Designing the Roadmap for Costa Rica’s Low Carbon Transport System: Good practices in Laws and Policies from Latin America

Estefanía Jiménez*

Abstract

Climate change is the most complex challenge humanity has ever had to face. Significant efforts have to be strategically made by all countries in order to adapt to its impacts and mitigate further environmental effects. Costa Rica has had a long history of commitments in this regard, however, the country has lagged behind in its reduction of emissions in the transport sector. This paper aims to be a contribution on the path towards a low carbon transport system in Costa Rica. It intends to support the country’s National Energy Plan with an array of good practices in sustainable transport laws and policies from other countries with similar geographic, political and social circumstances so that their replication is more feasible. These regulations have been selected based on Costa Rica’s current gaps in the matter; on the information presented in each of the NDCs of the Latin American countries submitted to the UNFCCC; and their current transport governance. There are numerous legal and political measures that can be implemented, whereby these practices constitute a model proven to be successful, and that can be followed by Costa Rica.

Keywords
Climate change; Paris Agreement; transportation policies; low carbon; Costa Rica; Latin America

1. Introduction

Through a comparative perspective, this paper reflects on policies and laws with the potential to enhance the efforts towards a low carbon transport system in Costa Rica as part of the mitigation commitments of the country in order to tackle global climate change. First, it refers to an overview of climate change and the Paris Agreement legal instrument. Then, the most important characteristics of Costa Rica’s national context are presented, as well as those of the transport sector and its legal framework. The next chapters focus on the three major axes of action based on the gaps in the country’s pathway towards a low carbon transport system; identify good laws and policies in Latin American countries that could address those gaps; and briefly assess the opportunities and relevance of implementing these measures in Costa Rica. The axes of action were established by the 7th National Energy Plan 2015-2030 of Costa Rica. And finally, the paper concludes with the exposition of further measures the country could implement, and a reflection on

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the future transportation system in the Central American country. This paper does not include aviation nor maritime transport.

2. Climate Change and the Paris Agreement

Climate change is unequivocal, and human influence associated with it is evident. Anthropogenic greenhouse gas (GHG) concentrations in the atmosphere have steadily increased since the pre-industrial era, mostly due to economic and population growth, and today we face the highest levels of these gases in recorded history\(^1\). Emissions of \(\text{CO}_2\) from the combustion of fossil fuels and industrial processes account for approximately 78% of the total increase of GHG emissions from the period between 1970 and 2010\(^2\). Since the 1950s, many abnormal changes in the climate system have been observed. The temperature of the atmosphere and oceans has increased, the amounts of snow and ice have declined, the sea level has risen, the pH of the ocean surface has decreased (ocean acidification) and many extreme weather and climate events have changed their patterns. These changes represent important impacts on human and natural systems all around the world\(^3\). Sustained GHG emissions will cause further warming and enduring changes in the climate, exacerbating existing risks and creating new ones of severe climate-related impacts for glaciers, terrestrial and marine ecosystems, coastal systems, livelihoods, water availability, food production, human health, and economics, amongst many others. In order to limit climate change, significant and continuous reductions of GHG emissions are needed. Mitigation actions are supported by effective institutions and governance, innovation and investments in technologies and infrastructure, and sustainable lifestyles and behaviors. These actions depend on policies and measures across international, regional, national and sub-national scales\(^4\).

The Paris Agreement\(^5\) is the international treaty that binds states to 'holding the increase in the global average temperature to well below 2\(^\circ\)C above pre-industrial levels and pursuing efforts to

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\(^2\) Ibid, p. 5

\(^3\) Ibid, pp. 2-8

\(^4\) Ibid, pp. 8-29

\(^5\) UNFCCC, Decision 1/CP.21, Adoption of the Paris Agreement, UN Doc. FCCC/CP/2015/10/Add.1; hereinafter PA
limit the temperature increase to 1.5°C above pre-industrial levels\(^6\). On December 2015, at the 21\(^{st}\) session of the Conference of the Parties to the United Nations Framework Convention on Climate Change\(^7\) held in Paris, world leaders of 195 sovereign states adopted the PA. On November 2016, the PA entered into force\(^8\). Nationally determined contributions (NDCs) are the heart of the PA\(^9\) where Parties put forward their best efforts to achieve the set goal by reaching GHG emissions peak as soon as possible\(^10\). Moreover, the fulfilment of the PA will reflect equity and the principle of common but differentiated responsibilities and respective capabilities, in the light of different national circumstances\(^11\). The operative sections of the Agreement cover the issues of mitigation, adaptation and means of implementation (capacity building, finance, and technology transfer)\(^12\). The PA is a treaty with unprecedented international support, showing that a consensus among heads of state, government officials and scientists is possible. There is only one thing that can be done to preserve the earth we live in, and that is for everyone to engage recognizing the importance of cooperation and respect for our equality and numerous differences\(^13\). This is what this extraordinary treaty intends to do.

### 3. Costa Rica

#### 3.1 National Context

Costa Rica is a Central American country with a population of 4,563,539 inhabitants and 51,100 km\(^2\) of land, located in the tropics and characterized by different climates\(^14\). The country is divided into seven climatic regions due to its geographic, atmospheric and oceanic factors: North Pacific,

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\(^{6}\) The PA, article 2 (1.a)
\(^{10}\) The PA, articles 3 & 4
\(^{11}\) The PA, article 2 (2)
Central Pacific, South Pacific, Central Region, Northern Region, North Caribbean Region and South Caribbean Region. It has 34 watersheds, the main ones being Tárcoles and Reventazón; and a predominantly mountainous relief where the highest peak is Chirripó with an altitude of 3,879 m. In general, there are two climatic regimes: dry and rainy season. The most extreme weather events that affect the country are: tropical cyclones, low pressure systems, troughs and cold fronts. Costa Rica’s climate variability is mostly related to the ENSO (El Niño Southern Oscillation) phenomenon; during the El Niño phase, the Pacific and Central regions are more likely to experience drier conditions, while the Caribbean is more likely to have extreme rain conditions.

Tourism is one of the most important economic activities and the one bringing the largest amount of foreign investments. Agriculture is also a very important economic activity for the country, coffee being the main crop. Forest coverage reached 54.4% by 2013, due to its great advance in forestry policies along with an excellent operation of the mechanism of payment for environmental services. In the education sector, Costa Rica has an old tradition of investment in its public education system; it is one of the few countries in Latin America to invest 8% of its GDP in this ambit. Regarding energy, Costa Ricans have one of the highest rates of national coverage in the region. The most important sources of primary energy used for electricity generation are hydroelectric, geothermal and wind energy. According to the Costa Rican Electricity Institute (ICE, for its acronym in Spanish), around 98.1% of the country’s electricity comes from renewable sources. The country used carbon-free electricity for more than 250 days last year with a continuous 110-day stretch. In 2010, the total energy consumption was 152,863 TJ, of which 21.8% corresponded to primary energy and 78.2% to secondary energy. The most important sources of energy are petroleum derivatives, accounting for 56.9% of the total consumption.

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15 Ibid, p. 23
16 Ibid, p. 23
17 Ibid, p. 24
19 Supra note 14, p. 24
20 Supra note 18, p. 5
21 Supra note 14, p. 23
23 Ibid
24 Supra note 14, p. 23
followed by biomass with 21.2% and electricity with 20.2%\(^{25}\). The transport sector is responsible for 46.0% of the total energy consumption, the industrial sector accounts for 24.9% and the residential one for 17.8%\(^{26}\).

According to the GHG inventory of 2010, the biggest source of emission was the energy category (7,081.20 Gg CO\(_2\) equivalent), followed by waste (1,378.21 Gg CO\(_2\) equivalent), and industrial processes and product use (802.72 Gg CO\(_2\) equivalent)\(^{27}\). The tons of CO\(_2\) equivalent per capita were 1.93\(^{28}\). As a signatory country to the UNFCCC, Costa Rica has implemented many policies, measures, and initiatives in order to tackle climate change, these include the National Climate Change Strategy and its Plan of Action, as well as the progress in the Framework Law on Climate Change. Some of the mitigation measures are the Domestic Voluntary Carbon Market, which was created as the main project of the National Plan on Climate Change; the Reducing Emissions from Deforestation and Forest Degradation (REDD +) strategy as a response to the National Development Plan; and the Industrial Strategy on Climate Change. In regard to adaptation, the sectors showing the greatest advances are water, agriculture, biodiversity and energy. The main initiatives are related to climate observation and climate change monitoring. The Guanacaste Water Program is one of the most ambitious projects aiming to ensure water supply during extreme dry years. Furthermore, there have been actions on education and awareness, for example: climate change firmware; radio and television broadcast; training for teachers, farmers, and the general public\(^{29}\).

