet will be an important factor in achieving high rates of technological change to zero-emissions vehicles.

2031– 2050

1. To consolidate the scaling process of technology adoption:
   - To offer a wide range of electric vehicles.
   - To offer broad information for users.
   - To offer support systems (workshops, recharging stations).
   - To offer a national banking system lines of credit for the purchase of zero-emissions vehicles similar to a conventional product.

Decarbonization axis 3:

Promotion of a freight transport that adopts modalities, technologies and energy sources until achieving zero or the lowest emissions possible

Transformation vision:

- *By 2022, Limon's' Electric Freight Train (TELCA) in operation.*
- *By 2030, 20% of the fleet operates with LPG.*
- *In 2035 sustainable logistics models in major ports and urban areas of the country are consolidated.*
- *By 2050, cargo transportation will be highly efficient and will have reduced emissions by 20% compared to 2018 emissions.*

Activities to foster change
2019- 2022

1. To consolidate the program of cargo logistics to reduce emissions.

Period Goals

- At least 1 cargo logistics pilot project operates under low-emission parameters.
- Limon's Electric Freight Train (TELCA) in operation.

3.1.1 To implement measures that improve the distribution of cargo in agreement with the Logistics and Cargo Plan.

- To create consolidation centers or logistics activity zones (including scanners and other intelligent merchandise management systems) in the peripheries of the GMA and other emerging population centers.
- To define peripheral routes and schedules that limit the access of heavy trucks to urban centers.
- To establish pilot projects of centers of consolidation and final distribution that combine technologies and various modes of transportation, creating possible "low-emission areas".
- To adequately divide loads so that the size of the cargo vehicles that circulate in urban centers are proportional.

3.1.2 To generate open data to improve the planning of light and heavy cargo transport.

- To generate the following open data: age of the fleet, types of vehicles, operating conditions, origins and destinations of the cargo, type of cargo, origin of the trucks (domestic or foreign).
- To evaluate the feasibility of designing a Monitoring, Reporting and Verification (MRV) scheme to measure the emissions from the sector and from the transformation to a decarbonized one.

3.1.3 To integrate the intensive use of rail transportation for the mobilization of merchandise in the major routes and demand in the distribution model and Pre-investment Study registered in MIDEPLAN cargo commercialization.

- To develop the necessary regulatory instruments for the implementation of the TELCA, including the establishment of the rates, prices or fares required for its implementation.

2. To promote technological efficiency in heavy and light cargo transport sector

Period goals

- Plan to improve efficiency and reduce emissions in the freight transport sector.
- 1 pilot project to improve the efficiency of the freight transport sector (use of biofuels and LPG).

Activities

3.2.1 To design a plan for the technological efficiency improvement of the cargo transport sector, which will consider aspects such as technological improvement (LPG, for example), the use of filters, biofuels and other efficiency improvements.

- To promote technologies such as LPG, use of filters, biofuels and other efficiency improvements.
- To implement a pilot project of efficiency improvement of the cargo transport.

3.2.2 To implement a pilot project of efficiency improvement of the cargo transport.

- To reinforce road emissions controls, of the compliance of standards and maintenance regulations for light and heavy cargo vehicles.
- To manage the strengthening of Central American and national regulations linked to efficiency standards, emissions, safety for light and heavy loads.

3.2.3 To adjust Law 9518 so that fiscal incentives also apply for electric light-duty vehicles.

3.2.4 To establish a Pilot Plan to involve companies in the cargo transport sector in the Carbon Neutrality Country Program 2.0.

To avoid "lock-in"

To limit the options that deepen dependence on fossil fuels or generate new dependencies.

To generate improvements in the regulation and gradual standards that are consistent with the deep decarbonization process and which consider the availability of competitive technological options and the lifespan of assets.

2023 – 2030

1. To agree on a technical standard of efficiency and reduction of carbon emissions and pollutants that serve as a criteria for cargo trucks with an agenda and intermediate goals.

- To establish a trajectory with reduction goals for 2026 and 2030 (for example, 20% reduction compared to 2018).
- Not to invest in technological options that lead to compromised emissions incompatible with the Paris Agreement has to be cautiously considered.

2. To develop an advanced logistics approach to reduce tons-kilometers in order to meet the demand for cargo transport, both in Costa Rica and in the Central American region.

3. To prepare financial and technological feasibility studies for the electrification of cargo transport through hydrogen vehicles in the short- and medium-term.

4. To implement pilot projects with alternative technologies.
To electrify and implement hydrogen technologies for the cargo transport.

5. To formalize a Central American dialogue to generate comparative analysis that allow to evaluate with data the competitive concerns that are expected in the Costa Rican sector if the lower environmental standards remain in the rest of Central America.

Avoid to "lock-in"

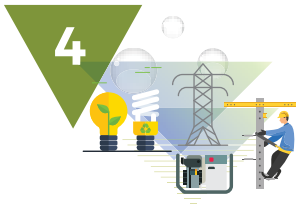
To avoid investments in fuels or alternative energy options without evaluating first their contributions to the emissions trajectories.

To identify other risks of technological or institutional "lock-in" as the sector evolves.

2031 – 2050

1. To implement a funding strategy for transformation adapted to scale.

2. To implement deployment actions, including regulations, incentives, information processes and consolidated financing under the assumption that zero-emissions technologies for recharge transport are viable at this stage.



Decarbonization axis 4:

Consolidation of the national electricity system with capacity, flexibility, intelligence and resilience, necessary to supply and manage renewable energy at a competitive cost

Transformation vision:

- *By 2025, an integrated intersectorial planning of the electrification process of the country's different uses is implemented.*
- *By 2030, the electricity matrix operates at 100% with renewable energy.*
- *By 2050, electric power will be the primary source of energy for the transport, residential, commercial and industrial sectors.*
- *By 2050, the institutional processes will be digitized and will facilitate efficiency and competitiveness.*

Activities to foster change:
2019- 2022

1. To promote the modernization of the electrical system to face the challenges coming from decarbonization, digitalization, and decentralization in the electricity production.

Period goals

- Maintain an electric matrix above 95% renewable that favors the transition towards the decarbonization of other sectors.
- At least 2 sectoral plans and/or electrification strategies (eg, transportation, industry) prepared and published.
- The installation and operation of 274,240 smart meters.
- Plan to improve the investment climate for the national electricity system.

Activities

4.1.1 To promote the diversification of the system with non-conventional renewable sources.

- To incorporate non-conventional renewable energies into the plans of generation expansion.
- To promote research on non-conventional renewable sources, as well as energy storage.
- To promote studies for the decarbonization of thermal energy support.

4.1.2 To promote the electrification processes of key sectors.
To link the electric sectoral planning with the sectoral planning of electric transport.

- To promote the generation and exchange of information and databases between the different actors of intersectoral planning.
- To estimate the demand projections between 2020 and 2050 under scenarios that include: energy management and storage technologies, electro-mobility, energy efficiency and other elements that affect demand.

4.1.3 To establish a national vision or strategy for the operation of smart grids.

- To promote processes associated with digitization and establishment of smart networks.
- To purchase and install smart meters.
- To realize related investments in smart grid components.
- To monitor and analyses database information that supply the meters.
- To develop the strategy of institutional process digitalization and

impulse for the consolidation of smart networks.

4.1.4 To design a plan for the improvement of climate investment that includes:

- To establish governance in energy matters: includes strengthening of the rectory, access to information.
- To analyze current electrical legislation.
- To analyze distributed generation.
- To analyze system risks.
- To review tariff structure.
- To re-adapt the financing models of the productive assets.
- To make visible the market of the auxiliary services of energy storage.

2. To promote energy efficiency.

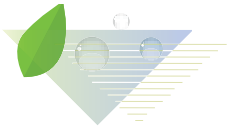
Period goals

- An updated Energy Efficiency Law and complementary regulatory framework.
- 20 macro public consumers have improved their energy efficiency.

Activities

4.2.1 To promote energy efficiency:

- To implement a more effective planning and coordination of energy efficiency.
- To facilitate access to more efficient equipment by institutions, consumers and entrepreneurs.
- To update the list of efficient energy equipment that can be exonerated.
- To promote a culture of energy efficiency among citizens.
- To stimulate energy efficiency in macro-consumers.
- To promote energy consumption efficiency in the public sector.
- To adjust tariffs for the promotion of energy efficiency.



To avoid "Lock-in"

Avoid short-term investment aimed at lowering user rates without firstly evaluating their impact on emissions during their lifespan (of direct and indirect investments).

2023 – 2030

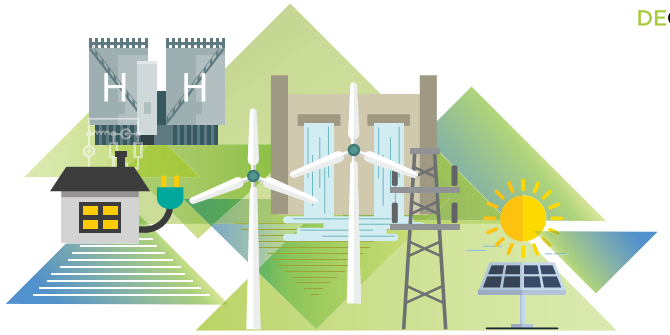
1. To implement strategies for the electrification and digitalization of the different sectors of the economy, including scenarios and routes of flexible investment.

2. To strengthen the renewable diversification program with a vision towards 2050, according to projected demand and costs.

3. To increase investments to expand the electro-mobility zero-emissions in the transport of commuters, cargo and light vehicles.

4. To realize investments in transmission and distribution that allow the development of different models of generation and demand management.

5. To implement financing strategies to consolidate the energy transition process.



To avoid " Lock-in"

To avoid investing in the short-term to lower user rates without evaluating their impact on emissions during their lifespan (of direct and indirect investments).

2031 – 2050

1. To implement strategies to consolidate the energy transition process.

2. To adjust investment plans that allow adaptations to technological disruptions.

3. To continue investing to meet electricity demand, maintaining a diversified and low -emissions renewable energy matrix.

4. To maintain technological vigilance and innovation, which allows the implementation of new low-emissions models.

Decarbonization axis 5:

Development of buildings of different uses (commercial, residential, institutional) under high efficiency standards and low-emission processes

Transformation vision:

- *By 2025, an increase of 10% in the use of wood, bamboo and other local materials in buildings.*
- *By 2030, 100% of the new buildings are designed and built adopting low-emission and resilience systems and technologies under bioclimatic parameters.*
- *By 2050, 50% of commercial, residential and institutional buildings operate under emission standards (high electrification or use of renewable energy in cooking processes and water heating).*

Activities to foster change:
2019 - 2022

1. To strengthen the regulations, standards and incentives for the effective implementation of sustainable construction practices in buildings and other infrastructures.

Period goals

- 20 new buildings applying environmental standards of a voluntary nature..

Activities

5.1.1 To create and improve the standards that promote low- emission sustainable construction practices, such as energy efficiency (e.g.: temperatures insulation, cooking systems, water heating, washing and/or drying with electrical technologies, solar thermal, air conditioning or other more efficient and less polluting), efficient use of water, low carbon footprint materials (e.g., cement and green concrete, wood and bamboo, reuse of materials), among other sustainable practices that reduce the impact on emissions in the design, construction and operation of buildings and other infrastructures.

- To generate regulations or promote the existing ones for certifications, both for the public and private sectors.
- To strengthen the guidelines for low-emission sustainable construction for public buildings and social housing through public biddings among other identified effective mechanisms.
- To evaluate the feasibility of establishing regulations for the adoption of sustainable low-emissions construction practices in different types of buildings, for example: affordable housing, commercial and residential buildings, among other buildings and infrastructure categories.

5.1.2 To identify incentive schemes to promote low-emission construction (green credits, subsidies review, acknowledgments, certifications, awards) to accelerate the adoption of these practices in private and public projects in accordance with the Sustainable Production and Consumption Policy, among other regulations.

5.1.3 To design a communication strategy that facilitates access to information and understanding about sustainable low-emissions construction.

2. To improve operating practices of existing buildings and other

infrastructure that significantly reduce their impact on GHG emissions.

Period goals

- At least 20 existing buildings implementing at least one action to reduce their GHG emissions in their operation.

Activities

5.2.1 To promote the implementation of energy efficiency practices in existing buildings.

- To promote the use of efficient, solar and refrigeration equipment and natural or low Global Warming Potential (GWP) air-conditioning systems (in accordance with the Kigali Amendment) in existing buildings.

5.2.2 To promote the implementation of recognition programs such as the National Carbon Neutral Program, and/or the Ecological Blue Flag Program (PBAE) in its categories: Sustainable Construction, Sustainable Homes, Communities and Neutral Climate Community.

- To support the implementation of the Technical Regulation of Energy Efficiency and Labeling for the Regulation of Refrigerators, Refrigerators-Freezers and Freezers.

5.2.3 To promote the implementation of bioclimatic design, the reuse of materials, low carbon footprint materials such as cements and green concrete, as well as local inputs (wood from national plantations and / or bamboo).

Avoid to "Lock-in"

To avoid using carbonized technologies, e.g., LPG in cooking and water heating systems.

2023 – 2030

1. To strengthen the management capacity for the implementation of standards-technical regulations and labeling in urban planning areas, new buildings, existing buildings, equipment and devices.

2. To establish fiscal and consumer financing elements (Energy Transition Fund) to give access to efficient technologies – just transition approach – to all segments of the population including the most vulnerable groups.

3. To apply scaling of projects and programs, aligned with the Public Procurement System:

- To raise awareness among users.
- To educate with a special emphasis on the suppliers of public institutions.
- To scale the implementation of recognition programs for organizations, companies and public institutions (Blue Flag, Carbon Country Program Neutrality 2.0, Institutional Environmental Management Plans (PGAIs), and National Program for Environmental and Energy Labeling).

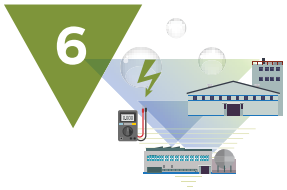
4. To promote the design and implementation of an MRV system for sustainable construction in both private and public projects and the establishment of an entity that centralizes the data derived from it.

- To design urbanism.
- To build new buildings.
- To remodel existing buildings.
- To purchase and monitor equipment and devices.
- To accelerate the adoption of standards in construction/buildings and technologies of the sector, since an inefficient building or obsolete technologies are a clear case of lock-in, similar to an air conditioning device lesser efficient than the more demanding standards.

2031 – 2050

1.The State Public Procurement System clearly notifies the market and operates under zero-emissions parameters.

2. To strengthen the fiscal elements of just transition and consumer finance to give access to efficient technologies to all, required to reach mass acceptance of all sustainable standards at least from 2040.



Decarbonization axis 6:

Transformation of the industrial sector through processes and technologies that use energy from renewable sources or others, sustainable and efficient, with low- and zero-emissions.

Transformation vision:

• By 2030, the sector will have innovative productive models of "cradle to cradle" or circular economy in the main productive chains of the agro-industry, services, construction, among others.

• By 2050, the industrial sector will have changed its energy sources to decouple its activity growth from its emissions.

Activities to foster change:
2019 – 2022

1. To promote the process of low-emissions technological transformation of the industrial sector

Period goals

- At least 2 roadmaps for emissions reduction (1 per type of industry) developed and published (e.g., Cement Sector).
- At least 1 implemented pilot project to replace natural refrigerants.
- An updated official list of exempted goods by the Article 38 of Law N ° 7447 on Regulation of the Rational Use of Energy.

Activities

6.1.1 To update and reactivate the industrial climate change strategy.

- To create a commission with the representation of the industrial sector and key public institutions to promote the strategy and Roadmaps.

6.1.2 To support the construction of Roadmaps for the reduction of emissions.

- To define specific GHG reduction targets by type of industry (based on science) in the roadmaps, which can be translated into a commitment of the sector to reduce its GHG emissions (Roadmaps with respective Voluntary Agreements).
- To characterize the different types of industry processes according to their energy requirements and to promote the replacement of the use of fossil energy by renewable electricity, bioenergy (generated from biomass or waste) and implement improvements in energy efficiency.

6.1.3 To promote energy efficiency in industrial processes:
(See linkage with line of action 4).

- To promote good practices in energy management (for example, ISO 50001).
- To update the official list of exempted goods in accordance to the article 38 of the Regulation of the Rational Use of Energy, Law No. 7447 of November 3rd, 1994 and its amendments in accordance with article 10 of the executive decree No. 41121 of April 5th, 2018, through the inclusion of new equipment and technologies.
- To develop technical regulations that ensure the energy efficiency of carbonized equipment.

6.1.4 To facilitate the substitution processes of refrigerants with low- or zero-GWP in accordance with the Montreal Protocol and the Kigali amendment.

- To align fiscal incentives (importation) to promote the use of

natural refrigerants and the equipment that uses them and discourage the use of refrigerants with high GWP.
- To support pilot projects.
- To develop regulations for the adequate disposal of refrigerants and associated equipment.

2. To promote the development and consumption of products and services under circular economy models.

Period goals
- 2 circular economy pilot projects in the industry implemented and documented.
- At least 3 products have an environmental label or seal based on the official scheme of the Government of Costa Rica.

Activities

6.2.1 To promote the production of sustainable goods and services that remove or reduce GHG emissions along the industry value chain.
- To support the design of circular economy models that promote waste valorization, the generation of new raw materials and are inserted in the industrial and agroindustrial value chains (e.g., the use of waste from the agro-food industry as raw material or energy source in industrial processes).
- To promote the use of the Life Cycle Assessment (LCA) and life cycle approach to determine the raw materials, inputs, processes or others that minimize the products GHG emissions.

6.2.2 To promote the consumption of products and services with smaller footprints and environmental impact.
- To standardize the definition of "green" products and services.
- To implement the National Environmental and Energetic Labeling Program for products with an LCA approach.
- To develop and implement a Carbon Neutrality scheme in products under the Neutrality Carbon Country Program.
- To improve the technical criteria used in sustainable public procurement to include the analysis of environmental labels recognized by the Costa Rican government.

Avoid to "lock-in"

To avoid the use of technologies that deepen the dependence on fossil fuels in the industry.

2023 – 2030

1. To implement long-term technological pathways, with significant replacement programs when it is necessary to reduce activities in a sector that can be replaced by another.

2. To consolidate mechanisms for technical assistance, technology transfer, and financing mechanisms to promote investments in innovations and best practices in the various industrial sub-sectors (with special emphasis on boiler issues).

3. To implement new efficiency programs for industrial equipment in the country.

4. To agree on a reporting and monitoring system with relevant authorities to supply the National Climate Change Metrics System (SINAMECC), among others.

Avoid to "lock-in":

By converting high quality energy sources as alternatives to fossil fuels, the analysis of energy balance has to be realized in the future to ensure that the industrial demand is within the available options, such as, for example, agricultural waste. The above throughout his lifespan of industrial investments.

2031 – 2050

1. To implement and update a finance strategy adapted to scale for the transformation of the industrial sector.

2. To implement and update investment pathways to ensure the modernization, transformation, and decarbonization of the sector.

3. During this period, very limited investment in fossil technologies will be carried out. This investment will be realized along with a greater disablement and/or replacement of old fossil equipment with renewable options. As a result, year after year, the reduction of the use of fossil fuels and emissions from the industrial sector will be significant.

Decarbonization axis 7

Development of an integrated system of maximum efficiency and low greenhouse gas emissions waste management based on the separation, reuse, revaluation and final disposal

Transformation vision:

- *By 2025, 10 municipalities implement the national composting strategy.*
- *By 2040, areas of high population density have a 100% coverage of sanitary sewer and wastewater treatment.*
- *By 2050, other priority areas have 100% coverage.*
- *By 2050, 100% of the territory present solutions for the collection, separation, reuse, and disposal of waste.*
- *By 2050, 20% of GMA's rivers have been restored.*

Activities to foster change:
2019- 2022

1. To present policies that promote the integral management of low-emission waste and circular economy

Period goals

- Launch of the National Composting Strategy
- Reach a volume of 3,800 tons of solid waste that are managed daily.
- Designed NAMA strategy to reduce emissions in the waste sector.

Activities

7.1.1 To design a mitigation strategy for emissions in the waste sector (NAMA). This strategy will consider aspects such as:

- The encouragement of the treatment of organic waste at household level.
- The encouragement of the treatment of organic waste at industrial scale.
- The promotion of the use of biodigestion as a treatment method for liquid and solid organic waste at large or multiple generators scale.
- To have a selective collection of non-recoverable and recoverable waste (organic and inorganic) at the municipal level through a tariff scheme that allows to offer this public service in an efficient way.
- To analyze the municipal tariff charged for the collection of solid waste and to identify improvements options to promote the improvement of the management.

7.1.2 To design technical and legal instruments to control the import, manufacture and marketing of products and materials that generate waste which are challenging to manage for the country, such as single-use plastics, or waste challenging to recycle, or with no valuation method.

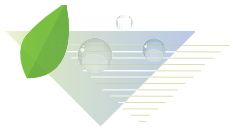
7.1.3 To review the technical and legal instruments that allow applying the principle of extended responsibility of the producer from the importation, manufacture and marketing of products and materials to strengthen its implementation.

7.1.4 To implement an environmental labeling system for the products and materials marketed in the country that allows consumers to

clearly identify if the product or material is recyclable or not; and in which category it should be recycled, using the color codes of the National Strategy for Separation, Recovery and Recovery of Waste. See linkage with the line of action 6.

7.1.5 To create the enabling conditions to enhance the use of biogas generated in mechanized sanitary landfills for generating electricity or as a fuel for mobile and fixed sources.

7.1.6 To promote productive linkages through public-private partnerships to strengthen the recycling value chain from its source.



Avoid to "lock-in":
To avoid the implementation of waste treatment systems that implies dependence on their generation instead of promoting the reduction of their generation.
To avoid obsolete technologies that delay compliance with the goals of this plan.

2. To strengthen the effective management of wastewater.

Period goals
The development of sanitary sewer projects in priority sectors: Palmares, Jacó, Golfito and Ciudad de Limón[15].

Activities
7.2.1 To strengthen the execution capacity and dialogue of the governing entities in the control and monitoring of the reports of water discharge without treatment or treatment plants and septic tanks malfunctioning through the existing regulatory instruments.

7.2.2 To strengthen the IT platform of the National System of Integrated Management of Water Resources (SINIGIRH) to collect data on the entities that generate wastewater.

7.2.3 To expand the coverage of sanitary sewer networks and treatment systems of ordinary residential wastewater in the country.

3. To create enabling conditions to improve the integral management of solid and liquid waste at both residential and business levels

Period goals
- At least 1 executed dissemination and awareness campaign about avoiding, reducing, separating and treating the waste.
- At least 3 capacity building processes for municipalities about integral waste management.
- At least 1 circular economy model pilot project promoting integral waste management implemented.

Activities
7.3.1 To massively launch dissemination and awareness campaigns on avoiding, reducing, separating and treating waste.

7.3.2 To strengthen metrics and access to information on waste management in open formats.
- To standardize methodologies for measuring and publishing data.
- To publish data on waste management in an accessible manner.

7.3.3 To strengthen the capacities of the municipalities about waste management.
- To design technical capacity building programs in low-emission waste management.
- To strengthen the monitoring commissions Municipal Waste Plan.
- To generate spaces to improve the intermunicipal articulation in waste management (transfer centers).

[15] Goal aligned with the National Development and Public Investment Plan (PNDIP)

- To strengthen the audit and report of the municipalities.
- To create a database of municipal actions to exchange best and mal-practices of waste management.
- To increase the involvement of the municipalities in the improvements of waste management as a measure to reduce emissions under the PPCN.

7.3.4 To generate spaces for a greater involvement of the private sector.

- To analyze the market of sellers and buyers of waste.
- To make visible the "winners" of the private sector in their work at municipal level.
- To determine the needs to promote the transformation of the sector and the search for circular economy models. See linkage with the line of action 6.

Avoid to "lock-in":

To avoid the implementation of waste treatment systems that generate dependence on their generation, instead of promoting the reduction of their generation.

To avoid obsolete technologies that delay compliance with the goals of this plan.

2023 – 2030

1. To implement Phase I of NAMA Waste.

2. To promote the implementation of Municipal Waste Management Plans and the creation of Recycling Programs in Municipalities through pilot projects.

- To determine the governance and institutional strengthening requirements necessary for the success of the plans, before financing and implementing them.

3. To improve the availability of data in the sector by improving data collection and supplying various Information Systems.

4. To promote pilot investments:

- To implement a Regional Recovery and Transfer Centers that facilitates the Integrated Waste Management (IWM) by type.
- To implement technologies for the capture of methane in landfills.
- To implement a pilot composting plants (e.g. compost using rotary drums and batteries, vermicompost).
- To modernize the recollection systems, optimize the routes and improve the recollection vehicles.

5. To evaluate and promote the use of economic instruments, linking sectors under a circular economy approach: Agriculture with Organic Agricultural Waste (OAWS); Residential and Commercial with non-organic waste revaluation.

6. To promote education and awareness campaigns about the generation and management of waste with an emphasis on the established linkages with other objectives (for example, to reduce plastics to protect the oceans).

To avoid "lock-in":

Not to increase waste management through landfill more than allowed by the national trajectories and goals.

2031 – 2050

1. To consolidate financing strategy to scale investments.

2. To significantly expand the use of more effective and consistent technologies with environmental parameters and zero-emissions trajectory.

Decarbonization axis 8:

Promotion of highly efficient agri-food systems that generate low-carbon export and local consumption goods

Transformation vision:

- *By 2030, the value chains for coffee, livestock, sugarcane, rice, and bananas use emission reduction technologies both at the farm and processing stage levels*[16].

- *By 2050, the most advanced methods and technologies are applied to achieve a sustainable, competitive, low-carbon, resilient agriculture with the lowest levels of contamination.*

Activities to foster change:

2019- 2022

1 To develop innovative processes in the value chain of priority products that facilitate the generation of decarbonized agricultural goods.

Period goals

- At least 2 new NAMAs processes will be initiated.
- At least 2 Board agreements present instructions to align programs and instruments to support the producers with decarbonization goals.

Activities:

8.1.1 To promote the decarbonization and vertical integration of the priority value chains.

- To develop and consolidate processes-programs of NAMAs[17] in priority products. Coffee: to consolidate the escalation stage, Banano-Musaceas: to boost the initial process, Sugarcane-rice: to initiate the processes.
- To promote the identification, transfer and adoption of technologies that reduce emissions and improve competitiveness at farm and processing levels.
- To promote actions that facilitate the commercialization of low-emission products (among others, to promote labeling and differentiation processes, promotional campaigns linked to the country brand).
- To promote circular economy processes that promote the valuation and reuse of agricultural organic waste, and other waste generated along the value chain. See linkages with the axes 7 and 8.

8.1.2 To align the current agro-environmental policies and plans with

[16] The prioritization of products is related to the agricultural sub sectors that generate the most emissions: livestock, coffee, sugar cane, bananas, rice. Other products could be incorporated if there is evidence of their impact on the generation of emissions within the agricultural sector..

[17] In the Costa Rican context NAMA is understood as a programmatic intervention that allows the identification of technologies for the reduction of emissions, it allows generating training at the level of key structures MAG, ICAFE, Chambers, and producers to promote adoption of technologies, encourages the development of MRV, and promotes vertical integration approaches to work equally with the commercialization processes. At the national level, the learning of the NAMA Café and the NAMA Livestock will facilitate the start-up of the proposed new NAMAs.

the decarbonization goals.

- To implement the Sectoral Agreement to Reduce Emissions in the Agricultural Sector[18]. The agreement includes:
  - To develop financial mechanisms aimed at the implementation of efficient low-carbon technologies.
  - To develop a system of recognition of the eco-benefits generated by the farms in their sustainable and climatically responsible production.
  - To consolidate the MRV system of the sector that supplies SINAMECC and GHG Inventory.
- To establish board agreements in relevant institutions (for example: Institute of Rural Development (INDER), Costa Rican Institute of Pacific Ports (INCOP), Banking System for Development, National Directorate of Community Development (DINADECO), among others) to align and allocate resources for the development of decarbonization projects.
- To align sub-sectoral policies and strategies with the decarbonization objectives (e.g., Policy / Strategy for coffee production, Musaceas, Caña, etc).

Avoid to "Lock-in":
To avoid extensive systems and crops that compete with forest and conservation areas.

2023 – 2030

1. To consolidate a national decarbonization strategy for the agricultural sector, that includes the axis 8 (agriculture) and axis 9 (livestock).

[18] The Agreement was signed in 2018 by both Ministers and has a term of 5 years. This agreement reflects the sectoral contribution to the national goal defined in the NDC. The agreement can be found at https://cambioclimatico.go.cr/acuerdo-reduccion-de-emisiones-sector-agropecuario/

2. To implement Escalation Phases of NAMAs.

3. To contribute to the transition from a low-emission agricultural sector into bioeconomy-based, among other aspects, on the direct use and sustainable transformation of biological resources, including biomass waste generated in agricultural and agro-industrial processes, under a circular economy focus.