Costa Rica aspires to be a laboratory for the world’s economy process of de-carbonization. In its NDC, Costa Rica reaffirms its goal of becoming a Carbon Neutral economy starting year 2021, as a continuation of its voluntary action and a milestone in this path towards de-carbonization\(^{30}\). The country is committed to a maximum of 9,374,000 T CO\(_2\) equivalent net emissions by 2030, with proposed emissions of -0.27 net tons per capita by 2100\(^{31}\). These numbers are consistent with the path to achieve the 2°C goal set by the UNFCCC. Costa Rica’s pledge includes a GHG emissions reduction of 44% of a Business As Usual (BAU) scenario, and a reduction of 25% of emissions

\(\text{\footnotesize Supra note } 14, \text{p. } 23\)
\(\text{\footnotesize Supra note } 14, \text{ pp. } 23-24\)
\(\text{\footnotesize Supra note } 14, \text{p. } 24\)
\(\text{\footnotesize Supra note } 14, \text{p. } 24\)
\(\text{\footnotesize Supra note } 14, \text{ pp. } 24-29\)
\(\text{\footnotesize Supra note } 18, \text{p. } 2-3\)
\(\text{\footnotesize Supra note } 18, \text{p. } 3\)
compared to 2012\textsuperscript{32}. In order to accomplish this goal, Costa Rica would have to reduce 170,500 tons of GHG emissions per year until 2030\textsuperscript{33}.

Dramatic changes in rainfall and mean temperatures have been observed in the past decades in the country\textsuperscript{34}; in November last year, the country suffered the consequences of Hurricane Otto. This is the first hurricane to directly affect the country in the last 165 years\textsuperscript{35}. The NDC also aims to strengthen the country’s adaptation capacity, enhancing risk and adaptation management in both communities and ecosystems. The country believes this contribution is ambitious. It promotes low emission development, not only in the production of electricity, but also in the transport, agricultural and waste management sectors. Under the PA, Costa Rica has begun a process of legal, institutional and organizational change in order to comply with its newly acquired commitments and climate change policies\textsuperscript{36}.

3.2 Costa Rica’s Transport Sector

In Costa Rica, the transport sector is responsible for 66\% of hydrocarbon consumption and 54\% of CO\textsubscript{2} emissions\textsuperscript{37}. Within the transport sector, the main contribution of CO\textsubscript{2} comes from private vehicles (41\%), followed by cargo transportation, motorcycles, special service buses, special equipment and public transportation, in that respective order\textsuperscript{38}. The National Emissions Inventory, prepared with data provided by the Air Quality Monitoring Network, shows that vehicles are the main contributors to the deterioration of air quality. The levels of atmospheric pollutants in the urban zones of Costa Rica’s greater metropolitan area (GAM) are higher than the amounts agreed by international standards. The high concentration of particulate matter in the air, generated by transport and similar activities, not only has repercussions on the environment, but also on

\textsuperscript{32} Supra note 18, p. 3
\textsuperscript{33} Supra note 18, p. 3
\textsuperscript{34} Supra note 18, p. 15
\textsuperscript{35} Instituto Meteorológico Nacional de Costa Rica, ‘Noviembre 2016’, Boletín Meteorológico Mensual, ISSN 1654-0465, (2016), p. 34
\textsuperscript{36} Supra note 18, pp.9-11
\textsuperscript{38} Ibid, p. 93
people’s health. The population exposed to these pollutants are more prone to suffer from strokes, lung cancer, and lung diseases, such as asthma\textsuperscript{39}.

A factor that contributes to air pollution and inefficient energy consumption in this sector is the age of the vehicle fleet in the country. According to studies carried out, the average age of the vehicle fleet reported is 16 years\textsuperscript{40}. An element hampering the fleet renewal is the regulation in the import of used vehicles; the current regulation allows the entry of vehicles with more than 15 years of age. In 2014, the import of used vehicles accounted for 34% of the total imports of these goods, of which 24% exceeds 15 years old\textsuperscript{41}. The country also shows a lag in the international context regarding emissions and performance of new imported vehicles; in Costa Rica, the average emissions ranged from 197 to 206 g C\textsubscript{2}/km and the average performance from 13 to 14 km/l over the 2008-2014 period\textsuperscript{42}. The concept of energy efficiency is not part of the Costa Rican culture; the country currently does not apply any type of energy efficiency measure in internal combustion vehicles. The country also lacks policies and studies on sustainable management of car scrapping\textsuperscript{43}.

In Costa Rica, there is a prevailing preference for individual transportation over collective one for many reasons, such as public insecurity, disintegrated public transport system, little information for users, slow public services, and poor mechanical conditions of public transportation\textsuperscript{44}. According to a 2014 report, 31% of the bus fleet, used for public service, is an average of 7.05 years of age and the other 69%, used for special services and tourism, is an average of 11 years of age\textsuperscript{45}. The taxi fleet is an average of 10 years of age\textsuperscript{46}. The situation gets worse due to population growth in urban areas. Productive areas and houses are dispersed and disconnected from each other, forcing the population to make long daily commutes. In addition, there is no adequate urban planning, making the GAM one of the largest and least densely populated metropolitan areas in Latin America\textsuperscript{47}. The rate of vehicles per 1,000 inhabitants rose from 132 in 1994 to 263 in 2014,

\textsuperscript{39} Ibid, pp. 94-95
\textsuperscript{40} Ibid, p. 96
\textsuperscript{41} Ibid, pp. 96-97
\textsuperscript{42} Ibid, p. 97
\textsuperscript{43} Ibid, p. 98
\textsuperscript{44} Ibid, pp. 99-100
\textsuperscript{45} Ibid, p. 102
\textsuperscript{46} Ibid, p. 102
\textsuperscript{47} Ibid, p. 99
significantly increasing traffic congestion\textsuperscript{48}. Also, in this period, the use of motorcycles tripled and as it became a popular way of transportation, which is infrequent in developed countries. And, the number of bus trips decreased from 60\% in 1999 to 45\% in 2007\textsuperscript{49}. A Rapid Transportation of Passengers project as well as the restoration of the railway system with the use of electric trains are currently under consideration\textsuperscript{50}.

As it was previously mentioned, petroleum products are the main energy source in Costa Rica. In order to meet the national demand, the country has a monopoly on the import, refining and distribution of crude oil and its derivatives. The quality of fuels is determined by the Central American Technical Regulation for Petroleum Products established by the Central American Integration System. In addition, the country has emitted decrees to improve the standards of this regulation; however, both the regulation and the decrees, have been left behind in the pathway towards more efficient automotive technologies. Another limitation of the country to advance towards better quality fuels is the lack of exclusive pipelines for each product in the National Fuel System. During the transfer process, product contamination is generated causing economic loss for having to sell the product as contaminated material at a lower price. The products also suffer significant contamination in the import, distribution and marketing processes. In regards to biofuels production, the country still does not have the necessary legal support to allow their incorporation into the national energy matrix. A cooperative strategy is needed since the private sector is the one with production capacity but the State is the one responsible for blending. As for liquefied petroleum gas (LPG) use, it has had a growth and the regulation of conventional vehicles to carry out the combustion with LPG is being developed\textsuperscript{51}. It is important to point out that the country is only a few days away from inaugurating its first bus with a hydrogen powered electric motor, an initiative of Ad Astra Rocket Company. It is the first country in Central America and the second in Latin America to develop this type of technology\textsuperscript{52}.

\textsuperscript{48} Ibid, p. 100
\textsuperscript{49} Ibid, p. 100
\textsuperscript{50} Ibid, p. 101
\textsuperscript{51} Ibid, pp. 103-109
According to the 7th National Energy Plan 2015-2030 of Costa Rica, these are the challenges towards a cleaner and efficient transportation system:

- Strengthen control of vehicular emissions,
- Improve air quality by reducing pollutant emissions,
- Implement regulations on the import of new and used vehicles,
- Promote fiscal, financial, infrastructure and other conditions for the integration of new technologies in the vehicle fleet,
- Establish the concept of energy efficiency in the acquisition and ownership of vehicles,
- Promote vehicle scrapping and its correct disposal,
- Improve urban planning in order to achieve cities densification allowing the development of integrated public transport,
- Restructure and modernize public transport and project implementation,
- Educate people in the use of public transport through informative campaigns,
- Ensure the long-term supply of fuels in a competitive manner,
- Quality of fuels and their connection with new technologies,
- A refinery that ensures direct benefits to the population, beyond the quality of fuels,
- Gradual incorporation of alternative clean energy in the transport sector to promote the substitution of petroleum products\(^53\).

Policy orientations on transport and fuels of the National Energy Plan have three axes of action: 1) towards a friendlier vehicle fleet for the environment, 2) with a view to sustainable public transport, and 3) on the road to cleaner fuels. They are based on the analysis of the problem exposed and they take into account the results of public consultations. Strategic and specific objectives linked to actions to be implemented in the short, medium and long term, support the axes of action\(^54\). In general, the National Energy Plan seeks to make a meaningful leap towards an economy with low level of emissions, more nature-friendly processes for energy generation and use, an energy matrix capable of sustaining the competitiveness of national industries and a greater contribution of the energy sector to the quality of life of Costa Ricans\(^55\). The following are the most

\(^{53}\) Supra note 37, p. 99, p. 103, p. 109

\(^{54}\) Supra note 37, pp. 110-128. For a full look of all planned actions in the transport sector of the 7th National Energy Plan 2015-2030 of Costa Rica, refer to the aforementioned pages.

\(^{55}\) Supra note 37, p. VIII
relevant laws and policies currently contributing to the road towards a low carbon transportation system in Costa Rica. Some of these are already in line with the foreseen actions of the Energy Plan.

3.3 Costa Rica’s Laws and Policies on Climate Change and Transportation

Earlier this year, the new biofuel regulation came into force by Executive Decree 40050, which aims to regulate the roles of the stakeholders in the value chain of biofuels and the requirements for their storage, transportation and distribution. It appoints the Ministry of Environment and Energy (MINAE) and the Ministry of Agriculture and Livestock (MAG) as the entities responsible for promoting, organizing, implementing, monitoring and supervising the National Biofuels Program. It also assigns the Costa Rican Petroleum Refinery S. A. (RECOPE) as the authority in charge of the mix of fossil fuels with biofuels56. The latter is very important since the old legislation did not allow it57.

Last year, the Executive Decree for the Regulation for the Control of the Polluting Emissions produced by Motor Vehicles with Internal Combustion Engines was issued, establishing the guidelines based on the emissions for the entry and circulation control of vehicles with internal combustion engine. It includes all motor vehicles circulating on public roads and using gasoline, diesel, LPG, alcohol or blends of those as fuel. As of January 2021, new and used automobiles entering the country must comply with the following emission standards: Euro 6, Tier 3 or higher. Additionally, traffic officers may conduct random checks on public roads58.

Executive Directive 056 of 2016 enunciates that fuels purchased by the Public Administration institutions must comply with the requirements of the 7th National Energy Plan59.

56 Costa Rican Legal Information System. Executive Decree 40050 Regulation of Liquid Biofuels and their Blends. 2016, section IX, article 1, article 7 & article 10
57 Supra note 37, p. 107
58 Costa Rican Legal Information System. Executive Decree 39724 Regulation for the Control of the Polluting Emissions produced by Motor Vehicles with Internal Combustion Engines. 2016, article 1, article 7 & article 18
59 Costa Rican Legal Information System. Executive Directive 056 Quality parameters for fuels derived from petroleum. 2016, article 1
Also last year, the country released its new regulation on air quality which aims to establish the organization and operation of the National Air Quality Monitoring Network, as well as the maximum concentration values of criteria pollutants present in the air. The Air Quality Commission is created in order to strengthen the operation of the network. It is important to point out that for the first time, particles with a diameter of less than 2.5 micrometers will be regulated.

Additionally last year, the Law on Strengthening of the Costa Rican Institute of Railroads (INCOFER) and Promotion of the Interurban Electric Train of the Great Metropolitan Area was emitted. The law modernizes INCOFER and its attributions with the purpose of electrifying, rebuilding, rectifying and extending the entire existing rail network. Moreover, the law declares the project as a priority for the Public Administration.

On 2015, Executive Decree 39114 made official the Action Plan of the National Climate Change Strategy. The Strategy sets transportation as one of the priority intervention sectors for GHG emissions reduction under the mitigation actions.

Also on 2015, Executive Decree 39219 made official the National Energy Plan 2015-2030.

Executive Decrees 33096 (2006) and 37822 (2013) encourage the use of hybrid-electric vehicles. They exempt new vehicles powered by electricity, fuel cells (hydrogen) or compressed air from

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60 Costa Rican Legal Information System. Executive Decree 39951 Regulation of Air Quality for Criteria Pollutants. 2016, article 1 & article 5.1
62 Costa Rican Legislative Assembly. Law 9366 Strengthening of the Costa Rican Institute of Railroads (INCOFER) and Promotion of the Interurban Electric Train of the Great Metropolitan Area. 2016, article 1, article 2 & article 3
63 Costa Rican Legal Information System. Executive Decree 39114 Makes official Action Plan of the National Climate Change Strategy. 2015, article 1
65 Costa Rican Legal Information System. Executive Decree 39219 Approves the VII National Energy Plan 2015-2030. 2015, article 4
selective consumption tax. New hybrid-electric vehicles will also have a tax reduction. Additionally, it encourages environmental and energy entities, and public entities in general, to develop the infrastructure for operation, maintenance and recharge of electric, hybrid, natural gas and LPG vehicles. In addition, higher education centers are urged to include technical training of professionals in these technologies within their programs. Also, public entities are encouraged to consider these vehicles at the time of changing their fleet\textsuperscript{66}. However, these decrees are criticized for several reasons. It has been said that the cost of reducing the emissions to the country in this way is extremely high. It would be much better to replace the exemptions for fixed tax credits applicable to sales and apply exemptions to property taxes for a certain period\textsuperscript{67}.

Executive Decree 36372 stipulates that the maximum limit of the sulfur content in diesel shall be 0.005% m/m\textsuperscript{68}.

The Regulation of the Rational Use of Energy Law of 1994 pursues the establishment of mechanisms to achieve greater energy efficiency. Producers of vehicles must obtain authorization from the Ministry of Natural Resources, Energy and Mines (MIRENEM) in regards to their energy efficiency before the production begins. The import of vehicles is also conditional to the submission of energy efficiency data. These goods must also have a plate with the information of their energy consumption. The law states that the Technical Commission of Transport is obliged to safeguard the compliance with the requirements set by MIRENEM in energy and environmental matters; the Commission should incorporate these requirements into all administrative contracts signed in the field of public transportation. The Ministry of Public Works and Transport (MOPT) must request MIRENEM’s judgment for energy and fuel consumption estimates in order to set the rates of taxis and buses. MOPT is also responsible for annual emissions tests; vehicles that exceed permissible

\textsuperscript{66} Costa Rican Legal Information System. Executive Decree 33096 Encourages the use of hybrid-electric vehicles as part of the use of clean technologies. 2006, article 2, article 4, article 9, article 10 & article 11; Costa Rican Legal Information System. Executive Decree 37822 Reform executive decree N ° 33096 “Encourages the use of hybrid-electric vehicles as part of the use of clean technologies”. 2013.


\textsuperscript{68} Costa Rican Legal Information System. Executive Decree 36372 Reduces the sulfur content in diesel to 0.005% m/m as the maximum limit. 2011, article 1
limits, fixed by MIRENEM, cannot be authorized to circulate in the national territory\textsuperscript{69}. In 2010, modifications to the exonerations of the law were made to further encourage the development and use of renewable sources of energy\textsuperscript{70}.

The Simplification and Efficiency Tax Law of 2001 imposes a single tax by type of fuel, both domestic and imported. This tax is updated quarterly\textsuperscript{71}.

The approval of a bill to promote electric transport is currently being encouraged in the Legislative Assembly. The law would exonerate electric vehicles from their selective consumption tax, sale tax and from 1\% of the customs value tax, with an $18,000 cap of total exoneration per vehicle\textsuperscript{72}. It also exempts from the right of circulation payment for the first five years, vehicle restriction and parking meters payment. In addition, electric vehicles may park in designated blue spaces within public parking\textsuperscript{73}. Congress rejected the bill as it intends to include hybrid vehicles\textsuperscript{74}.

In recent years, a significant progress towards a cleaner and more efficient transport system in Costa Rica has been made, but there is still a long way to go. A summary of the current legislation on sustainable transport of the country is presented below:

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Table 1. Costa Rica’s Laws and Policies on Climate Change and Transportation \\
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\textsuperscript{69} Costa Rican Legislative Assembly. Law 7447 Regulation of the Rational Use of Energy. 1994, article 1, article 13, article 15, article 16, article 19, article 22 & article 27


\textsuperscript{71} Costa Rican Legislative Assembly. Law 8114 Simplification and Efficiency Tax Law. 2001, article 1 & article 3


\textsuperscript{73} Costa Rican Legislative Assembly. Draft Law N. 19744 Incentives and Promotion for Electric Transportation Law. 2016, article 9, article 10, article 11, article 13, article 15, article 16 & article 17

\textsuperscript{74} Supra note 72
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<td>Executive Decree 40050 Regulation of Liquid Biofuels and their Blends</td>
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<tr>
<td>Executive Decree 39724 Regulation for the Control of the Polluting Emissions produced by Motor Vehicles with Internal Combustion Engines</td>
<td>2016</td>
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<td>Executive Decree 39951 Regulation of Air Quality for Criteria Pollutants</td>
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<td>Executive Decree 39114 Makes official Action Plan of the National Climate Change Strategy</td>
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<td>Executive Decree 37822 Reform executive decree N° 33096 &quot;Encourages the use of hybrid-electric vehicles as part of the use of clean technologies&quot;</td>
<td>2013</td>
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<td>Executive Decree 36372 Reduces the sulfur content in diesel to 0.005% m/m as the maximum limit</td>
<td>2011</td>
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<td>Executive Decree 33096 Encourages the use of hybrid-electric vehicles as part of the use of clean technologies</td>
<td>2006</td>
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<td>Law 9366 Strengthening of the Costa Rican Institute of Railroads (INCOFER) and Promotion of the Interurban Electric Train of the Great Metropolitan Area</td>
<td>2016</td>
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<td>Law 8829 Modification of article 38 of Law No. 7447 Regulation of the rational use of Energy, dated 03/11/1994 and its amendments, Law to Encourage the Development and Use of Renewable Energy Sources</td>
<td>2010</td>
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<tr>
<td>Law 8114 Simplification and Efficiency Tax Law</td>
<td>2001</td>
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<tr>
<td>Law 7447 Regulation of the Rational Use of Energy</td>
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Source: Own elaboration.