2031 – 2050

1. To scale and transform for an agricultural system which is highly productive per production unit, low in carbon, resilient and that contributes to the Costa Rican bioeconomy.

Decarbonization axis 9:

Consolidation of a livestock model based on productive efficiency and reduction of greenhouse gases

Transformation vision:

- *By 2025, a circular economy is promoted in livestock farms through the implementation of a biodigester program.*
- *By 2030, 70% of the cattle herd and 60% of the areas dedicated to livestock implement low-carbon technologies.*
- *By 2050, livestock activity uses the most advanced technology according to the standards of sustainability, competitiveness, low-emissions and resilience to the impacts of climate change.*

Activities to foster change:
2019- 2022

1. To encourage the livestock sector to contribute to the decarbonization using efficient practices and carbon capture in farms, the protection of ecosystem services and the generation of resilience.

Period goals

- 1 guideline for the Low-Carbon Livestock Strategy generated.
- 1773 livestock farms implementing NAMA technologies.
- 1 mechanism to provide technical support to the farms.
- 1 education campaign on organic agricultural waste for producers and technicians.
- 1 pilot project on the use of organic agricultural waste in the industrial sector and Small and Medium Enterprise (SMEs) in the food sector.

Activities

9.1.1 To consolidate the Low Carbon Livestock Strategy (EGBC) as the policy to decarbonize the sector.

- To generate a guideline that consolidates the EGBC as the governing policy of the livestock sector.

9.1.2 To promote an eco-competitive livestock approach by scaling up the NAMA Livestock, the implementation of efficient technologies, and technical support, among others.

- To implement the first scaling of the NAMA Livestock.
- To promote activities along the value chain that promote the implementation of efficient technology.
- To strengthen capacity building, extension work and technology transfer.
- To increase the biodiversity of the farms.
- To develop a second-generation PES Environmental Services Payments model that recognizes the service coming from good land management in farms.
- To design and implement a mechanism to provide technical support to livestock farms, this mechanism must actively integrate information technologies.

9.1.3 To develop and scale-up the meat and milk value chains with a circular economy approach for the generation of biomass from Organic Agricultural Waste (OWA).

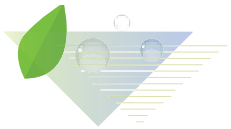
- To introduce experiences in the use of OWAs in the livestock

sector (in particular, excreta and slurry in the production of biogas and fertilizers).
- To implement pilot plans for the use of OWAs for the industrial sector (meat and dairy industry) and SMEs in the food sector.

2. To design and improve the metric system associated with the livestock production units

Period goals
- A roadmap designed to consolidate national research on emission factors.
- 1700 farms implementing MRV.

Activities
9.2.1 To enhance the calculation of the reduction generated with the measures and technologies of emission mitigation and to develop national emission factors.
- To promote the realization of the necessary studies to develop national emission factors for the livestock sector.
- To consolidate the MRV system of the subsector and supply the SINAMECC and the GHG Inventory, among other reports.
- To implement the MRV system in the first escalation of the NAMA Livestock.



Avoid to "Lock-in":
- To prevent extensive livestock farming from competing with areas for forest and conservation.
- To avoid feeding systems based on grains importation, which may increase the carbon footprint.

2023 – 2030

1. To consolidate a sectorial pathway aligned with the objectives of the NDC and the Paris Agreement.

- To evaluate the actions and goals established by the sector in the Sectoral Agreement for the Reduction of Emissions in the Agricultural Sector considering the goal of decarbonization of the sector set in the NDC to 2030 and 2050 and in the context of the Paris Agreement.
To reduce the contribution to 30-45 kg CO2eq per unit of the Agricultural GDP (AGDP).
To establish a level of ambition in agreement with the national goals and the Paris Agreement.
To propose a broad scaling strategy is crucial because it is valid for 5 years (2018-2023).
- To evaluate the "NAMA Cattle Livestock" model as a mitigation instrument (for example, financing model, cost of climate technologies and governance).

2. Based on the evaluation, to review and update the Strategy for Low-Carbon Livestock in Costa Rica (2015-2034).

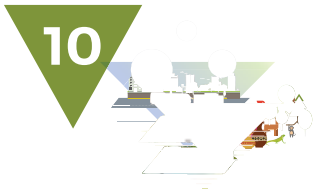
3. To start a second scaling to initially benefit 10,000 additional farms, eventually covering around 33% of the livestock farms. This goal could be adjusted once the analysis of the level of ambition and trajectory of the sector has been carried out in order to comply with the decarbonization goals of the NDC and the Paris Agreement.

4. To examine the technological options of food management and methanogenesis reduction and the handling of excreta and waters to not invest in options incompatible with decarbonization goals.

2031 – 2050

1. To implement a finance strategy at an adapted scale.

2. To scale up the transformation projects to consolidate an eco-competitive, densified, low carbon livestock, free of deforestation in the entire national territory.



Decarbonization axis 10

The management of the rural, urban and coastal territory will be oriented towards conservation and sustainable use, growing forestry resources and ecosystem services based on nature-based solutions

Transformation vision:

• *By 2030, the current forest cover is maintained, and new areas are restored to increase the cover to 60%, without competing with the agricultural sector.*

• *By 2050, 4,500 hectares of green areas operate as recreational parks in the GMA, and a system of environmental-pedestrian networks that acts as biological corridors and pedestrian corridors is consolidated.*

• *By 2050, the rural and coastal landscape allows the restoration and protection of other high carbon ecosystems (Mangroves, wetlands, peatlands, soils).*

Activities to foster change:
2019- 2022

1. To implement the REDD+ Strategy to encourage the reduction of emissions from deforestation, to avoid degradation, and to preserve forests and ecosystems in both rural and urban areas.

Period goals

- REDD+ strategy completed and financing initiated.
- At least 3 kilometers of restored urban corridors.
- Payment for Ecosystem Service System PES 2.0.
- SIMOCUTE 1.0 in operation and integrated with SINAMECC and SINIA.

Activities

10.1.1. To promote the growth of forest cover and the restoration of ecosystems.

- To turn green and regenerate urban space (example increase of recreational parks, interurban corridors, river corridors).
- To implement tree planting productive systems (fences, agroforestry systems, marine-coastal zones in strategies and restoration actions).
- To stop deforestation.
- To strengthen the conservation of ecosystems inside and outside the protected areas.
- To regenerate degraded lands through forest restoration and reforestation.
- To accelerate actions to address forest fires.
- To promote a landscape management with a restoration approach in rural, coastal and urban areas.
- To design and launch new generation of Payments for Ecosystem Services PES to PES 2.0.
- To align the sale strategy of forest emission reduction consistent with the NDC and Decarbonization Plan.

10.1.2. To establish a sustainable management of forestry resources.

- To promote the consumption of national wood from plantations and agroforestry systems (See linkages with the line of action 5).
- To open a space of dialogue to discuss the issue of exploitation of secondary forests.
- To consolidate the Forest Monitoring system and ecosystems.
- To establish a system of custody chain and traceability of wood.

- To improve data on emissions reduction accounting for m3 of wood consumed in the national territory.

2. To promote the protection, restoration and management of other high carbon ecosystems.

Period goals

- At least 2 pilot projects in management and protection of wetlands and mangroves implemented.
- Analysis of other high carbon ecosystems realized.

Activity

10.2.1 To strengthen carbon capture in other high carbon ecosystems

- To consolidate the program of wetland and mangrove protection and management.
- To analyze strategies options associated with blue carbon.
- To promote information gathering (mapping, status, etc.) of other high carbon ecosystems (peat bogs, etc).
- To promote soil management and restoration processes.

Avoid to " Lock-in":

To avoid investments that encourages an expansive urban model and destruction of forest areas.

To avoid expansive investments (real estate, agricultural activities) that lead to the destruction of forest areas, mangroves, wetlands.

2023 – 2030

1. To implement the REDD + Strategy Scaling Phase.

2. To consolidate the synergies between the strategies of the three conventions (climate change, biodiversity, soil degradation). To implement projects focused on the three conventions.

3. To implement Urban Landscape Project with Environmental, Pedestrian and Cycling Networks.

4. To encourage the involvement of Municipalities in the landscape management processes of the biological and river corridors.

2031 – 2050

5. To develop a financing strategy at scale.

6. To deploy projects adapted to scale.

Section 6:
Institutional requirements and involvement for transformation

The implementation of actions fostering change, such as those described in the previous section, not only requires visionary public policies (based on data and with appropriate finance) but also a management capacity that lives up to the leadership the country needs to achieve decarbonization. Undoubtedly, Costa Rica has institutions that have achieved great milestones - in issues like education, health and trade. However, the country must also modernize and modify its institutional and regulatory structure to adjust it to the proposed change.

This aspect is consistent with the pressing reform aimed at modernizing public management of the Costa Rican State. Without adequate public management, an execution of the decarbonization agenda will be challenging. Currently, many ministries and autonomous entities seem to lack the efficient mechanisms required to respond to society's expectations. The best-known example is the shortcomings that have accumulated over the years in the transport sector, which is characterized by being disjointed, unsustainable and inefficient. This has to invite reflection on the imperative changes necessary to advance the modernization of the country and the decarbonization of the economy.

Given the previous statement, planning this decarbonization requires a need to identify actions that foster change aimed at achieving decarbonization and complemented by (a) institutional requirements, (b) cross-cutting measures and (c) considerations on impact management. These are discussed below.

Institutional requirements for transformation

One of the fundamental institutional questions, given the transformational nature of decarbonization and the inclusion of actions within all sectors, is: who is responsible for the decarbonization of the economy? Is it the responsibility of the President or a particular minister? Should there be a high-level commission that would take charge of the decisions and monitor progress?

There is no universal model and each country should decide based on its governance model. In the case of Costa Rica, the governance and monitoring of progress requires an institutional innovation that goes beyond the environmental and/or climate sector. For example, given the high dependence on oil and the urgent need to transform the existing transportation model, there is a crucial need to design a model that directly involves the economic sector. Simultaneously, to create an architecture guided by the spirit of the aforementioned presidential message will be necessary to facilitate the country's transformation into one of the first decarbonized countries in the world. As such, the team in charge of the agenda must insist on the debate of how to gestate the changes; to get out of the inertia of traditional debates (reiterated in the paralysis and inability to generate a certain change or reform, or to contravene the procedure of institutional use). Indeed, the purpose of the instructional requirements for transformation, answers the question of what model of government management is required in order for carbonization to be reversed?

In this context, an identification of the need to design institutional governance options at the level of the required structural change is relevant. Some changes that are proposed will require laws adjustments that will take time. Hence, while they are developed, an initial or transitory proposal of articulation is required to further promote the Decarbonization Agenda, and this would include the following structures:

• A "Government Center" team will operate from the Presidency to facilitate the implementation of the Plan. This group will be composed of political authorities and their appointed technical teams and will have representation from the Presidency, MIDEPLAN, Finance and MINAE.

• To facilitate the implementation of the first policy package (2019-2022) of the plan, the coordination will be carried out in two ways:

• With MIDEPLAN and the Treasury, to review, align and prioritize public investment processes will be carried out.

• With the Strategic Areas of Presidential Coordination, the creation of work teams responsible for promoting the implementation of key actions for the period 2018-2022 will be boosted. The teams must then coordinate from the strategic areas of presidential articulation.

Table 5: Presidential Articulation - Decarbonization Axis - Cross-cutting Strategies

Strategic Area of Presidential Articulation	Plan Decarbonization Axis	Cross-cutting Strategy
Innovation and Competitiveness: Its objective is to offer and coordinate policies that promote innovation as a means to revitalize the national productivity and the generation of quality employment at the central, regional and international levels, as well as knowledge transfer.	4: Renewable electricity at competitive cost 5: Sustainable Construction 6: Low Emissions Industry	• Knowledge-based digitization • Investment Attraction Strategy
Infrastructure, Mobility, and Territorial Planning: aims to generate the necessary conditions of urban planning, territorial ordering, infrastructure and mobility to achieve resilient, sustainable and inclusive urban and rural spaces .	1: Mobility and sustainable public transport 2: Zero-emissions light transport 3: Freight Transport and Sustainable Logistics. Linked to line of action 10	• Information and Transparency, and open data
Human Security: aims to devise and develop policies and strategies that allow for conditions that favor human development and the construction and preservation of protective environments..		• Inclusion, Human rights and equality
Health and Social Security: aims to establish a comprehensive strategy for the prevention and care of the people's health, as well as for the consolidation of an equitable and sustainable social security system.	7: Integral Waste Management	• Just Transition
Education for Sustainable Development and Coexistence: aims to establish articulation strategies that promote the development of capacities for an effective coexistence in society and incorporation into the market labor, as well as to allow a preparatory stance in facing the challenges of the fourth industrial revolution.		• Education and Culture for the Bicentennial
Economic for Stability and Inclusive Growth: Its objective is to define, coordinate and monitor macroeconomic policies for economic stability, the promotion of production, public investment and the reduction of inequality.		• Green Tax Reform • Financing for transformation
Territorial Development: aims to articulate, coordinate and monitor projects that generate inclusive growth and sources of employment, based on the particularities of each territory	8: Agriculture Low in emissions 9: Eco-competitive Livestock 10: Territory management with solutions based on nature	
Reform Commission of the State		• Integral Institutional Reform

- To monitor the Plan, an agenda and a tracking and monitoring mechanism will be designed by the Government Center team. The technical proposal for tracking and monitoring will be designed by the Climate Change Directorate, together with a MIDEPLAN team. The Government Center team will endorse it and will issue instructions for its initial implementation.

- The monitoring and coordination process will be reinforced with a multi-sectorial and multi-dimensional coordination from the Presidential Environmental Council, and this would be in collaboration with the other structures of the so-called climate change system which is comprised of: the Climate Change Coordination of the Environmental Sector Council, the Climate Change Directorate, the Interministerial Technical Committee, the Citizen Advisory Council on Climate Change (5C), and the Scientific Council on Climate Change (4C).

Eight cross-cutting strategies to promote change

In addition to the governance model for decarbonization that will execute the plans and lead in this field, cross-cutting tasks are required in at least eight areas:

A. Comprehensive reform for the new Institutionality of the Bicentennial

The country needs to develop the project of institutional reform in order to endow the country with a modern, digitized, flexible institutionality with the capacity to manage the disruptive changes that the new economy entails. The changes must be seen in an integral way and include institutions of the central level, along with autonomous institutions, and municipalities. The new institutional framework must base its actions on results (to guarantee natural capital) and not on processes, have an adaptive capacity, and a culture of service to citizens. It requires the use of technological tools, the internet of things, open data, and a capacity for multi-sectoral and multi-dimensional articulation. The priority reforms proposed are as follows:

- *The modernization of RECOPE:* The institution must make use of the transition to modernize and to contribute to the country's energy independence in the context of a deep decarbonization of the economy. The impacts of decarbonization on the fuel market – on the short-, medium- and long-term - have to be evaluated to better identify the opportunities for the transition of RECOPE to an energy system without emissions. Research and development (R&D), the supply of new services related to zero-emissions fuels, as well as the requirements of the workforce to drive these changes have to be further explored. This may include an analysis of the advantages and disadvantages of the use of biofuels and an analysis of the use of hydrogen in different applications. As it is a state company, law reforms and specific work strategies have to be promoted with the institution.