4. **Latin American Laws and Policies on Low Carbon Transportation**

The next three sections focus on the three major axes of action of the National Energy Plan 2015-2030 of Costa Rica which are based on the gaps in the country’s pathway towards a low carbon transport system. Within each section, good laws and policies of Latin American countries with the potential to address these gaps are identified and described, followed by a brief assessment of the opportunities and relevance of these measures if implemented in Costa Rica.

4.1 **Towards a Friendlier Vehicle Fleet for the Environment**
4.1.1 Peru

Over the past ten years, Peru has experienced a rapid economic growth which has allowed an important progress in social inclusion, health provisions, education and infrastructure, among others. Various initiatives that are transforming national energy consumption by switching fuels to natural gas have been carried out\(^\text{75}\). One of this initiatives is the creation of the Temporary Regime for the Renewal of Automotive Vehicles in order to promote the Change of Energy Matrix through Executive Decree 213-2007-EF. The Decree takes into account that vehicular natural gas (VNG) is an energy resource that the country produces which enables self-sufficiency and it is a fuel that contributes to the reduction of GHG since it is less polluting. The Regime encourages the scrapping of diesel vehicles with the objective of gradually reducing diesel consumption, and promoting the switch to new vehicles that consume gasoline and VNG. To qualify for the Regime, diesel vehicles will obtain a Scrapping Certificate that may be used, within one year, for the purchase of a new vehicle to be used alternatively with VNG. The Ministry of Energy and Mines will approve the economic incentive equivalent to the market price of diesel vehicles that are more than 10 years old, which will be delivered to registered sellers. The financing of this subsidy is the responsibility of the Ministry of Energy and Mines and the Ministry of Transport and Communications. The Regime will run for three years\(^\text{76}\). Executive Decree 052-2008-EF adds that the entity in charge of the conversion of vehicles to VNG is the Ministry of Transport and Communications\(^\text{77}\).

MINAE from Costa Rica started the Acquisition of Efficient Vehicles Program in 2015, with the purpose of promoting the renewal of the vehicle fleet in order to switch to more efficient technologies. The program provides financing benefits to vehicles with a certain level of emissions and performance. The Costa Rican Energy Plan proposes the strengthening and enhancement of this Program with tax incentives and other types of incentives, in a permanent way\(^\text{78}\). An Executive Decree such as 213-2007-EF from Peru, could be a good element to complement and reinforce this Program. MINAE and MOPT can be the main promoters of the new Regime. Instead of advocating

\(^{75}\) Peru. (2015). Intended Nationally Determined Contribution (iNDC) from the Republic of Peru, p. 1

\(^{76}\) Peruvian Legal Information System. Executive Decree 213-2007-EF creating the Temporary Regime for the Renewal of Automotive Vehicles to promote the change of energy matrix. 2007, article 1, article 2, article 5, article 6, article 9 & article 10

\(^{77}\) Peruvian Legal Information System. Executive Decree 052-2008-EF modifies Article 7 of Executive Decree 213-2007-EF creating the Temporary Regime for the Renewal of Automotive Vehicles to promote the change of energy matrix. 2008, article 1

\(^{78}\) Supra note 37, pp. 97-98
for vehicles using VNG, the Regime should benefit electric vehicles since almost all Costa Rican electricity comes from renewable sources. Moreover, it should encompass both buying and importing new technology cars. MINAE along with MOPT and the Ministry of Finance, can be the authorities in charge of all the operation and calculation of financial incentives. MOPT would be in charge of scrapping certificates and MINAE would be responsible for the technical specifications required for cars to apply to the Regime. Significantly, the Regime would also be in line with the Energy Plan objective of encouraging old vehicles scrapping in order to accelerate the renewal of the current vehicle fleet of the country\textsuperscript{79}. A Regime stipulated by Executive Decree, like the Peruvian one, can be a great support in the long process of transforming the vehicle fleet of Costa Rica.

### 4.1.2 Chile

Chile has positioned itself internationally as a country that seeks to support significant climate change actions. One of the main sources of black carbon in Chile comes from diesel for transportation\textsuperscript{80}. For this reason, the 2014-2018 Atmospheric Decontamination Plans Strategy of Chile sets the guidelines, deadlines and goals to solve the pollution problem in Chile as quickly as possible. Currently, there are 10 decontamination plans in active force, but only one of these plans targets the south of the country and this is one of the most polluted areas. Therefore, the government decided to establish decontamination plans with effective measures to reduce emissions in areas declared as saturated or latent, and implement short-term measures in areas where there are no plans but the monitoring information shows high concentrations of particulate matter. The goal for 2018 is to have a total of 20 plans in force, covering more than 57\% of the population, and 87\% of the population exposed to pollution\textsuperscript{81}. Chapters II and III of the Atmospheric Decontamination and Prevention Plan (ADPP) for the Metropolitan Region cover the field of transport and fuels. The update of this Plan establishes a new technological development with an emphasis on the reduction of emissions of diesel vehicles through technological improvements and use of afterburners. In addition, more strict standards for the entry of light vehicles and motorcycles, and incentives for low and zero emission vehicles were introduced.

\textsuperscript{79} Supra note 37, p. 115

\textsuperscript{80} Chile. (2015). Intended Nationally Determined Contribution of Chile towards the Climate Agreement of Paris 2015, p. 5, pp. 17-18

\textsuperscript{81} Chile. Ministerio del Medio Ambiente. (2014). Planes de Descontaminación Atmosférica Estrategia 2014-2018, pp. 4-10
Furthermore, additional improvements are required to vehicular fuels in order to make the incorporation of cleaner technologies feasible. The APDD assigns tasks to the different entities of the State Administration that are involved in the subject and proposes measures, through different modalities of coordination, allowing a better involvement of the citizens in the application of the ADPP. Relevant regulations, an Operational Plan to Face Critical Episodes, the issue of financing, among others, are also included in the ADPP for the Metropolitan Region of Chile.82

This Chilean Strategy sets forth a comprehensive approach to tackle all types of particulate matter in the air. In the case of Santiago, there have been 97% fewer episodes of coarse particulate contamination between 1997 and 2016.83 The Strategy aims to reduce emissions by 65% in the transport sector.84 Costa Rica can learn from this, and begin to design decontamination plans starting with the GAM and the largest cities until it covers the whole territory. It is important to point out that this approach takes into account every city context, needs, opportunities and gaps in the transport sector, since every city will have its specific decontamination plan. All plans will be directed by the guidelines of a central entity under a general strategy; in Costa Rica’s case, this entity would be MINAE. Municipalities would be the authorities in charge of coordinating the layout of each of the plans and all sectors, as well as citizens, have to participate. Moreover, MOPT should carefully study all regulations and laws displayed in the Chilean Plans, specially the ADPP for the Metropolitan Region, in order to complement and improve the transport laws of Costa Rica.

4.1.3 Ecuador

Ecuador considers itself as the first country of the world to recognize the rights of nature.85 The Constitution of the Republic, issued in 2008, establishes that nature or Pacha Mama has the right to integral respect for its existence, maintenance and regeneration of its life cycles, structure, functions and evolutionary processes. Any person may demand the public authority to fulfill the rights of nature. The State will encourage the protection of nature, and promote respect for all

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82 Library of the National Congress of Chile. Decree 66-1012499 Revises, reformulates and updates the Atmospheric Decontamination and Prevention Plan for the Metropolitan Region (ADPP). 2010, article 2 subsection m)
84 Ibid
elements in an ecosystem. The State shall establish the most effective mechanisms to achieve restoration and shall take appropriate measures to eliminate or mitigate harmful environmental consequences. The State shall apply precautionary measures for activities that may lead to the destruction of ecosystems or the permanent alteration of natural cycles. The State will promote the use of environmentally clean practices. Also, the State will adopt measures for the mitigation of climate change. The central State and decentralized autonomous governments will adopt comprehensive and participatory urban planning policies that regulate the management of urban fauna and encourage the establishment of green areas; and non-motorized ground transportation will be encouraged and facilitated.\(^{86}\) The Constitution gave rise to political, social, economic and cultural transformations in the environmental area, specifically with regards to climate change.\(^{87}\)

In April of this year, the National Assembly of Ecuador issued the Organic Code on the Environment with the aim of guaranteeing the right of people to live in a healthy and ecologically balanced environment, as well as protecting the rights of nature. The provisions of this Code will regulate the rights, duties and environmental guarantees contained in the Constitution, as well as the instruments that strengthen them. Among its objectives, there is the establishment of principles and environmental guidelines to direct public policies, and effective and cross-cutting measures to address the effects of climate change through mitigation and adaptation actions. The Code set out environmental principles including: integral responsibility; best available technology and best environmental practices; sustainable development; polluter pays; *in dubio pro natura* (when in doubt, favor nature); access to information, participation and justice in environmental issue; and caution. Among the minimum mitigation measures, there is the promotion of sustainable and low carbon means of transport.\(^{88}\) These two legal instruments comprise an innovative approach regarding harmonious management of nature.

The Organic Law of the Environment of Costa Rica is from 1995 and it has had few reforms to date. The Law makes no reference to climate change. It mentions the atmospheric pollution in general,

\(^{86}\) Asamblea Constituyente. (2008). Constitución de la República de Ecuador, article 71, article 72, article 73, article 413, article 414 & article 415


without any emphasis on the means of transport\textsuperscript{89}. The Constitution of the Republic of Costa Rica dates back to 1949, and has had few modifications as well. The Constitution does not mention climate change either\textsuperscript{90}. If Costa Rica is indeed committed to be a carbon neutral economy and it aspires to make substantial progress towards the transformation of its laws and policies with the objective of advancing its efforts regarding climate change, especially in its main source of emissions which is the transport sector, it should take the same step as Ecuador: improve the fundamental law of the State, the Constitution. The protection of the rights of nature fits perfectly in the paradigm of the country. The Organic Law of the Environment also requires modifications in order to include the issues of climate change and mitigation in an integral manner, setting out environmental principles and minimum mitigation measures. These modifications would be in line with all three axes of action of the Costa Rican Energy Plan.

4.2 With a View to Sustainable Public Transport

4.2.1 Colombia

Since 2010, the country of Colombia has been developing policy instruments for climate. Within the Colombian Low-Carbon Development Strategy, the country has been thoroughly analyzing the trajectories to decouple GHG emissions growth from economic growth. In the same way, the National Development Plan 2014-2018 includes a Green Growth approach\textsuperscript{91} and one of its objectives involves the expansion and remodeling of the Transmilenio network\textsuperscript{92}. Transmilenio arose as a remedy to the critical situation of mobility in the country's capital, Bogotá. It is comprised of an infrastructure dedicated exclusively to its operations, specialized corridors, lanes of single use, stations, bridges, bike paths and plazas for special pedestrian access, designed to facilitate the use of the system to the users. The project for its construction was approved in 1999 and its first route was inaugurated in 2000. Currently the system has 112.9 km of track in operation, 134 stations, 9 portals, 9 yard garages, and 13 bicycle parking lots\textsuperscript{93}. It mobilizes an average of 1,926,985 passengers per day covering 30\% of the public transportation demand in

\begin{footnotesize}
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\textsuperscript{90} Asamblea Nacional Constituyente. (1949). Constitución Política de la República de Costa Rica.
\textsuperscript{91} Colombia. (2015). Republic of Colombia Intended Nationally Determined Contribution, pp. 4-7
Aside from the evident benefits of Transmilenio, such as the reduction of pollution and the reduction of commute times, there was also a decrease in accidents and, an increase in safety and in the quality of life of all citizens. This bus rapid transit (BRT) system is the largest and one of the fastest of the world; urban planners from around the globe go to Bogotá to study it.

Transmilenio is ruled by a series of resolutions, laws and decrees. Opportunely, the Single Regulatory Decree of the Transport Sector was issued in 2015 with the aim of compiling and rationalizing the regulatory framework that governs the sector and in order to have a single legal instrument for the same. The Chapter on mass public transport service states that the competent authority shall be under the institutional coordination of the Ministry of Transport.

Action 6.2.1.5 of the Costa Rican Energy Plan is to elaborate the phases of a project for the implementation of a Rapid Passenger Transport System, such as an electric train between the main cities of the GAM that can be complemented by other means of mass public transport. A BRT like Transmilenio could be an excellent option for Costa Rica. This type of system costs between $1 million and $5.3 million per kilometer, well below the cost per kilometer of a subway; and it can be started in periods of 12 to 18 months. Costa Rica’s central government and public agencies should carefully study all the laws managing Transmilenio, and the political and social processes that led to its success. Costa Rica has the capacity to implement a BRT but first, there is a need to overcome the political hindrances. There will be inevitable opponents, such as private bus operators and car users. They will not like to be pushed out their routes and neither the reduction of traffic lanes. A firm position and special provisions to integrate existing groups into the new system are necessary.

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94 Ibid
95 Ibid
98 Colombian Presidency of the Republic. Decree 1079 Single Regulatory Decree of the Transport Sector. 2015, article 2.2.1.2.1.1.1
99 Supra note 37, p. 119
project are crucial to its success. Due to Transmilenio, there is a 302,000-ton reduction in carbon
dioxide per year in Bogotá\(^{101}\); a system similar to this one can have a great impact on the
transformation of Costa Rica’s transport system and its GHG emissions.

### 4.2.2 Uruguay

Uruguay is expecting to be a net CO\(_2\) sink by 2030. The country’s dynamic has allowed a growth
coupled with a reduction on emissions in all sectors; for some of them it has even reduced absolute
emissions. This is due to strong public policies on climate change, a new institutional framework,
the buildup of a National Climate Change Response Plan, and specific policies for all sectors. The
country has made important progress in the transport sector and it will continue to execute
innovative approaches in the sector. This advance has been possible because of large investments
promoted by public policies\(^{102}\). For example, the transformation of the energy sector was feasible
through a public-private investment accumulated over various years, which reached 3% of the
annual GDP on average\(^{103}\).

Also in 2008, the country issued Law 18.308 on Land Planning and Sustainable Development\(^{104}\)
which constitutes an innovative regulatory framework for the planning and management of the
national and departmental territory. This law aims to overcome the disintegration within sectors\(^{105}\)
through the following instruments:

a. At a national level: National Guidelines and National Programs.
b. At a regional level: Regional Strategies.
c. In a departmental scope: Departmental Guidelines, Departmental Ordinances, Local Plans.
d. In an interdepartmental scope: Interdepartmental Plans.
e. Special instruments.

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(visited 2017, June 28)

\(^{102}\) Uruguay. (2015). Uruguay Intended Nationally Determined Contribution, pp. 3-12

\(^{103}\) Ibid, p. 7


The Ministry of Transport is part of the National Committee of Land Management, which is in charge of the coordination of strategies\textsuperscript{106}. Accordingly, the Mobility Plan (MP) comes to be part of the set of Sectoral Plans. The MP, derived from the Montevideo Plan, includes the general guidelines in terms of roads and transportation; it is an instrument of territorial structuring linked to the road system, production and promotion sectors, urban centers and green areas. The Metropolitan Transportation System (MTS) is the proposal for urban transport in Montevideo and the fundamental component of the MP. One of the strategic guidelines of the MP is active transportation, which aims to consolidate the use of the bicycle as a sustainable mode of transport. It seeks to guarantee the continuous and safe circulation of this mode, and its complementation with the Montevideo MTS. It is understood that this alternative comes with a change in the model of the city; therefore the creation of bike lanes is one of the commitments of the MP\textsuperscript{107}. Currently, there are 35.9 km of bike paths in the capital of Uruguay\textsuperscript{108}. Among the pioneer cities in the implementation of bike-inclusive policies in Latin America, Montevideo is the one that has more public institutions working together in the promotion of the bicycle\textsuperscript{109}. Furthermore, another measure that has been fundamental in the promotion of the construction of bike lanes in Montevideo is the Participatory Budget (PB)\textsuperscript{110}. The PB is a departmental program that gives the inhabitants of Montevideo the right to participate in proposing and then deciding, through the a secret vote, the execution of infrastructure works and social services, which are financed with the budget of the Intendance of Montevideo\textsuperscript{111}. The joint work of the departmental government and other organizations has achieved a significant advance in cycling mobility\textsuperscript{112}. Unibici is a program of the University of the Republic that promotes the use of cycling among its students and teachers\textsuperscript{113}. There are other groups of volunteers promoting the use of bicycles in Montevideo. Gente en Bici organizes trips to inform people of transit laws and basic safety practices. Ciclovida Urbana

\textsuperscript{106} Supra note 104, article 8 & article 75  
\textsuperscript{107} Supra note 105, pp. 17-33  
\textsuperscript{108} Banco Interamericano de Desarrollo. (2015). Ciclo-inclusión en América Latina y el Caribe: Guía para impulsar el uso de la bicicleta, p. 4  
\textsuperscript{109} Ibid, p. 15  
makes cycling picnics, and offers free bicycle repair workshops and a map of friendly spaces for bicycles and shops. They gathered more than 10,400 signatures in an online petition asking the local government for more cycling actions\textsuperscript{114}. In that way, the Intendance of Montevideo issued the Decree 35.865, which imposes the obligation of parking places for bicycles in public and private buildings\textsuperscript{115}.