- *New institutional framework for sustainable mobility*: Given the importance of shifting the city model and the inclusion of new paradigms, such as a public transport-oriented development, the redesigning of the institutional framework associated with public transport and urban planning is necessary. It aims to have the capacity to integrate and manage urban planning, development, and transportation planning processes. Governance options have to be evaluated based on examples and international best practices, and their advantages and disadvantages in the Costa Rican context have to be taken into consideration. Of the options to be explored, there includes the creation of an Urban Transport Authority, amongst others, to better consolidate the processes of transport-oriented development.

For these processes, macro aspects will be analyzed within the

framework of the Committee of Notables and will be coordinated with RECOPE, MOPT, the Public Transport Council (CTP) and others, and they will be involved according to the specific proposals to be promoted.

B. Green Tax Reform

It will be necessary to disengage the revenues of the State from gasoline sales before boosting the massive electrification of the light-vehicle fleet. New revenue sources should be identified to replace gasoline and automobile sales, and this should be done with a focus on taxing negative externalities, such as air pollution. This reform would be of great importance as a first step in starting the process of setting a carbon price in Costa Rica. The implementation of a carbon price will be an important driver in this transition, as it will create an (increasing) price signal , with an effect that will impact multiple sectors. The price may start with the green tax reform and the debate on the economic valuation of negative externalities, such as pollution. The process must respond to an integral analysis of the country tax structure and define actions that allow coherency to the public policy packages of decarbonization, taking into account the distributive costs of the various measures. The priority actions are:

- A comprehensive analysis of the tax system and tax charges towards consolidating a process of alignment of incentives and taxes with decarbonization objectives.
- The implementation of carbon pricing schemes, such as the Emissions Levy, to mobile and fixed sources.
- The consolidation process of the elimination of fossil fuel subsidies

The institution in charge of leading this strategy is the Ministry of Finance (with collaborations from MINAE).

C. Funding Strategy and Investment Attraction for transformation

Promoting the transition process will require public and private investments, for which the design of financing strategies that include "financial engineering" models, promotion of public-private partnerships to support the portfolio of priority actions, projects, and change catalysts will be carried out. On the one hand, it will be key to align international cooperation with public investment efforts and the mobilization of private funds. Furthermore, the prospect of the international cooperation promoting soft actions for the generation of capacities, build enabling environments and implementing pilot projects is considered; this must subsequently be scaled according to public and private international and national financing programs. The actions include integrated strategies to access climate facilities financing (among other the Green Climate Fund (GCF), the Global Environment Fund (GEF), the Adaptation Fund, and work with binational and multilateral cooperators, investment funds, and financial systems. Likewise, work will be carried out on the design of strategies that will attract direct foreign investment to engage companies that promote linkages and a consolidation of ecosystems innovation in key areas, such as electric mobility, digitalization, data centers, smart cities, circular economy and climate-smart agriculture.

Work with the national and international financial sector under innovative approaches to promote the investments attraction will be carried out, and the creation of conditions that favor investment in key areas will be addressed, and these would be consistent with the vision of the Plan. As part of the priority actions, the following stand out:

- To consolidate the Portfolio of Priority Investments for the NDC.
- To design an Investment Attraction Plan aligned with the vision of transforming the country into a Laboratory for Decarbonization and Resilience.
- To design tools aimed at facilitating the alignment and prioritization of the public investment system with key projects.

- To consolidate a structure to access Climate Financing or National Designated Authority based on the Public Investment System of the country (Ministry of Finance, MIDEPLAN, Central Bank, MINAE).
- To analyze the feasibility of establishing funds or innovative financial schemes which consider the limited ceiling of fiscal indebted-ness. Some of the requirements identified include: Energy Transition Fund, Key Infrastructure Fund for Decarbonization, Nature Based Solutions Fund.

For this process, international cooperation issues will be articulated with MIDEPLAN and the Foreign Ministry, the Foreign Direct Investment (FDI) issues with the Ministry of Foreign Trade of Costa Rica (COMEX), the Investment Promotion Agency of Costa Rica (CINDE) and National Promoter of Trade (PROCOMER), the public investment issues with the Treasury, MIDEPLAN; and the Central Bank for the processes associated with international cooperation and indebted-ness.

D. Digitalization and Knowledge-based Economy Strategy

The country must progress within a strategy that allows the accumulation, processing, and analysis of data to allow it to have competitive conditions in the new context of a knowledge-based economy. Hence, the country must improve in digital connectivity processes, in the development of tools for analysis and use of digital data, and in the availability of data centers infrastructure, fiber optics, submarine cables, and interconnection with the region. The country has excellent conditions in which to establish a "cluster" of data centers and operate as a regional hub. These conditions will allow the country to take advantage of new trends in the sectors that are committed towards the consumption of renewable energy and the establishing of smaller data centers that are closer to the demand points. The digitization processes, together with the provision of data center services and the internet of things, will allow a consolidation of smart city systems and teleworking schemes, along with improve productive and commercial processes efficiency. The priority actions are:

- To design and implement a digitalization strategy for institutional processes.
- To consolidate a "cluster" of data centers that promotes regional development outside the GMA.
- To consolidate a data center that supports the government cloud as part of the anchor project.
- To develop an Investment Attraction Strategy by data centers.
- To support and promote the establishment of smart cities.

The Institution in charge of leading the strategy will be the Ministry of Science, Technology and Telecommunications (MICITT) with the support of the Costa Rican Electricity Institute (ICE) Group, MINAE, CINDE and PROCOMER.

E. Labor strategies of "just transition"

The decarbonization of the economy will impact on the productive sectors and the labor markets associated with them. Costa Rica has, for the Bicentennial, been an imperative of "just transition" that goes beyond the dimension of decarbonization because the country is part of a transformation - and disruption – that is broader than many of those summarized under the concept of "Fourth Industrial Revolution", which are derived from the transition to the digital economy. Therefore, the political viability of these major transitions will be associated with the process of adapting to the opportunities and challenges that will arise in the labor market (ranging from the automation of a port to the transition to an economy of services that is digitized) must be recognized. To identify the international best practices of just transition processes, evaluating their applicability in the Costa Rican context is necessary.

Relevant plans to the sectors that are exposed to the greatest impacts will be elaborated. A funding strategy must be included, since

intervention and communication strategies must be designed to cater for the sectors that are directly affected.
The institution in charge of leading this strategy is the Ministry of Labor (with the collaboration of MINAE, MIDEPLAN and with research support from the Central Bank regarding labor impacts on a macro level).

F. Inclusion, human rights and promotion of gender equality

The transformation processes will be carried out under integral strategic considerations with a focus on human rights and gender equality, thereby guaranteeing a respect for diversity and the promotion of inclusion. On the one hand, the decarbonization of the economy will generate opportunities and challenges that will potentially affect the most vulnerable groups differently, and for this reason, national policies, programs and projects with differentiated approaches and disaggregated indicators should be designed to measure the participation and the impact on these groups. Likewise, women, youth, indigenous peoples and other groups can play a key role as change actors in specific processes linked to energy transformation and independence, the rescue of cities and sustainable mobility approaches, models and technologies for the management of natural heritage (solutions based on nature). The country must continue its leadership in this area and promote the incorporation of human rights and gender approach in multilateral processes, particularly in environmental conventions (Climate Change, Biodiversity, and Desertification) and should articulate novel national processes that operationalize these approaches, thus strengthening structures, such as those of the Citizen Advisory Council on Climate Change 5C, where there is representation of several of these groups. The immediate actions are:

- To promote representativeness and gender parity in the current governance structures of the climate change system.
- To include the National Women's Institute (INAMU) in the inter-institutional governance structures of the climate system.
- To launch an international strategy to promote the issue of human rights and gender in the international agenda.
- To consolidate processes for the formulation of new climate policies with a focus on human rights and gender.

G. Transparency, metrics and open data strategy

To measure the decarbonization of the country, the National Metrics of Climate Change System (SINAMECC) has to be consolidated as a sub-module of the National Environmental Information System (SINIA). This system has to be robust, efficient and flexible, along with facilitating an access to information for citizens, businessmen, municipalities and various public institutions. The SINAMECC must continue to formulate indicators of the transformational processes, since emissions are already a delayed indicator or "lagging indicator"; and progress needs to be monitored in order to rectify actions before it is too late(other methods could include the import of oil barrels and vehicle fleet growth, given the direct impact that it has on carbon emissions). The digital revolution must rise along with a socialization strategy of the metric in order to serve as a useful management tool, rather than as a downloadable document to indicate how last year's emissions fared. Excellent information precedents exist in the Central Bank and the Costa Rican Electricity Institute, and this can serve as a quality standard to supply open and updated data on the performance of the decarbonization agenda. Important steps have already been taken in that direction.

The institution in charge of leading this strategy is MINAE (with the collaboration of the Climate Change Directorate, Secretariat of Planning of the Energy Subsector, ICE, RECOPE, MAG, MIDEPLAN).

H. Education and Culture Strategy: a Bicentennial Costa Rica free of fossil fuels

President Alvarado made a cultural call in his inaugural speech by

stating that *"we have the titanic and beautiful task of abolishing the use of fossil fuels in our economy to create a pathway for the use of clean and renewable energies. Decarbonization is the great task of our generation, and Costa Rica must be among the first countries in the world to achieve it, if not the first"*. While this goal requires a decarbonization strategy that is armed with concrete sectorial actions, it also requires educational campaigns which ascribes to the best international practices for consumers and users in order to promote acceptance in the value proposal of technologies and modalities. Inspiring approaches can be explored to make schools and colleges a part of this transition (for example, in science and civics). At the same time, linking elements of decarbonization in the communication strategy of the "Costa Rica Bicentennial" can also be considered. In practice, a partnership between the State and civil society to inform cultural and educational initiatives is possible.

The institution in charge of leading this strategy is the Ministry of Public Education (with the collaboration of the Ministry of Culture, MINAE and MICITT).

Box 9

Indicative examples of links between the 10 decarbonization lines of action and the 8 transversal strategies

The "Costa Rica 2050 Plan" that MIDEPLAN is heading will deepen the links that exist between the decarbonization lines of action and the 8 transversal strategies. Some linkages are very visible and will call for the coordination between key institutions of various lines of action and transversal strategies. For example, the increase in electricity demand that will result from the electrification of buses, a possible electric train and a zero-emissions vehicle fleet (line of action 2) and the actions of line 4, which focuses on strengthening the electrical system - and the creation of a recharge infrastructure. In other cases, the integration task will be more complex.

Simultaneously, a delineation of the times and impetus level of the transversal strategies found within the transformation periods that are associated with the 10 lines of action is necessary. The creation of a tax associated with carbon emissions will depend on the green tax reform. Once created, it will result in a possible source of financing for the lines of action. For example, it could be a motor for change that is offered in the industry and stimulate investments so that the productive sector makes investments in zero- and/or low emissions technologies.

With regard to the transport line of action (1, 2, 3), strong links can be created with the transversal educational and cultural strategy as an educational campaign for students that would allow the uniting of clean transportation issues with the aspiration of the Costa Rica Bicentennial, as mentioned by the President in his inaugural speech. I.e. being free of fossil fuels.

Analysis of impacts

Managing the impacts of the transition is crucial for the practical success of the economy decarbonization strategy. The vision of the Administration Alvarado Quesada contains a strong call for Costa Rica to make a successful transition to the so-called "Fourth Industrial Revolution" - and the decarbonization that it entails - which must be socially fair. A first step toward the "transition management" would be to identify the main impacts. For instance, on the labor market level and at province level, the identification of these impacts should take into account the recognition that they can show differently in the urban and rural economy. To do so, the National Decarbonization Plan must be complemented with several detailed impact analyses. These analyses include at least two types of questions:

Analysis of the costs and benefits associated with the main decarbonization measures

At the international level, there is a growing effort to quantify the health benefits that are derived from decarbonization policies. For example, the International Energy Agency has calculated that with a 7% increase in the investment required to achieve clean air policies by 2040, 3 million people can be saved from premature death. In the US alone, 175,000 people will be saved from dying prematurely by 2030 if their country implements climate policies with an emphasis on renewable energy.

This type of quantification is vital in addressing the bias found in public debates that tends to focus narrowly on a single piece of data: the incremental cost of clean technology (for example, the higher price of an electric bus versus a diesel one). To overcome this bias, it is important to count on the quantification of the economic benefits that come from reducing oil consumption or the diseases associated with polluted air. The UN Environment estimates that if all buses and taxis in San José were made to run on electricity by 2030, 406 deaths associated with poor air quality would be avoided, $436 million would not be spent on international fuel purchases and the equivalent of 4 million tons of carbon would not be emitted [19].

In Costa Rica, this type of quantification has begun. For example, PIMUS, a project of the IDB

[19] MOVE, "E-Mobility Assessments" ¿Te imaginas tu Ciudad con Transporte Público 100% Eléctrico?: San José" http://movelatam.org/wp-content/uploads/2017/11/MOVE_28.11.2017_eMobility-City-Assessments_CRC_SANJOSE.pdf Julio 30, 2018.

and the Government of Costa Rica, established a cost of the negative externalities associated with the transport model of the GMA - inefficient, uncoordinated and polluting - for the country. It was estimated at $ 2,864 million per year: $ 17 million for greenhouse gas emissions, $ 177 million for poor air quality, $ 112 million for noise, $ 1,864 million for accidents and accidents and, $ 691 million for congestion. To change the current transport system, an approximate investment of $ 3,500 million is required. If the PIMUS is applied, it is calculated that 70% of the negative impacts would be reduced by 2035. This type of quantification is necessary to show that it is not only a "cost" for the country but that the investment could be recovered in two years of PIMUS application if the negative externalities suffered by the population are accounted for, such as the damages to their health and the economy, due to accidents, pollution and congestion.

Analysis of the impact of decarbonization in the labor market

A decarbonized economy creates jobs. The International Work Organization (IWO) estimates that the renewable energy sector will create 64 million jobs worldwide. However, other jobs will inadvertently disappear. Therefore, methodologies have been defined in order to determine the net impact on the labor market.