In order to tackle the issues in the public transport system in Costa Rica, a good commencement would be to enhance the integration of the sectors involved. Uruguayan Law 18.308 could serve as a starting point to achieve the latter and to design an exhaustive Mobility Plan for the GAM of Costa Rica. This Plan will guide the pathway towards an integral transport system in the metropolitan area and promote further cycling policies and infrastructure. Action 6.1.2.1 of the Costa Rican Energy Plan is to promote infrastructure that provides safety and comfort to cyclists in urban areas of the country\textsuperscript{116}. For this matter, it is also important to remember citizen participation since bicycle policies are used, promoted and even hindered by the community itself. Any project must include civil society because its knowledge can improve future projects\textsuperscript{117}. This inclusion needs to be done from local governments. Municipalities within Costa Rica’s GAM have made some progress on this subject, nevertheless, a lot of work remains to be done. In this regard, Montevideo and San José, capital of Costa Rica and portion of the GAM, are similar. In Montevideo, as well as in San José, 2% or the trips are made by bicycle\textsuperscript{118}; none of them has a metro system; and both rely their mass transportation on old buses\textsuperscript{119}. Bikes and its culture have been slowly gaining territory in Montevideo\textsuperscript{120}, and in San José, the same can happen.

\textbf{4.2.3 Mexico}

\textsuperscript{114} Inter-American Development Bank. (2013). Cycling in Latin America and the Caribbean, p. 22
\textsuperscript{115} The Departmental Board of Montevideo. Decree N 35.865. 2012, article 4 & article 5
\textsuperscript{116} Supra note 37, p. 118
\textsuperscript{117} Supra note 108, p. 10
\textsuperscript{118} Supra note 108, p. 2
\textsuperscript{119} Siemens AG. (2010). Latin American Green City Index: Assessing the environmental performance of Latin America’s major cities, p. 73
\textsuperscript{120} Supra note 110
Mexico is the first developing country to have a comprehensive law on climate change. In 2012, the congress of Mexico unanimously approved the General Law on Climate Change\(^\text{121}\). In regards to mitigation actions, the law prioritizes the sectors with greater potential for GHG reduction, finalizing with the most expensive ones. These actions will be done in a gradual manner\(^\text{122}\). In the transport sector, important opportunities to reduce GHG emissions meant for the fulfillment of the country’s INDC goal have been identified, such as the improvement of the infrastructure for public transportation systems aimed at supporting the mass transport model shift\(^\text{123}\). In this context, an ongoing mitigation measure is the *Ecobici* individual transport system\(^\text{124}\). *Ecobici* is a fourth-generation public bicycle system, implemented by the Government of the Federal District as part of the Bicycle Mobility Strategy (BMS) and managed by the Environment Department of the Federal District. It started operations in 2010 with 85 bike stations and currently it has 444 with a coverage area of 32 km\(^2\) in 42 colonies\(^\text{125}\). The BMS is product of the Green Plan of the Environment Secretariat, which was promoted by the Sustainable and Long Term Development axis of the General Development Program of the Federal District 2007-2012\(^\text{126}\). *Ecobici* now has approximately 6,500 bikes and more than 240,000 registered users\(^\text{127}\). It is recognized as the largest public bicycle system in Latin America and an international success case of shared sustainable mobility\(^\text{128}\). As of today, over 42,148,750 trips have been made using the *Ecobici* system\(^\text{129}\). Around 35,000 trips of the 135,000 trips less than 5 km long that are made in Mexico City, are made using the *Ecobici* system\(^\text{130}\). This increase is due to the fact that one of the first actions of the government of the

\(^{121}\) Mexico. (2015). Intended Nationally Determined Contribution, p. 1
\(^{122}\) Chamber of Deputies. H. Congress of the Union. LXIII Legislature. United States of Mexico. DOF 01-06-2016 General Law of Climate Change. 2016, article 32
\(^{124}\) Ibid, p. 183
Federal District was to integrate Ecobici into the City Card. Now with the City Card you can use the metro, the metrobus, the Electric Transportation System and the Ecobici system. More than 50% of Ecobici users combine their trip with the metrobus. Due to the number of bicycle trips, the local government has invested in bike-schools and two massive bicycle parking lots. It is important to note that when this project started, only 2 out of 10 users were women; today it has risen to 4 out of 10. This is a positive indicator of the perception regarding the safety of the system and the safety of using bicycles in Mexico City. A major change in bike culture has been achieved in this city. Much of this progress is thanks to the activists, as they have put pressure on local authorities.

Similar to the previous case, the importance of the role of local governments, inclusive laws and citizen participation is evident in the promotion of bicycle policies and infrastructure into the urban planning. In 2014, Costa Rica started a pilot project on bike sharing with 100 units and 3 bike stations in the province of Cartago. Nevertheless, there is no such project yet in San José. Taking as an example the case of Mexico, the Municipal Development Plan of San Jose should be updated and include more green components that allow the development of projects like the Ecobici system in the capital city. Improving the security component for citizenship is essential to promote this system. The Development Plan of San Jose needs to be in line with the Mobility Plan for the GAM mentioned above. Most importantly, a General Law on Climate Change would be a great reinforcement for the ongoing low carbon initiatives in Costa Rica. The principle of priority for the less costly initiatives should be implemented as well.

4.2.4 Chile

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131 Ibid  
132 Ibid  
133 Ibid  
134 Supra note 127  
According to the IESE Cities in Motion Index of 2016, the city of Santiago, Chile is the most sustainable city in Latin America\(^\text{136}\). One measure that is carried out in the public transport of this city is the Beep Card! The Beep Card! is the means of payment which allows access to public transport services for passengers of the Trasantiago System, both in buses and subway. Is a card that contains an electronic chip\(^\text{137}\). There are four types of Beep Card!. The Beep Card! Carrier is the most popular, it can be used by the person who has it and it cannot be blocked due its loss or robbery. The Beep Card! Custom allows you to block it and recover the balance; it is non-transferable since it has a name and photo. The Beep Card! Banking has debit card functions as well. And the National Student Card is a benefit of reduced rates for students\(^\text{138}\). The card also has an official application that can be downloaded to the cell phone, which can be used to charge the card, plan the trip, among other things\(^\text{139}\). The card is complemented by an integrated rate system. The integrated rates operate within two hours from the start of the first trip, allowing a maximum of two transfers. When combined bus and metro or train during the Peak Hours there is an additional cost of 100 Chilean pesos. When combined bus and metro or train during Valley Hours there is an additional cost of 20 Chilean pesos\(^\text{140}\). The antecedent to this measure is an agreement between the Ministry of Transport and Telecommunications and the Passenger Transport Company Metro, and Law 18.696 authorizing the importation of vehicles for the transport of passengers\(^\text{141}\) whose emissions must not exceed the amounts fixed. The law assigns the Ministry of Transport and Telecommunications as the responsible for the regulation and operation of the remunerated transportation of passengers, public or private\(^\text{142}\).

One of the actions envisaged in Objective 6.2.1 of the Costa Rica Energy Plan, to promote the implementation of measures that optimize the operation of public transportation system, is the implementation of an electronic payment system for the different modalities of mass public

\(^{136}\)IESE Business School. Center for Globalization and Strategy. (2016). IESE Cities in Motion Index, p. 33

\(^{137}\)Library of the National Congress of Chile. Exempt resolution 3107 Approve Procedure to Use Beep Card!. 2013, section 1.2


\(^{141}\)Supra note 137, section 1.1

\(^{142}\)Library of the National Congress of Chile. Law 18.696 Modify article 6 of Law N. 18.502, Authorizes import of vehicles signed and established Standards on Passenger Transportation. 2016, article 2 & article 3
transportation\textsuperscript{143}. In fact, the first step in the matter has already been taken. Last February, the Cooperation Agreement for the development of the project between the MOPT and the Public Transport Council, INCOFER, the Public Services Regulatory Authority (ARESEP) and the Central Bank of Costa Rica was signed. The electronic payment system for buses and train will work with the use of prepaid and bank cards. Unfortunately, this plan has been accompanied by many failures and delays. The proposal for the public policies that guide the development of the system is still pending\textsuperscript{144}. The country should study the case of Chile and the regulation for the use of the Beep Card\textsuperscript{1} in order to advance faster and avoid further delays. During this process they should also consider the integrated rate system. MOPT together with ARESEP should determine the conditions for it.

4.2.5 Argentina

The goal of the Argentinian NDC is intended to be achieved through the sectors of economy, energy, agriculture, forests, transport, industry and waste\textsuperscript{145}. The capital of Argentina, Buenos Aires, has made important improvements in its reduction of GHG emissions and urban mobility. Proof of this, is that the city became the 2014 winner of the Sustainable Transport Award. Among the sustainable projects that made the city worthy of this honor is the transformation of the city center into an environment that encourages walking and cycling instead of driving, promoting a culture that prioritizes people\textsuperscript{146}. In fact, the city of Buenos Aires is considered one of the most walkable cities in the world\textsuperscript{147}.

In Buenos Aires, where railroads, road accesses and even buses are dependent on the national government, innovative measures have been adopted in urban planning, and transport policies and projects. Despite the authorities' fear of taking measures to limit the use of cars in a city where their

\textsuperscript{143} Supra note 37, p. 119
\textsuperscript{145} Argentina. (2016). Republic of Argentina First Revision of its Nationally Determined Contribution, p. 1
use was increasing significantly, in 2006-2007, the National Transportation Secretariat carried out a study on public urban transport in *Buenos Aires*. In 2009-2010, a survey of mobility was also carried out in the city. At the end of 2008, the *Buenos Aires* legislature approved, through Law 2930, the Environmental Urban Plan. This element guided the elaboration of the Sustainable Mobility Plan. This Plan embraces the four dimensions of the concept of sustainability: efficiency and effectiveness, equity, environmental issues and management.\(^\text{148}\) The Plan aims to reorder the transit in the city, so that transportation is fast, safe and orderly. It includes programs that were developed taking into account the best experiences worldwide.\(^\text{149}\) One of the Plan's programs is Pedestrian Priority which promotes infrastructure projects that improve road safety and promote good coexistence in the streets. In the *Microcentro* area, where more than one million people circulate every day, streets were demarcated as pedestrian priority, sidewalks were widened, new bicycle lanes were built, and better lighting and new trees were incorporated. Chinatown was improved, a new pedestrian path was made between the Metrobus stations, and 12 pedestrian interventions were created in the San Martin Avenue.\(^\text{150}\) Moreover, in *Microcentro* there is a vehicular restriction on working days from 11 to 16 hours. Only vehicles with parking inside the area and with a permit can circulate in this timetable.\(^\text{151}\) Due to the expansion of the *Microcentro* model, other cities are starting to carry out further measures such as the application of speed limit of 10 km/h in some of the streets, free Wi-Fi connection, and landscape renovations.\(^\text{152}\) It is also important to highlight that last June, the government of *Buenos Aires* enacted Decree 208/17 modifying the organizational structure of the Ministry of Environment and Public Space of Buenos Aires in order to create the Subsecretariat of Pedestrian Routes and the four dependent directions.\(^\text{153}\)

If I had to select the potentially most effective or urgent policy measure which needed to be implemented in Costa Rica to advance sustainable transportation goals, it would be the Pedestrian Priority policy; following the example of Argentina but adding a special component on security. This is because in Costa Rica, despite the fact that buses are renewed, the train is improved, fuels are more environmentally friendly, and a subway is built, people will still prefer private transportation over public or non-motorized transportation due to insecurity. People fear being mugged if they walk in downtown *San José* or if they take the bus, particularly women. People drive their cars a couple of blocks due to this perceived insecurity. This is why the security component is so important. It is necessary to install security cameras on the streets, increase the number of policemen, raise their salary, train them better, and make stronger laws and penalties, among others. This policy would be coherent with Specific Objective 6.1.2 of the Costa Rican Energy Plan regarding the promotion of non-motorized mobility actions. A Subsecretariat of Pedestrian Routes for the Municipality of San Jose is an excellent idea to direct this policy.

4.3 On the Road to Cleaner Fuels

4.3.1 Brazil

In 2010, a Decree promulgated by the President of Brazil set a national target for annual GHG emissions. This Decree made Brazil the first developing country to establish an absolute limit to its GHG emissions. As of today, Brazil’s actions against climate change represent one of the largest compromises by any country of the world. In 2012, Brazil reduced its GHG emissions by 41% in relation to 2005 levels. For instance, Brazil has one of the best and largest biofuels programs. The country is the world’s top exporter and consumer of sugarcane fuel ethanol. Particularly, Brazil’s transport sector energy mix comprises a high share of biofuels. Law 11.097 of 2005, on the introduction of biodiesel in the Brazilian energy matrix, aims to increase the economic, social and environmental participation of biofuels in the national energy matrix. The proposals of national policies to the President of the Republic for the guidelines of the biofuels program are assigned to

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154 Supra note 37, p. 118
156 Brazil. (2015). Federative Republic of Brazil Additional information on the iNDC for clarification purposes only, p. 1
157 Ibid, p. 3
158 Supra note 155
the National Energy Policy Council. The law establishes the National Agency for Petroleum, Natural Gas and Biofuels as the regulator of the biofuels industry, linked to the Ministry of Mines and Energy.159 Most importantly, amendments to this law set the minimum mandatory percentage of biodiesel added to the diesel fuel marketed in any part of the national territory at 8% by 2016, 9% by 2017 and 10% by 2018.160

Costa Rica is starting to change the regulations around the development of the biofuel industry. After the enactment of the new Decree on the regulation of biofuels and their blends, RECOPE is the responsible for the commercialization and distribution of fuel ethanol and biodiesel through the mixture with fossil fuels. RECOPE is in charge of establishing the required volumes of biofuels to meet the national demand and these must comply with the technical specifications set. The shares between biofuels and fossil fuels in the blends will be determined by MINAE.161 RECOPE is going to start first with ethanol, and later with biodiesel. This is because the price of biodiesel is up to twice the price of diesel, and there are no provisions of domestic raw material that can supply national consumption at the moment. For this reason, the country must come into possession of important plantations for biodiesel production and these must be of quality. It is expected that the sale of biodiesel will occur within 3 to 5 years.162 If 60,000 hectares of palm oil are utilized, this would generate 15,000 direct jobs, savings or local investment for $200 million annually and a decrease of more than 20% in GHG emissions.163 In order to begin and direct the sale and promotion of biodiesel in Costa Rica, a regulation like Law 11.097 from Brazil might add a valuable encouragement to the process. The gradual increase of the mandatory percentage of biodiesel in the mixtures is a great option to introduce this type of fuel into the energy matrix of the country.

159 Brazil Presidency of the Republic Civil House Sub-branch for Legal Affairs. Law 11.097 Provides for the introduction of biodiesel into the Brazilian energy matrix; amends Laws 9.478 of August 6, 1997, 9.847 of October 26, 1999 and 10.636 of December 30, 2002; and makes other arrangements. 2005, article 1, article 3 & article 5
160 Brazil Presidency of the Republic Civil House Sub-branch for Legal Affairs. Law 13.263 Amends Law 13.033, dated September 24, 2014, to provide for the percentage of biodiesel added to the diesel sold in the national territory. 2016, article 1
161 Supra note 56, article 10, article 11, article 12 & article 13
MINAE would be the entity responsible for the determination of the percentages and the deadlines for their implementation. This initiative would be in line with the Energy Plan objective 7.3.1 of creating the legal, technical, and institutional conditions to incorporate biofuels into the energy matrix\textsuperscript{164}. Brazil aims to enhance cooperation on biofuel capacity-building with other developing countries\textsuperscript{165}. This could be an extraordinary opportunity for Costa Rica to further advance in the industry.

4.3.2 Guatemala

Guatemala has taken solid steps to address the challenges posed by climate change. The country has a National Policy on Climate Change and one of the first climate change laws worldwide\textsuperscript{166}. The Framework Law to Regulate Vulnerability Reduction, Mandatory Adaptation to the Effects of Climate Change and the Mitigation of Greenhouse Gases has the objective of establishing the necessary regulations to prevent, plan and respond in an urgent, adequate, coordinated and sustained way to the impacts of climate change in the country. The law establishes that all public entities dedicated to research and scientific application, will design and implement plans, projects and actions to improve the contribution to the reduction of GHG emissions. The country's universities and private research centers will promote research on climate change and may be supported by the State. The law also creates the National Council on Climate Change which will be chaired by the Presidency of the Republic as a regulatory entity, with public and private participation of all sectors. Moreover, the Secretariat for Planning and Programming of the Presidency and the Ministry of Public Finance shall prioritize the allocation of economic resources to government entities that formulate their plans, programs and projects as established by this law. Municipalities and the Urban and Rural Development Councils will take into account the results of national communications and the biophysical, social, economic and cultural conditions of their respective territories when addressing land use planning for climate change mitigation.