In Costa Rica, this type of analysis has to be carried out by sector and for the entire economy. For example, methodologies could be applied to evaluate the impact of the transport decarbonization on the labor market in order to find out the net effect on both the transportation and fossil fuels associated when making the transition from internal combustion engines to electric motors.

[20] See *"Repostando hacia el Futuro: Como Propulsar la Economía Dejando Atrás el Carbono"* (2018) por ECODES, Transport & The Environment and Cambridge Econometrics.

In Spain, an analysis of the economic impact of the electrification of all transport by 2030 has been completed in 2018, and it determined the expected net gain of jobs (quantifying both the jobs created, and the jobs removed) . For example, the study showed that the transition could create up to 23,185 net jobs while reducing CO2 emissions by 28% in 2030, along with reducing emissions of pollutants, such as nitrogen oxides particles, by up to 92% and 89%, respectively. The efficiency improvement and the use of zero-emissions vehicles will also reduce CO2 emissions, as well as generate an estimated GDP benefit increase of 3.191 million euros. By importing less oil, less capital leaves the country, reducing these incurred costs on capital by € 4,583 million. This type of analysis should be carried out in the Decarbonization Plan of Costa Rica, and should make use of the methodologies that are already used internationally.

Analysis of the best practices that emerge in the context of a "just transition" towards the fourth revolution and zero-emissions economy

At an international level, the IWO has initiated a dialogue with other institutions to create guidelines that not only identify the creation of "green jobs" but also guide just transition processes in the context of a transition to a green economy. The international debate points to the importance of creating transition and adaptation strategies for businesses, communities and workers that are affected by the changes made towards new technological paradigms.

Some international experiences have suggested the need for early lessons. For example, transitions lessons to avoid adverse impacts at work have been gleaned from coal and industrial transformations: anticipation of the process (not denying it), developing local economic resilience, investing in human capital, and coordinating with local affected parties.

The "Just Transition Center", which was created in 2017, focuses on

decent jobs and climate protection to help its affiliates with just transition policies. For example, the Netherlands unions agreed to a strategy to phase out coal plants if accompanied with a process was designed to identify and finance retraining needs.

Section 7:
Conclusions: Five priority actions

Successful decarbonization requires the establishing of a pragmatic agenda and priorities. Short-, medium- and long-term actions are required in the 10 decarbonization axes along with the 8 cross-cutting strategies with strong institutional arrangements. A frequent question among decision makers between 2018-2022 would thus be: what are the 5 priority actions starting this month?

Given the presidential mandate to place Costa Rica in a leadership role, it is essential to prioritize two sectors that contribute the most to carbonization of the Costa Rican economy – the transport and agricultural sectors - through an implementation of actions that could generate benefits for citizenship and the productive sector:

1. **1. To set off the transformation of public transport with an emphasis on creating route systems adjusted to present and future demand and these would provide rapid and direct routes to users within a modern urban model.** The most concrete step of this investment in public transport would be bus electrification, which will improve air quality and reduce greenhouse gases emissions.

2. **To accelerate and scale the actions in the agricultural sector activities that produce the most emissions -** in particular, implement mitigation actions in coffee and livestock (known as "NAMAS") - without losing sight of the need to identify or to develop additional options of decarbonization in these sectors – thereby ensuring that Costa Rican agriculture is one of the most sustainable in the world, and allowing for its differentiation and commercial benefits.

The foundation must be laid for the electrification of the economy - not only in transportation but also in the industrial sector.

3. **The energy policy** will have to establish guidelines so that electricity supply planning can consider both new technological supply options and the transformations of the medium- and long-term demand. In the short-term, the premise must be that the public electricity supply service is competitive with regards to energy alternatives with a greater carbon component. For this purpose, the tariff policy of the different energy sources has to be reviewed; and the distortions that are against the decarbonization process, as well as the inefficiencies of the electrical development that affect its competitiveness, have to be rectified.

4. **To avoid technological pathways in energy and transport that present limited opportunities to partially reduce emissions and are not aimed at a transition of "zero-emissions".** These may postpone or hinder the change to clean technologies which are in line with the goal of decarbonization. The period is too short to invest in "bridge" technologies as they result in committed emissions and will divert investment capital from being aligned with the decarbonization goal.

Given that the decarbonization agenda is part of a wider green economy agenda, it is vital to start the process of two cross-cutting reforms in 2019, without which the decarbonization of the Costa Rican economy will not be viable:

5. **The first is the environmental institutional reform, which starts with the reform of RECOPE and the institutional**

framework to promote sustainable mobility approaches to lay the foundations of a deep decarbonization process. The second is the green tax reform aimed at promoting the actions of sustainable development and green growth. The latter is vital in a Costa Rican context, particularly as a new 21st century fiscal model is debated. In the reform, tax collection would increase based on pollution and other negative externalities, and fiscal benefits would be offered to activities that contribute to decarbonization and green economy.

The task that Costa Rica has ahead requires substantial changes. This requires adapting institutions and procedures to changes, and would also be an opportunity to make transformations that - if they are achieved - will bring concrete benefits for the country in terms of life quality and job creation, along with in efficiency and leadership. Fundamental changes are necessary to move towards a successful Bicentennial Costa Rica. Therefore, it is worth reiterating the words that President Alvarado so eloquently noted on May 8: "This country was not built by always repeating the same ideas". It is a reminder that it is time to take the first steps; not towards becoming one of the first decarbonized countries in the world, but towards becoming the first.

ANNEXES

Decarbonization axis	Objective	Linkages with cross-cutting strategy and lock in parameters	Period goal	Indicator	Activity	Key actors
1. Development of a mobility system based on safe, efficient and renewable public transport and active mobility schemes.	1.1 To modernize public transport and to create an integrated and intermodal system.	**F. Reinforcement of the principles of inclusion, respect for human rights and promotion of gender equality:** - To ensure that fares guarantee a universal access to public transport. **A. Comprehensive reform for the new institutionality of the Bicentennial:** - Efficient organization of the transport sector and territorial planning with an integrated governance system **G. Transparency, metrics and open data strategy.** - To develop strategies innovative to capture Mobilization data from the population. - To make available in open data format on routes and service of public transport in real time (such as General Transit Feed Specification (GTFS).	• 8 main trunk lines inoperation At least one public transport mode operates with a system of integrated electronic payment.	Quantity of operating sectorized trunks Number of public transport modes with an operational electronic payment	1.1.1 To implement the sectorization of the public transport services, in bus modality, in a manner aligned with the mobility needs of the citizens, and firstly focused on the GMA. o To reorganize public transport routes; set trunk lines into operation in exclusive lanes. o To modernize the concession scheme for 2021, which will reward efficient and decarbonized service provision. o To develop a profitable and innovative financial model that promotes efficiency and transparency in the service operation.	MOPT CTP ARESEP INCOFER MINAE Private sector Users Bank MIVAH IFAM
					1.1.2 To establish and operate an efficient and accessible Electronic Payment system for bus and train services.	MOPT CTP Central Bank INCOFER ARESEP Operators
					1.1.3 To adopt measures that promote intermodality. o To design and implement intermodal stations (train-bus-taxi-bicycles). o To design and adjust the schedules for the provision of public transport services in a way that promotes systems integration.	MOPT CTP INCOFER IFAM
					1.1.4 To establish a governance model under the sustainable mobility system approach. 1.1.4 To establish a governance model under the sustainable mobility system approach. o To strengthen the capacities and transparency of the Public Transport Council and the stewardship of the Ministry of Public Works and Transport	MOPT CTP ARESEP INCOFER MINAE Private sector Usuarios

Decarbonization axis	Objective	Linkages with cross-cutting strategy and lock in parameters	Period goal	Indicator	Activity	Key actors
1					(MOPT). o To articulate joint approaches to land use d planning and transport planning.	
		<u>*Avoid the lock-in:</u> •-Avoid el fomento y la adopción de las tecnologías de transporte "transicionales" que creen barreras para la descarbonizació n del sistema de transporte en el mediano y largo plazo.	Electric train	Electric Train document	1.1.5 To progress in the construction of the Electric Train under the most feasible model, connecting Cartago, San José, Heredia and Alajuela. o To carry out feasibility and environmental impact studies. o To design the construction plans. o To prepare international bidding documents for the design, construction and operation phase. o To bid for the concession of the electric train construction • To develop a financial and technical strategy for the construction and commissioning of the Electric Train aligned with a vision of intermodality and sustainable mobility.	INCOFER Presidency MOPT ICE Municipalities
		<u>F.</u> Reinforcement of the principles of inclusion, respect for human rights and promotion of gender equality: - To ensure that fares guarantee a universal access to public transport.	• To implement electric pilot buses on at least 2 public transport routes. • To realize contracts of concession of bus service which includes specific goals and conditions associated with the use of electric buses or zero-emissions.	Number of routes with working pilot electrical buses	1.1.6. **C6 To implement campaigns that promotes the use of public transport and intermodality.** (Quick Win)	MOPT MINAE Presidency
				Concession contract document Bus mode includes specific goals and conditions associated with the use of electric buses or zero-emissions buses	1.2.1 To establish the electrification of public transport program, which will include the implementation of three electric buses pilots, financing alternatives and incentives to test the process at the level of transportation companies level, considering tariffs that facilitate the inclusion of the technology in the model of service provision. o To implement three electric buses pilots - launched in June 2018 on the GMA routes. o To design and approve the tariff scheme	MINAE MOPT CTP ARESEP ICE Buses Operators Users

Decarbonization axis	Objective	Linkages with cross-cutting strategy and lock in parameters	Period goal	Indicator	Activity	Key actors
1		**C. Funding Strategy and Investment Attraction for transformation:** - To establish financial strategies that promote the efficient transition to technologies zero-emissions. - To encourage the supply of green credits. - To explore subsidies. - To explore the implementation of innovative operating models for electric buses and taxis, such as leasing. **G. Transparency, metrics and open data strategy:** - To ensure transparency and accountability in the provision of the licensed public transport service. - To generate open data about the performance of the different technologies ***Avoid lock-in:** --Avoid the promotion and adoption of	To design and officialize a Roadmap for the consolidation of the Hydrogen Cluster.	Cluster Roadmap Document	appropriate to the use of new technology in public transport, in order to ensure the affordability of the rates. o To design financing alternatives and incentives for concept proof at the level of transport companies. o To define a joint and integral line of action. o To establish a schedule for the implementation of the fleet electrification. o To align concession contracts of 2021 with objectives and goals of the Decarbonization Plan and Law 9518: Incentives and Promotion for Electric Transportation.	
					1.2.2 To identify and evaluate the best options to electrify the taxi fleet. o To analyze the implications of the tariff scheme and identify improvements to facilitate technology adoption in taxis. o To identify financing scheme to facilitate renewal of the taxi fleet. o To design a pilot program for the electrification of taxis.	MOPT CTP ARESEP MINAE ICE Cooperativas de Taxistas Bank
					1.2.3. To explore the technical and financial feasibility of creating a public fund to improve the conditions of the transition to electric public transport.	MOPT CTP ARESEP MINAE Bank Multilateral y nacional
					1.2.4. To design a plan to promote hydrogen and other zero-emission technologies. o To define the Roadmap to consolidate a Research and Development (R&D) cluster in Hydrogen o To implement the inter-institutional action plan to promote the use of hydrogen in the transport sector.	MINAE MOPT RECOPE ARESEP Bank Academy Private companies

Decarbonization axis	Objective	Linkages with cross-cutting strategy and lock in parameters	Period goal	Indicator	Activity	Key actors
1		transport technologies "that create barriers to decarbonisation of the transport system in the medium and long-term. More modelling exercises must be realized for informed decision-making			o To conduct pre-feasibility studies of the identified key projects, and define a business model o To design the pilot project of hydrogen public buses o To publicize the lessons in terms of costs, performance and infrastructure.	
					1.2.5 **To analyze the options for new undertakings and business models to promote shared mobility schemes in the country.**	MOPT MINAE MEIC MICITT Business incubators
		A. Comprehensive reform for the new institutionality of the Bicentennial: - Efficient organization of the transport sector and territorial planning with an integrated governance system. - Alignment of the plans goals and projects associated with spatial planning in order to promote sustainable cities.	The implementation of transport-oriented development and low emissions practices in at least 3 municipalities.	Number of municipalities implementing transport-oriented development practices	1.2.6. **To launch communication campaigns that promotes public transport and zero-emissions.** o To communicate about the benefits of zero-emissions public transport in the long-term and its relationship with the goal of decarbonization. o To raise awareness about pioneer bus companies with zero-emission technologies. o To raise awareness about real-time information of an air quality monitoring system to warn the population about high contamination situations. (Quick Win):	MOPT CTP MINAE Presidency
		G. . Transparency, metrics and open data strategy: -To promote the generation and publication of more open data at the cantonal level to	The participation of 16 municipalities in the 2nd "cantonal" category of the National Carbon Neutral Program (PPCN).	Number of municipalities participating in the Carbon Neutral Program 2.0	1.3.1 To review and adjust the Regulatory Plans and other territorial management tools in order to promote low-emissions development oriented to transport. o To adjust the regulatory plans and urban development regulations to ensure that their formulation promotes a low-emission and transport-oriented development. o To identify the necessary adjustments in the approved regulatory plans of the GMA to comply with the above statement.	Municipalities INVU MIVAH IFAM MINAE

Decarbonization axis	Objective	Linkages with cross-cutting strategy and lock in parameters	Period goal	Indicator	Activity	Key actors
1		improve environmental, climate and urban management and city planning.			o To articulate the urban, residential and commercial development policies with the transportation plans and land use planning	
					1.3.2. To promote dense and compact city models. o To promote cantons densification and compactness around the electric train. o To design programs and incentives to promote the model of compact cities.	Municipalities Presidency INVU MIVAH IFAM INCOFER MOPT MINAE
		H. Education and culture strategy: A Bicentennial Costa Rica free of fossil fuels - To promote cultural change towards the use of sustainable mobilization modes, with an emphasis on active mobility. - To communicate about the benefits of living in compact cities and their associated inhabitants' rights. ***Avoid el lock-in:** -To avoid the promotion and adoption of "transitional" transportation technologies that create barriers for the decarbonization of the transport system in the medium- and -long term.			1.3.3. To promote sustainable mobility in cities, with special emphasis on the promotion of active modes. o To design and implement walkable city plans in the major urban centers of the country, including intermediate cities. o To design and implement integrated plans to promote the use of bicycles, which consider cyclo-inclusive infrastructure. o To encourage innovation in the design and implementation of measures that promote sustainability in cities, in both the public and private sector, and in civil society.	Municipalities INVU MIVAH IFAM MINAE MOPT Presidency
					1.3.4. To implement demand management measures. o To expand the plate-based vehicular restriction to other urban centers such as Cartago, Heredia, and Alajuela. o To promote the development of parking policies on public roads to limit parking areas on them	Municipalities MOPT MIVAH IFAM MINAE Presidency