\textsuperscript{164} Supra note 37, p. 127
\textsuperscript{165} Brazil. (2015). Federative Republic of Brazil Intended Nationally Determined Contribution: Towards achieving the objective of the United Nations Framework Convention on Climate Change, p. 4
\textsuperscript{166} Guatemala. (2015). Contribución Prevista y Determinada a Nivel Nacional, section 2
Furthermore, the law creates the National Climate Change Fund with the objective of financing mitigation plans and projects, among others.\(^{167}\)

Under this framework, the *Reciclaceite* project was launched in April 2015. The project started with the aim of collecting used cooking oil from 400 restaurants at 6 markets in Guatemala City, and then be transformed into biodiesel by the Valle University from Guatemala. The project, in addition to avoiding pollution in water sources, will also reduce GHG emissions as the biodiesel produced will be used to fuel vehicles of the Municipality of Guatemala City and the Electric Company of Guatemala (EEGSA)\(^{168}\). The project was awarded a $50,000 grant under a program called Sustainable Communities in Central America and the Caribbean which is funded by the U.S. Department of State and executed by the Organization of American States, through the Energy and Climate Partnership of the Americas. *Reciclaceite* brings together other key players. Solar Foundation, a large nonprofit environmental organization in Guatemala, manages the project. The Municipality of Guatemala City is in charge of oil collection. EEGSA contributed $25,000 in supplemental funding, and the Renewable Fuels Association granted additional support. Plus, the technical aspect is responsibility of the Valle University, a private nonprofit institution. The project has shown a lot of potential. The city collects 100 gallons of used oil per week and has a bigger demand, owners of restaurants have expressed their content about helping the environment.\(^{169}\) The pilot project has officially ended but the city is continuing to collect the oil while expecting a long-term solution such as a biodiesel plant producing 4,500 gallons of biodiesel per month, which will be enough to supply the entire fleet of diesel-powered vehicles of the city.\(^{170}\) For this project the B25 mixture was chosen which can reduce up to 45% of GHG emissions.\(^{171}\)

\(^{167}\) Congress of the Republic of Guatemala. Decree 7-2013 Framework Law to Regulate Vulnerability Reduction, Mandatory Adaptation to the Effects of Climate Change and the Mitigation of Greenhouse Gases. 2013, article 1, article 7, article 8, article 10, article 12 & article 24


\(^{170}\) Ibid

An integral and comprehensive legal framework in climate change has allowed Guatemala to have such experiences that in the long term they could represent a large portion of the contribution to achieve the goals proposed by the country in the reduction of GHG emissions. Costa Rica can replicate these lessons. As mentioned earlier, a General Law on Climate Change would be a great advance for the country and it would be in line with Specific Objective 7.3.1 of the National Energy Plan as it refers to the creation of legal, technical and institutional conditions to incorporate biofuels into the energy matrix. It is important that this legislation involves research centers, universities and relevant entities; and that the State provides them incentives in the area of innovative projects for the reduction of GHG emissions. The law should also give budget priority to entities that implement low carbon actions and contribute to the mitigation of emissions. The Climate Change Fund, like the one in Guatemala, would be important to replicate as well, with the prioritization of sustainable transportation measures in public entities and municipalities, such as Reciclaceite. This initiative, if implemented in all the municipalities of Costa Rica, could have a profound impact on the total GHG emissions.

4.3.3 Argentina

Climate change legislation in Argentina hasn't been easy to enact, however, the country currently has a considerable portfolio on climate laws. Law 26.123 states the technological development, production, and use of hydrogen as fuel, as well as an alternative energy source, a matter of national interest. Among the objectives of the law are: encourage the application of technologies that allow the use of hydrogen; promote international cooperation in the field of generation and use of hydrogen through the exchange of scientific knowledge; encourage the development of an educational plan to raise public awareness on the uses and scope of hydrogen as fuel; promote the research and development of technologies that allow the use of hydrogen as fuel for vehicular use. The Executive Power will decide the authority for the implementation of this law. The National Fund for the Promotion of Hydrogen, which will be used to finance the plans of the National Hydrogen Plan, is created through this law. Natural and legal persons who engage in the production

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172 Supra note 37, p. 127
and use of hydrogen promoted in terms of this law will enjoy tax benefits\textsuperscript{174}. Argentina, along with Brazil and Spain, are the three Ibero-American countries with the highest research and development activity in hydrogen and fuel cells. The main objective of the Plan is to use hydrogen as fuel in Argentina in the near future\textsuperscript{175}. The Plan has 24 projects to implement in different periods. One of them includes the injection of hydrogen into pipeline networks, others are linked to vehicles, public transport, trainings and the production of hydrogen from biomass\textsuperscript{176}.

Costa Rica could utterly enact a law similar to this one and learn from Argentina’s knowledge on hydrogen. One of the specific objectives of the Costa Rican Energy Plan is to promote research on the production and use of alternative fuels such as hydrogen\textsuperscript{177}. The country has made great progress in the matter, nonetheless, further promotion and development of this type of technology can bring the country many more benefits. The Ministry of Science, Technology and Telecommunications may be the entity in charge of presenting the bill and in collaboration with Ad Astra Rocket Company, universities, research centers, State companies, and the productive sector; can develop the Costa Rican Hydrogen Plan. Ad Astra Energy and Environmental Services (AASEA) partnered with RECOPE for the research and development of the experimental hydrogen compression and storage center which started operations in December 2013\textsuperscript{178}. The latter shows that the country has already had success in public-private cooperation in this subject. Furthermore, Argentina is seeking for international cooperation in the matter which could be a great opportunity for Costa Rica. The Argentinian project on injection of hydrogen into the pipeline networks is a project that Costa Rica might be interested in, since the country has the necessity to enhance the pipelines for each product in the National Fuel System, as mentioned earlier. As a matter of fact, Costa Rica has experience regarding international partnership in the field as the Ad Astra Rocket hydrogen bus was developed in an alliance with the French company Air Liquide, US Hybrid

\textsuperscript{174} Argentinian Legislative Information. Law 26.123 Promotion of Hydrogen. 2006, article 1, article 3, article 6, article 13, article 14 & article 17
\textsuperscript{177} Supra note 37, p. 128
Corporation and Cummins from US, and the Costa Rican operator Relaxury\textsuperscript{179}. The transport sector would be the biggest beneficiary of this law, however, there are other benefits of developing this technology, such as the possibility of importing hydrogen. Japan has plans to buy hydrogen from Argentina\textsuperscript{180}, for example. In the case of Costa Rica, hydrogen is obtained from the separation of water molecules, which does not generate GHG emissions. But, in industrialized countries you get methane gas that, when subjected to a treatment with steam, separates the hydrogen and carbon. In this case, the release of carbon has a polluting effect on a small scale\textsuperscript{181}. This adds value to the Costa Rican hydrogen. An incentive like law 26.123 of Argentina can mean a great advance in the use of hydrogen as fuel in the country, nevertheless, more support from the government in order for this alternative fuel to be feasible and competitive in the market is imperative.

5. Conclusion

This paper has presented a set of sustainable practices in laws and policies from Latin American countries which have contributed to the reduction of GHG emissions in their transport sector. The paper displayed innovative options and approaches that could be introduced into the Costa Rican legislature and adapted to its transport regulations needs in order to support the country’s endeavor to accomplish its commitments and its goal of becoming a carbon neutral economy. Nevertheless, there are many other good measures that Costa Rica could implement following the example of Latin America and other regions of the world in order to improve its transportation system, such as the Honduran regulation which prohibits the importation of cars older than 10 years but allows the importation of vehicles older than 25 years for collection purposes\textsuperscript{182}; or the Electronic Road Pricing system in Singapore\textsuperscript{183}; the Laudrive platform in Mexico that is similar to


\textsuperscript{181} Supra note 179


Uber but the drivers and passengers are only women\textsuperscript{184}; the \textit{Transmetro} in Guatemala executed with modest funding, recycled equipment and low fares\textsuperscript{185}; the car-free cities in Europe\textsuperscript{186}; the cable car network in Bolivia\textsuperscript{187}; etc. Costa Rica has made significant progress in laws and policies regarding climate change and transportation, and the country has demonstrated to have innovative capacity in the matter, for example, the country is at the forefront in Latin America regarding plasma research as an alternative source of energy\textsuperscript{188}. However, the tropical country still has a long way to go in sustainable transportation. With political will, significant investments, public participation, strategic and integrated planning, along with special attention to security increase for Costa Ricans, the country will be able to transform the culture of mobilization and reduce the main source of GHG emissions in a not too distant future.


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