Decarbonization axis	Objective	Linkages with cross-cutting strategy and lock in parameters	Period goal	Indicator	Activity	Key actors
1					1.3.5 To actively involve municipalities in the transition to low-emission development. o To implement infrastructure construction plans for active mobility (sidewalks, bike lanes) in priority municipalities. o To increase the number of municipalities participating in the cantonal category of the "Cantonal Carbon Neutral Country Program 2.0", as well as the development of mitigation strategies and pilot projects at a cantonal level in key sectors such as sustainable mobility, electric mobility and waste management. . (Quick Win)	Municipalities Presidency MIVAH IFAM MINAE MOPT

Decarbonization axis	Objective	Linkages with cross-cutting strategy and lock in parameters	Period goal	Indicator	Activity	Key actors
2. Transformation of the light-duty vehicles fleet to zero-emissions, boosted by renewable energy, not by fossil origin	2.1. To accelerate the transition of the vehicle fleet towards zero-emissions technology	**F. Strengthening of the principles of inclusion, respect for human rights and promotion of gender equality:** **- To create a s**ystem that does not punish the socially vulnerable populations. **B. Green Tax Reform:** - To reduce the fossil fuel dependence of the State revenue. - The principle "The one that pollutes pays" is considered **E. "Just Transition" labor strategies:** - To train mechanics and other populations who need support for the transition. **H. Education and culture strategy:** A Bicentennial Costa Rica free of Fossil Fuels - To communicate about the benefits of	The National Electric Transportation Plan and complementary regulations to operationalize Law 9518 are published. Zero-emissions fleets acquired in at least 3 public institutions 69 fast recharge centers operating by 2022.	Published documents (Plans and norms) Number of zero-emissions institutional fleets Number of operating recharge centers	2.1.1 To publish a National Electric Transportation Plan and generate complementary regulations (guidelines, regulations and standards) to operationalize Law 9518 on incentives and promotion of the electric transport. To progress on regulations prohibiting the importation of light-duty vehicles that use fossil fuels.	Presidency MINAE- SEPSE MOPT Legislative Assembly Importers
					2.1.2 To promote the implementation of the Sectoral Agreement on Emissions Reduction in the Transport Sector.	Presidency MOPT MINAE
					2.1.3 To implement transition plans for zero-emissions transport in institutional fleets. o To adjust state procurement schemes. o To implement pilot programs to change institutional fleets. o To consolidate transformation program of commercial fleets in pilot sectors, e.g.: Tourism.	Presidency MINAE- SEPSE MOPT MINSALUD
					2.1.4 To consolidate programs for the repair and maintenance of zero-emissions vehicles. (Quick win) o To expand the INA capacity building programs in repair and maintenance of electric vehicles.	INA Private businesses MINAE
					2.1.5 To consolidate the "Fast Charge Network" for electric transport. o To set up fast recharge centers distributed throughout the country. o To analyze business models that encourage the private sector to accelerate the consolidation of fast recharging points.	ICE Electric distribution companies MINAE
					2.2.1 To launch zero-emissions transport promotion campaigns. (Quick win) o To develop educational campaigns to cut down myths associated with electric technology in vehicles.	MINAE- SEPSE MOPT MINSalud Presidency

Decarbonization axis	Objective	Linkages with cross-cutting strategy and lock in parameters	Period goal	Indicator	Activity	Key actors
2. Transformation of the light-duty vehicles fleet to zero-emissions, boosted by renewable energy, not by fossil origin	2.2. To improve the efficiency of the combustion fleet.	migrating to zero-emissions transport **To avoid "lock-in"** To avoid the promotion and adoption of transport technologies called "transitional" that create barriers for the decarbonization of transport system in the medium- and long-term. **E. "Just Transition" labor strategies:** - To ensure that biofuel production does not relocate agri-food land or encourage land use change. **G. Transparency, metrics and open data strategy:** - To make available, in open format, data on vehicle efficiency and	Incorporation of 5% to 10% of ethanol in both gasolines by 2022. Roadmap for production and use of biodiesel.	Percentage of ethanol mixed with gasoline Roadmap document	2.2.2 To design financing mechanisms for the energy transition, including banking and insurance facilities for zero emission technologies.	MINAE Min of Financy Multilateral y national Bank
					2.2.3 To launch vehicle scrapping pilot program. o To define a "roadmap" for the implementation of the scrappage model and business scheme.	MINAE MOPT Ministerio de Salud Importers vehículos
					2.2.4 To design a roadmap for the efficient management of electric vehicle batteries at the end of their life cycle. • To analyze possible business models under the circular economy approach.	MINAE- SEPSE MOPT Ministerio de Salud Private businesses
					2.2.5 To consolidate the development of the national biofuels industry. o To implement the National Biofuels Strategy. o To implement demonstration projects with the MAG. o To analyze potential vertical integration of RECOPE in agroindustrial chains, for example palm trees. o To mix ethanol of national origin with gasoline. o To mix biodiesel of national origin with diesel.	RECOPE MINAE SEPSE ARESEP MAG Producer Chambers
					2.2.6 To design LPG Use Roadmap for specific niches coherent with global decarbonization goals. o To design adequate standards and regulations to regulate LPG conversion processes in the existing fleet.	MOPT MINAE SEPSE RECOPE
					2.2.7 To update regulations to improve the quality of fuels. o To adjust Central American regulations.	MINAE Min Salud MOPT COMEx

Decarbonization axis	Objective	Linkages with cross-cutting strategy and lock in parameters	Period goal	Indicator	Activity	Key actors
2	2.2. To improve the efficiency of the combustion fleet.	factory model data, such as driving efficiency and other variables. .	Eco-Labeling of the efficiency of designed vehicle.		2.2.8 To improve and update the energy efficiency regulations for the transport sector by updating the standards for the import and circulation of internal combustion engine vehicles, improving fleet standards. o To implement an eco-labeling in electric and combustion vehicles to make visible the vehicles efficiency.	MINAE MINSALUD MOPT COMEx

Decarbonization axis	Objective	Linkages with cross-cutting strategy and lock in parameters	Period goal	Indicator	Activity	Key actors
3. Promotion of a freight transport that adopts modalities, technologies and energy sources until achieving zero or the lowest emissions possible	3.1. To consolidate the program of cargo logistics to reduce emissions.	**D. Digitalization and Economy-Based Strategy:** - Use of data from load mobilization to improve strategies planning that lead the sector to be more competitive and decarbonized. **E. "Just transition" labor strategy** - Working conditions of the drivers of cargo vehicles. **G. Transparency, metrics and open data strategy:** - To make available in open format, updated data on behavior and performance of the light and heavy cargo mobility. ***Avoid lock-in:** To limit the options that deepen dependence on fossil fuels or generate new dependencies.	At least 1 cargo logistics pilot project operates under low-emission parameters. Limon's Electric Freight Train (TELCA) in operation	Cargo logistics pilot project Limon's Electric Freight Train (TELCA) operating in 2022	3.1.1 To implement measures that improve the distribution of cargo in agreement with the Logistics and Cargo Plan. o To create consolidation centers or logistics activity zones (including scanners and other intelligent merchandise management systems) in the peripheries of the GMA and other emerging population centers. o To define peripheral routes and schedules that limit the access of heavy trucks to urban centers. o To establish pilot projects of centers of consolidation and final distribution that combine technologies and various modes of transportation, creating possible "low-emission areas". o To adequately divide loads so that the size of the cargo vehicles that circulate in urban centers are proportional.	Presidency MOPT COMEX MEIC Private sector Municipalities IFAM
					3.1.2. To generate open data to improve the planning of light and heavy cargo transport . **(Quick Win)** o To generate the following open data: age of the fleet, types of vehicles, operating conditions, origins and destinations of the cargo, type of cargo, origin of the trucks (domestic or foreign). o To evaluate the feasibility of designing a Monitoring, Reporting and Verification (MRV) scheme to measure the emissions from the sector and from the transformation to a decarbonized one.	MOPT MINAE COMEX Private sector Riteve
					3.1.3 To integrate the intensive use of rail transportation for the mobilization of merchandise in the major routes and demand in the distribution model and Pre-investment Study registered in MIDEPLAN cargo commercialization. o To develop the necessary regulatory instruments for the implementation of	INCOFER MOPT Presidency ARESEP COMEX ICOP Private sector

Decarbonization axis	Objective	Linkages with cross-cutting strategy and lock in parameters	Period goal	Indicator	Activity	Key actors
3. Promotion of a freight transport that adopts modalities, technologies and energy sources until achieving zero or the lowest emissions possible.					the TELCA, including the establishment of the rates, prices or fares required for its implementation.	
	3.2 To promote technological efficiency in heavy and light cargo transport sector	**F. Strengthening the principles of inclusion, respect for human rights and promotion of gender equality** - To ensure that regulatory improvements do not shift the cost to primary commodities, such as food. **A. Comprehensive reform for the new institutionality of the Bicentennial** - Efficient organization of the cargo transport sector, to implement changes in regulations and their enforcement. ***Avoid el lock-in:** To generate improvements in the regulation and gradual standards that are consistent with the deep decarbonization process and which consider the availability of competitive technological options and the lifespan of assets.	Plan to improve efficiency and reduce emissions in the freight transport sector. 1 pilot project to improve the efficiency of the freight transport sector (use of biofuels and LPG).	Plan elaborated Pilot project started	3.2.1 To design a plan for the technological efficiency improvement of the cargo transport sector, which will consider aspects such as technological improvement (LPG, for example), the use of filters, biofuels and other efficiency improvements. o To promote technologies such as LPG, use of filters, biofuels and other efficiency improvements. o To implement a pilot project of efficiency improvement of the cargo transport.	RECOPE MINAE SEPSE MOPT COMEX Private sector
					3.2.2 To implement a pilot project of efficiency improvement of the cargo transport. o To reinforce road emissions controls, of the compliance of standards and maintenance regulations for light and heavy cargo vehicles. o To manage the strengthening of Central American and national regulations linked to efficiency standards, emissions, safety for light and heavy loads.	MOPT COMEX SEPSE Presidency MINAE
					3.2.3. To adjust Law 9518 so that fiscal incentives also apply for electric light-duty vehicles	Presidency Legislative Assembly MINAE Ministery of financy
					3.2.4. To establish a Pilot Plan to involve companies in the cargo transport sector in the Carbon Neutrality Country Program 2.0.	MINAE MOPT Private sector

Decarbonization axis	Objective	Linkages with cross-cutting strategy and lock in parameters	Period goal	Indicator	Activity	Key actors
4. Consolidation of the national electricity system with capacity, flexibility, intelligence and resilience, necessary to supply and manage renewable energy at a competitive cost	4.1 To promote the modernization of the electrical system to face the challenges coming from decarbonization, digitalization, and decentralization in the electricity production.	**C.** Funding Strategy and Investment Attraction for transformation: To assess the possibility of creating an Energy Transition Fund	The upkeeping of a renewable electric matrix above 95% that boosts the transition towards the decarbonization of other sectors.	Percentage of generation with renewable energies	4.1.1 To promote the diversification of the system with non-conventional renewable sources. o To incorporate non-conventional renewable energies into the plans of generation expansion. o To promote research on non-conventional renewable sources, as well as energy storage. o To promote studies for the decarbonization of thermal energy support.	MINAE SEPSE CONACE ICE Academy ARESEP Private sector
		D. Digitalization and Knowledge-based Economy Strategy	At least 2 sectoral plans and/or electrification strategies (eg, transportation, industry) prepared and published	Plan or strategy elaborated	4.1.2To promote the electrification processes of key sectors. o To link the electric sectoral planning with the sectoral planning of electric transport. o To promote the generation and exchange of information and databases between the different actors of intersectoral planning. o To estimate the demand projections between 2020 and 2050 under scenarios that include: energy management and storage technologies, electro-mobility, energy efficiency and other elements that affect demand.	MINAE SEPSE MOPT INCOFER Private sector ICE Academy
			The installation and operation of 274,240 of smart meters.	Number of smart meters installed and in operation	4.1.3 To establish a national vision or strategy for the operation of smart grids. o To promote processes associated with digitization and establishment of smart networks. o To purchase and install smart meters. o To realize related investments in smart grid components. o To monitor and analyses database information that supply the meters. o To develop the strategy of institutional process digitalization and impulse for the consolidation of smart networks.	CONACE MICIT

Decarbonization axis	Objective	Linkages with cross-cutting strategy and lock in parameters	Period goal	Indicator	Activity	Key actors
4. Consolidation of the national electricity system with capacity, flexibility, intelligence and resilience, necessary to supply and manage renewable energy at a competitive cost	4.2 To promote energy efficiency		Plan to improve climate investments for the national electricity system.	Improvement Plan	4.1.4 To design a plan for the improvement of climate investment that includes: o To establish governance in energy matters: includes strengthening of the rectory, access to information. o To analyze current electrical legislation. o To analyze distributed generation. o To analyze system risks. o To review tariff structure. o To re-adapt the financing models of the productive assets.	MINAE SEPSE CONACE ICE ARESEP CINDE Private sector Bank
			An updated Energy Efficiency Law and complementary regulatory framework.	Approved Draft Law	4.2.1 4.2.2 To promote energy efficiency: o To implement a more effective planning and coordination of energy efficiency. o To facilitate access to more efficient equipment by institutions, consumers and entrepreneurs. o To update the list of efficient energy equipment that can be exonerated. o To promote a culture of energy efficiency among citizens. o To stimulate energy efficiency in macro-consumers. o To promote energy consumption efficiency in the public sector. o To adjust tariffs for the promotion of energy efficiency.	MINAE CONACE
			20 macro public consumers have improved their energy efficiency.	Number of consumers improving energy efficiency Measurement of the effectiveness of the implemented energy efficiency measures		

Decarbonization axis	Objective	Linkages with cross-cutting strategy and lock in parameters	Period goal	Indicator	Activity	Key actors
5. .Development of buildings of different uses (commercial, residential, institutional) under high efficiency standards and low-emission processes	5.1.To strengthen the regulations, standards and incentives for the effective implementation of sustainable construction practices in buildings and other infrastructures	**B. Green Tax Reform:** - To consider increasing taxes on the most polluting materials. **C. Funding Strategy and Investment Attraction for transformation:** - To develop mechanisms to encourage sustainable construction. **E. "Just transition" labor strategies:** - To analyze the social impacts of changes in subsidies on materials or equipment.	• 20 new buildings applying environmental standards of a voluntary nature. 2019:5 2020:5 2021:5 2022:5 Total: 20	Number of buildings that voluntary adopt environmental standards to improve their performance [21].	5.1.1 To create and improve the standards that promote low-emission sustainable construction practices , such as energy efficiency (e.g.: temperatures insulation, cooking systems, water heating, washing and/or drying with electrical technologies, solar thermal, air conditioning or other more efficient and less polluting), efficient use of water, low carbon footprint materials (e.g., cement and green concrete, wood and bamboo, reuse of materials), among other sustainable practices that reduce the impact on emissions in the design, construction and operation of buildings and other infrastructures. o To generate regulations or promote the existing ones for certifications, both for the public and private sectors. o To strengthen the guidelines for low-emission sustainable construction, for public buildings and social housing through public biddings among other identified effective mechanisms. o To evaluate the feasibility of establishing regulations for the adoption of sustainable low-emissions construction practices in different types of buildings, for example: affordable housing, commercial and residential buildings, among other buildings and infrastructure categories.	MIVAH INVU BANVHI MINAE CFIA ECA INTECO Private sector
					5.1.2 To identify incentive schemes to promote low-emission construction (green credits, subsidies review, acknowledgments, certifications, awards) to accelerate the adoption of these practices in private and public projects in accordance with the Sustainable Production and Consumption Policy, among other regulations.	MIVAH Ministery of financy MINAE Bank Private sector INVU BHANVI

[20] Voluntary environmental standards are considered the following: Ecological Blue Flag Program Sustainable Construction Category (recognition), standards and certifications: RESET, EDGE and LEED.

Decarbonization axis	Objective	Linkages with cross-cutting strategy and lock in parameters	Period goal	Indicator	Activity	Key actors
5. .Development of buildings of different uses (commercial, residential, institutional) under high efficiency standards and low-emission processes	5.1. To strengthen the regulations, standards and incentives for the effective implementation of sustainable construction practices in buildings and other infrastructures.				5.1.3 To design a communication strategy that facilitates access to information and understanding about sustainable low-emissions construction. • To communicate about existing regulations, standards, certifications and awards that promote low-emission sustainable construction, as well as bioclimatic design and technology options and their benefits. • To progress in the environmental labeling of sustainable materials and efficient equipment, in line with the National Environmental and Energy Labeling Program. • To promote communication and awareness-raising campaigns for people who will live in sustainable construction	MINAE AYA- Comisión PBAE SEPSE
	5.2. To improve operating practices of existing buildings and other infrastructure that significantly reduce their impact on GHG emissions.	**C. Funding Strategy and Investment Attraction for transformation:** -To revise the formulation of the electricity tariff in order to encourage a greater electrification in new and existing buildings. - To analyze the feasibility of developing an Energy Transition Fund to replace and renew more efficient equipment. ***Avoid lock-in:** -To avoid using carbonized technologies, e.g., LPG in cooking and water heating systems.	At least 20 existing buildings implementing at least one action to reduce their GHG emissions in their operation.	Number of existing buildings that implement at least one GHG emission reduction action in their operation within the framework of one of the recognized voluntary mechanisms.	5.2.1 To promote the implementation of energy efficiency practices in existing buildings. • To promote the use of efficient, solar and refrigeration equipment and natural or low Global Warming Potential (GWP) air-conditioning systems (in accordance with the Kigali Amendment) in existing buildings.	MINAE ICE Private sector Comisión PBAE
					5.2.2 To promote the implementation of recognition programs such as the National Carbon Neutral Program, and/or the Ecological Blue Flag Program (PBAE) in its categories: Sustainable Construction, Sustainable Homes, Communities and Neutral Climate Community. (Quick win) • To support the implementation of the Technical Regulation of Energy Efficiency and Labeling for the Regulation of Refrigerators, Refrigerators-Freezers and Freezers.	MIVAH INVU CFIA Academy MINAE- SETENA AYA
					5.2.3 To promote the implementation of bioclimatic design, the reuse of materials, low carbon footprint materials such as cements and green concrete, as well as local inputs (wood from national plantations and / or bamboo).	

Decarbonization axis	Objective	Linkages with cross-cutting strategy and lock in parameters	Period goal	Indicator	Activity	Key actors
6 6.Transformation of the industrial sector through processes and technologies that use energy from renewable sources or others, sustainable and efficient, with low- and zero-emissions.	6.1 Impulsar el proceso de transformación tecnológica de bajas emisiones del sector industrial	**B. Reforma Fiscal Verde:** • Exoneraciones o incentivos para calderas eléctricas. • Reglamentar la exoneración de equipos eficientes. **D.** Estrategia de financiamiento y atracción de inversiones para la transformación: • Fondo de Transición Energética. **G.** Estrategia de **transparencia, métrica y datos abiertos** • Crear una plataforma de consulta y verificación y de "benchmarks" de resultados, informes y buenas prácticas empresariales. ***Avoid el lock-in:** • Avoid el uso de tecnologías que profundicen la dependencia a los combustibles fósiles en la industria.	Al menos 2 de hojas de ruta para la reducción de emisiones (1 por tipo de industria) desarrollada y publicada Lista oficial de bienes exonerados conforme al artículo 38 de la Ley N° 7447 del y sus reformas actualizada	Documento de Hoja de Ruta Documento de Lista de bienes exonerados con inclusión de nuevos equipos y tecnologías	6.1.1 Actualizar y reactivar la estrategia industrial de cambio climático. • Se deberá crear una comisión con representación del sector industrial, instituciones públicas claves para impulsar la estrategia y las Hojas de Ruta. 6.1.2 Apoyar en la construcción de Hojas de Ruta para la reducción de Emisiones. • Las Hojas de ruta definirán metas de reducción de GEI específicas por tipo de industria (basadas en la ciencia), que puedan traducirse en un compromiso del sector para reducir emisiones de GEI (Hojas de Ruta con respectivos Acuerdos Voluntarios). **(Quick Win)** • Caracterizarán los diferentes tipos de procesos de la industria de acuerdo con sus requerimientos energéticos y fomentarán la salida del uso de energía fósil por electricidad renovable, bioenergía (generada a partir de biomasa o residuos) y mejoras en eficiencia energética. 6.1.3 Impulsar la eficiencia energética en los procesos industriales: (Ver vínculo con Eje 4) • Promover buenas prácticas en la gestión de la energía (por ejemplo ISO 50001). • Actualizar mediante la inclusión de nuevos equipos y tecnologías lista oficial de bienes exonerados conforme al artículo 38 de la Ley de Regulación del Uso Racional de la Energía, Ley N° 7447 del 03 de noviembre de 1994 y sus reformas de acuerdo al artículo 10 del decreto ejecutivo N° 41121 del 5 de abril del 2018. • Desarrollar reglamentos técnicos que aseguren la eficiencia energética de los equipos carbonizados.	MINAE MEIC MIDEPLAN MICITT MINSALUD Chambers Empresariales Bank Academy

Decarbonization axis	Objective	Linkages with cross-cutting strategy and lock in parameters	Period goal	Indicator	Activity	Key actors
6. Transformation of the industrial sector through processes and technologies that use energy from renewable sources or others, sustainable and efficient, with low- and zero-emissions.	6.1 . To promote the process of low-emissions technological transformation of the industrial sector		At least 2 roadmaps for emissions reduction (1 per type of industry) developed and published (e.g., Cement Sector).	Roadmap document	6.1.4 To facilitate the substitution processes of refrigerants with low- or zero-GWP in accordance with the Montreal Protocol and the Kigali amendment. o To align fiscal incentives (importation) to promote the use of natural refrigerants and the equipment that uses them, and discourage the use of refrigerants with a high GWP. o To support pilot projects. o To develop regulations for the adequate disposal of refrigerants and associated equipment. **(Quick Win)**	
	6.2 To promote the development and consumption of products and services under circular economy models.	**D. Digitalization and Knowledge-based Economy Strategy** - Strategies for exploring new materials, LCA. **G. Transparency, metrics and open data strategy** - To create a platform of query and verification, benchmarks of results, reports and business best practices.	• An updated official list of exempted goods by the Article 38 of Law N ° 7447 on Regulation of the Rational Use of Energy.	List of exempted goods including new equipment and technologies	6.2.1 To promote the production of sustainable goods and services that remove or reduce GHG emissions along the industry value chain. o To support the design of circular economy models that promote waste valorization, the generation of new raw materials and are inserted in the industrial and agroindustrial value chains (e.g., the use of waste from the agro-food industry as raw material or energy source in industrial processes). o To promote the use of the LCA and life cycle approach to determine the raw materials, inputs, processes or others that minimize the products GHG emissions.	MEIC OMEX PROCOMEINAE MINSALUD Chambers Empresariales MAG MICITT Hacienda Academy ECA INTECO

Decarbonization axis	Objective	Linkages with cross-cutting strategy and lock in parameters	Period goal	Indicator	Activity	Key actors
6	6.2 To promote the development and consumption of products and services under circular economy models.	**H. Education and culture Strategy: a Bicentennial Costa Rica free of fossil fuels:** - Campaign to promote a circular economy which includes proper waste management.	At least 3 products have an environmental label or seal based on the official scheme of the Government of Costa Rica.	Quantity of products with an environmental label recognized by the Government of Costa Rica	6.2.2To promote the consumption of products and services with smaller footprints and environmental impact. • To standardize the definition of "green" products and services **(Quick Win).** • To implement the National Environmental and Energetic Labeling Program for products with an LCA approach. **(Quick Win).** •o To develop and implement a Carbon Neutrality scheme in products under the Neutrality Carbon Country Program. **(Quick Win).** •o To improve the technical criteria used in sustainable public procurement to include the analysis of environmental labels recognized by the Costa Rican government. .	

Decarbonization axis	Objective	Linkages with cross-cutting strategy and lock in parameters	Period goal	Indicator	Activity	Key actors
7. Development of an integrated system of maximum efficiency and low greenhouse gas emissions waste management based on the separation, reuse, revaluation and final disposal	7.1. To present policies that promote the integral management of low-emission waste and circular economy	**F. Strengthening the principles of inclusion, respect for human rights and promotion of gender equality:** - Inclusion of women and vulnerable populations in formal jobs throughout the integrated waste management chain. **B. Green Tax Reform** - To evaluate the possibility of establishing tax incentives for the importation of technologies for the integral management of waste with a focus on low emissions **C. Funding Strategy and Investment Attraction for transformation:** - Opening of special credit lines for technology purchase for the integral management of waste with a technology approach low emissions	2018-2022: 3,800 tons of solid waste are managed daily. 2019: 3.740 2020: 3.760 2021: 3.780 2022: 3.800	Indicator aligned with the National Development and Public Investment Plan: Number of tons of solid waste managed in an integral way on a daily basis.	7.1.1. To design a mitigation strategy for emissions in the waste sector (NAMA). This strategy will consider aspects such as: o The encouragement of the treatment of organic waste at household level. o The encouragement of the treatment of organic waste at industrial scale. o The promotion of the use of biodigestion as a treatment method for liquid and solid organic waste at large or multiple generators scale. o To have a selective collection of non-recoverable and recoverable waste (organic and inorganic) at the municipal level through a tariff scheme that allows to offer this public service in an efficient way. o To analyze the municipal tariff charged for the collection of solid waste and to identify improvements options to promote the improvement of the management.	Municipalities MIN Salud IFAM UGL MINAE Grupo ICE Private sector Sociedad Civil
					7.1.2. To design technical and legal instruments to control the import, manufacture and marketing of products and materials that generate waste which are challenging to manage for the country, such as single-use plastics, or waste challenging to recycle, or with no valuation method.	MINSalud MINAE Ministery of financy COMEX CINDE Private sector Sociedad Civil
				NAMA Waste Development process	7.1.3. To review the technical and legal instruments that allow applying the principle of extended responsibility of the producer from the importation, manufacture and marketing of products and materials to strengthen its implementation.	Ministerio de Salud MINAE Ministery of financy COMEX CINDE Private sector

[21] 2017: 3,720 tonnes per day integrally managed

Decarbonization axis	Objective	Linkages with cross-cutting strategy and lock in parameters	Period goal	Indicator	Activity	Key actors
7. Development of an integrated system of maximum efficiency and low greenhouse gas emissions waste management based on the separation, reuse, revaluation and final disposal.	7.1. Fortalecer la implementación de políticas, estrategias y planes que promuevan la gestión integral de residuos con un enfoque de bajas emisiones de GEI bajo el concepto de economía circular	**E. "Just Transition" labor strategies:** - To formally include the core sectors of the waste recovery value chain within municipal waste management processes. **H. Education and culture Strategy:** - To involve civil society organizations in the creation of a National Communication Strategy on Integrated Waste Management. **To avoid lock-in:** To avoid the implementation of waste systems treatment that implies dependence on their generation instead of promoting the reduction of their generation. To avoid obsolete technologies that delay compliance with the goals of this plan.	Launch of the National Composting Strategy Designed NAMA strategy to reduce emissions in the waste sector.			Sociedad Civil
					7.1.4. To implement an environmental labeling system for the products and materials marketed in the country that allows consumers to clearly identify if the product or material is recyclable or not; and in which category it should be recycled, using the color codes of the National Strategy for Separation, Recovery and Recovery of Waste. See linkage with the line of action 6.	Ministerio de Salud MINAE Ministery of financy COMEX CINDE Private sector Sociedad Civil
					7.1.5. To create the enabling conditions to enhance the use of biogas generated in mechanized sanitary landfills for generating electricity or as a fuel for mobile and fixed sources. **(Quick Win)**	MINSalud MINAE Ministery of financy COMEX CINDE Private sector Sociedad Civil
					7.1.6. To promote productive linkages through public-private partnerships to strengthen the recycling value chain from its source.	MINSalud MINAE Ministery of financy COMEX CINDE Private sector Sociedad Civil
					7.2.1. To strengthen the execution capacity and dialogue of the governing entities in the control and monitoring of the reports of water discharge without treatment or treatment plants and septic tanks malfunctioning through the existing regulatory instruments.	AyA MINSalud Municipalities IFAM MINAE

Decarbonization axis	Objective	Linkages with cross-cutting strategy and lock in parameters	Period goal	Indicator	Activity	Key actors
7. Development of an integrated system of maximum efficiency and low greenhouse gas emissions waste management based on the separation, reuse, revaluation and final disposal	7.2. To strengthen the effective management of wastewater.	**A. Comprehensive reform for the new institutionality of the Bicentennial:** - To evaluate whether it is necessary to modify the Law of Integral Management of Water Resources in order to improve the sanitation of wastewater. **G. Transparency, metrics and open data strategy** - To strengthen the National Information System for Integrated Water Resources Management (SINIGIRH). .	Goal aligned with PNDIP in priority sectors: Palmares, City of Jacó Garabito, Golfito and Ciudad de Limón[22] . 2019-2022: 100% 2019: 14,38% 2020: 28,35% 2021: 78,84% 2022: 100%	Indicator aligned with the PNDIP: Percentage of progress in sanitary sewerage projects.	7.2.2. To strengthen the IT platform of the National System of Integrated Management of Water Resources (SINIGIRH) to collect data on the entities that generate wastewater.	AyA Ministerio de Salud Municipalities IFAM MINAE
					7.2.3. To expand the coverage of sanitary sewer networks and treatment systems of ordinary residential wastewater in the country. o To strengthen the wastewater treatment infrastructure in the zones established by the National Plan for Development and Public Investments. These zones are: Palmares, Quepos, Jacó, Golfito and Ciudad de Limón.	AyA MINSalud Municipalities IFAM MINAE
	7.3. To create enabling conditions to improve the integral management of solid and liquid waste at both residential and business levels	**H. Strategy in education and culture:** - To involve civil society organizations, municipalities and the business sector processes of	At least 1 executed dissemination and awareness campaign about avoiding, reducing, separating and treating the waste.	Number of outreach and awareness-raising campaigns on avoiding, reducing, separating and treating waste.	7.3.1. To massively launch dissemination and awareness campaigns on avoiding, reducing, separating and treating waste. **(Quick Win)**	MINSalud MEP MINAE MEIC Ministerio de Comunicación

[22] Baseline: Palmares: Al 30-06-2018: 5,61% . Ciudad de Jacó, Garabito: Al 30-06-2018: 6,24% . Quepos: Al 30-06-2018: 5,30% . Golfito: Al 30-06-2018: 5,30% . Ciudad de Limón: 30-06-2018: 9,08%

Decarbonization axis	Objective	Linkages with cross-cutting strategy and lock in parameters	Period goal	Indicator	Activity	Key actors
7. Desarrollo de un sistema de gestión integrada de residuos basado en la separación, reutilización, revalorización y disposición final de máxima eficiencia y bajas emisiones de gases de efecto invernadero	7.3. To create enabling conditions to improve the integral management of solid and liquid waste at both residential and business levels	awareness-raising and training about integrated waste management. **G. Transparency, metrics and open data strategy:** To strengthen the National Information System for Integrated Water Resources Management (SINIGIRH). **To avoid lock-in:** To avoid the implementation of waste treatment systems that generate dependence on their generation, instead of promoting the reduction of their generation. To avoid obsolete technologies that delay compliance with the goals of this plan.	At least 3 capacity building processes for municipalities about integral waste management.	Number of capacity building processes for municipalities on integrated waste management.	7.3.2.To strengthen metrics and access to information on waste management in open formats. o To standardize methodologies for measuring and publishing data. o To publish data on waste management in an accessible manner.	MINAE MINSalud Sociedad Civil
					7.3.3. To strengthen the capacities of the municipalities about waste management. o To design technical capacity building programs in low-emission waste management. o To strengthen the monitoring commissions Municipal Waste Plan. o To generate spaces to improve the intermunicipal articulation in waste management (transfer centers). o To strengthen the audit and report of the municipalities. o To create a database of municipal actions to exchange best and mal-practices of waste management. o To increase the involvement of the municipalities in the improvements of waste management as a measure to reduce emissions under the PPCN.	MINSalud Public and private Universities MINAE Municipalities Private sector Bank
			At least 1 circular economy model pilot project promoting integral waste management implemented.	Pilot projects of circular economy models generated to enhance integrated waste management	7.3.4. To generate spaces for a greater involvement of the private sector. o To analyze the market of sellers and buyers of waste. o To make visible the "winners" of the private sector in their work at municipal level. o To determine the needs to promote the transformation of the sector and the search for circular economy models. See linkage with the line of action 6.	MINSalud Universidades públicas y privadas. MINAE Municipalities Private sector Bank MEIC

Decarbonization axis	Objective	Linkages with cross-cutting strategy and lock in parameters	Period goal	Indicator	Activity	Key actors
8. Promotion of highly efficient agri-food systems that generate low-carbon export goods and local consumption goods	8.1 To develop innovative processes in the value chain of priority products[23] that facilitate the generation of decarbonized agricultural goods.	**C. Funding Strategy and Investment Attraction for transformation** - To align available financial instruments for the agricultural sector **D. Digitalization and Knowledge-based Economy Strategy** - Precision agriculture, traceability technologies, Monitoring, Reporting and Verification (MRV)	At least 2 new NAMAs processes will be initiated	NAMA Proposal signed between representatives producers and MAG and MINAE	To promote the decarbonization and vertical integration of the priority value chains. o To develop and consolidate processes-programs of NAMAs[24] in priority products. Coffee: to consolidate the escalation stage, Banano-Musaceas: to boost the initial process, Sugarcane-rice: to initiate the processes. o To promote the identification, transfer and adoption of technologies that reduce emissions and improve competitiveness at farm and processing levels. o To promote actions that facilitate the commercialization of low-emission products (among others, to promote labeling and differentiation processes, promotional campaigns linked to the country brand). o To promote circular economy processes that promote the valuation and reuse of agricultural organic waste, and other waste generated along the value chain. See linkages with the axes 7 and 8.	MAG MINAE INDER MEIC PROCOMER Academy Chambers SBD Bank
					8.1.2 To align the current agro-environmental policies and plans with the decarbonization goals. o To implement the Sectoral Agreement to Reduce Emissions in the Agricultural Sector. The agreement includes:	MAG MINAE INDER MEIC PROCOMER

[23] Product prioritization is related to the agricultural subsectors that generate the most emissions: livestock, coffee, sugar cane, bananas, rice. Other products could be incorporated if there is evidence of their impact on the generation of emissions within the agricultural sector.

[24] In the Costa Rican context, NAMA is understood as a programmatic intervention that allows the identification of technologies for the reduction of emissions, allows the generation of training at the level of key structures MAG, ICAFE, Chambers, and producers to promote the adoption of technologies, encourages the development of MRV, and power vertical integration approaches to work equally with the marketing processes. At the national level, the learning of NAMA Café and NAMA Livestock will facilitate the operation of the proposed new NAMAs.

Decarbonization axis	Objective	Linkages with cross-cutting strategy and lock in parameters	Period goal	Indicator	Activity	Key actors
8. Fomento de sistemas agroalimentarios eficientes que generen bienes de exportación y consumo local bajos en carbono	8.1 To develop innovative processes in the value chain of priority products that facilitate the generation of decarbonized agricultural goods.				• To develop financial mechanisms aimed at the implementation of efficient low-carbon technologies. • To develop a system of recognition of the eco-benefits generated by the farms in their sustainable and climatically responsible production. • To consolidate the MRV system of the sector that supplies SINAMECC and GHG Inventory. o To establish board agreements in relevant institutions (for example: INDER, INCOP, Banking System for Development, DINADECO, among others) to align and allocate resources for the development of decarbonization projects. (Quick Win) o To align sub-sectoral policies and strategies with the decarbonization objectives (e.g., Policy / Strategy for coffee production, Musaceas, Caña, etc).	Academy Chambers SBD Bank

[25] El Acuerdo se firmó en el 2018 por ambos Ministros y tiene una vigencia de 5 años. Este acuerdo refleja la contribución sectorial a la meta nacional definida en la NDC. El acuerdo se puede encontrar en https://cambioclimatico.go.cr/

Decarbonization axis	Objective	Linkages with cross-cutting strategy and lock in parameters	Period goal	Indicator	Activity	Key actors
9. Consolidation of a livestock model based on productive efficiency and reduction of greenhouse gases	9.1 To encourage the livestock sector to contribute to the decarbonization using efficient practices and carbon capture in farms, the protection of ecosystem services and the generation of resilience.	**C. Funding Strategy and Investment Attraction for transformation:** - To create credits to support the strategy - To integrate environmental and social risk analysis into the financial sector. ***Avoid lock-in:** •To prevent extensive livestock farming from competing with areas for forest and conservation. To avoid feeding systems based on grains importation, which may increase the carbon footprint.	• 1 guideline generated for the Low-Carbon Livestock Strategy. • 1773 livestock farms implementing NAMA technologies. • 1 mechanism to provide technical support to the farms. • 1 education campaign on organic agricultural waste for producers and technicians. • 1 pilot project on the use of organic agricultural waste in the industrial sector and (Small and Medium Enterprise) SMEs in the food sector.	Number of guidelines generated Number of livestock farms implementing the NAMA model Technological solution to provide technical support to livestock farms Number of education campaigns on the use of OAWs Number of pilot schemes for the use of OAWs in the industrial sector and SMEs in the food sector	9.1.1 To consolidate the Low Carbon Livestock Strategy (EGBC) as the policy to decarbonize the sector. o To generate a guideline that consolidates the EGBC as the governing policy of the livestock sector. **(Quick Win)** 9.1.2 To promote an eco-competitive livestock approach by scaling up the NAMA Livestock, the implementation of efficient technologies, and technical support, among others. o To implement the first scaling of the NAMA Livestock. o To promote activities along the value chain that promote the implementation of efficient technology. o To strengthen capacity building, extension work and technology transfer. o To increase the biodiversity of the farms. o To develop a second-generation PES Environmental Services Payments model that recognizes the service coming from good land management in farms. o To design and implement a mechanism to provide technical support to livestock farms, this mechanism must actively integrate information technologies. **(Quick Win)** 9.1.3 To develop and scale-up the meat and milk value chains with a circular economy approach for the generation of biomass from organic agricultural waste (OWA). o To introduce experiences in the use of Organic Agricultural Waste (OWAs) in the livestock sector (in particular, excreta and slurry in the production of biogas and fertilizers). o To implement pilot plans for the use of OWAs for the industrial sector (meat and dairy industry) and SMEs in the food sector.	MAG INTA MINAE CORFOGA Livestock sector Chamber of Milk Producers National Livestock Council Regional Commissions Academia Companies PITTA

Decarbonization axis	Objective	Linkages with cross-cutting strategy and lock in parameters	Period goal	Indicator	Activity	Key actors
9. Consolidation of a livestock model based on productive efficiency and reduction of greenhouse gases	9.2 To design and improve the metric system associated with the livestock production units.	**Transparency, metrics and open data strategy** - To unify the criteria for the definition and "forest" and agroforestry livestock agroforestry systems. **D. Digitalization and Economy-Based Strategy:** - Precision agriculture.	A roadmap designed to consolidate national research on emission factors. 1700 farms implementing MRV.	Roadmap to consolidate resources for national emission factors research A consolidated MRV system for the livestock sector in 2022 **(Quick Win)**	9.2.1. To enhance the calculation of the reduction generated with the measures and technologies of emission mitigation and to develop national emission factors. o To promote the realization of the necessary studies to develop national emission factors for the livestock sector. o To consolidate the MRV system of the subsector and supply the SINAMECC and the GHG Inventory, among other reports. o To implement the MRV system in the first escalation of the NAMA Livestock.	MAG MINAE IMN DCC

Decarbonization axis	Objective	Linkages with cross-cutting strategy and lock in parameters	Period goal	Indicator	Activity	Key actors
10 10. The management of the rural, urban and coastal territory will be oriented towards conservation and sustainable use, growing forest resources and ecosystem services based on nature-based solutions	10.1 To implement the REDD+ Strategy to encourage the reduction of emissions from deforestation, to avoid degradation, and to preserve forests and ecosystems in both rural and urban areas.	**G. Transparency, metrics and open data strategy:** - To consolidate the National Monitoring System of Land and Ecosystem Cover and Use (SIMOCUTE) with SINIA and SINAMECC. **B. Green Tax Reform:** - To identify new sources to maintain the PES system. **C. Funding Strategy and Investment Attraction for transformation:** - To establish access strategy to climate finance for the forest sector aligned with NDC targets. **To avoid Lock-in** To avoid investments that encourages an expansive urban model and destruction of forest areas.	REDD+ strategy completed and financing initiated	Document with the Warsaw Framework and safeguards completed	10.1.1. To promote the growth of forest cover and the restoration of ecosystems. o To turn green and regenerate urban space (example increase of recreational parks, interurban corridors, river corridors). o To implement tree planting productive systems (fences, agroforestry systems, marine-coastal zones in strategies and restoration actions). o To stop deforestation. o To strengthen the conservation of ecosystems inside and outside the protected areas. o To regenerate degraded lands through forest restoration and reforestation. o To accelerate actions to address forest fires. o To promote a landscape management with a restoration approach in rural, coastal and urban areas. o To design and launch new generation of Payments for Ecosystem Services PES to PES 2.0. o To align the sale strategy of forest emission reduction consistent with the NDC and Decarbonization Plan. 10.1.2. To establish a sustainable management of the forestry resources. o To promote the consumption of national wood from plantations and agroforestry systems (See linkages with the line of action 5). o To open a space of dialogue to discuss the issue of exploitation of secondary forest. o To consolidate the Forest Monitoring system and ecosystems. o To establish a system of custody chain and traceability of wood. o To improve data on emissions reduction accounting for m3 of wood consumed in the national territory.	FONAFIFO MAG INDER Indigenous sector Private sector
			At least 3 kilometres of restored urban corridors	Intervened and improved urban area		
			Payment for Ecosystem Service System PES 2.0 designed and officialized	Officialized System Document		
			SIMOCUTE 1.0 in operation and integrated with SINAMECC and SINIA	Working operating system		

Decarbonization axis	Objective	Linkages with cross-cutting strategy and lock in parameters	Period goal	Indicator	Activity	Key actors
10 10. Se gestionará el territorio rural, urbano y costero orientado a conservación y uso sostenible incrementando los recursos forestales y servicios ecosistémicos a partir de soluciones basadas en la naturaleza	10.2 To promote the protection, restoration and management of other high carbon ecosystems.	**G. Transparency, metrics and open data strategy:** - To improve data and related documents on wetlands, peatlands, soils and other high carbon ecosystems. - To make forest and land use data and projections available in open format. **To avoid Lock-in** To avoid expansive investments (real estate, agricultural activities) that lead to the destruction of forest areas, mangroves, wetlands	• At least 2 pilot projects in management and protection of wetlands and mangroves implemented. • Analysis of other high carbon ecosystems realized. en carbono generado	Project document and field activities Analysis document	10.2.1. To strengthen carbon capture in other high carbon ecosystems o To consolidate the program of wetland and mangrove protection and management. o To analyze strategies options associated with blue carbon. o To promote information gathering (mapping, status, etc.) of other high carbon ecosystems (peat bogs, etc). o To promote soil management and restoration processes.	MINAE MAG Academy ONGS Private sector

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