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Green Logistics and Urban Mobility in Central America

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Acronyms

AMMS	The Metropolitan Area of San Salvador
ATE	Energy Transition Agenda
BID	Inter-American Development Bank
BRT	Bus Rapid Transit
COAMSS/OPAMSS	Council of Mayors and Planning Office of the Metropolitan Area of San Salvador
COMITRAN	Sectorial Council of Transport Ministers of Central America
CPC	Central American Port Corporation
DR-CAFTA	The Central America - Dominican Republic - United States Free Trade Agreement
EIB	European Investment Bank
FEGUA	Railways of Guatemala
GAM	Greater Metropolitan Area
GDP	Gross Domestic Product
GHG	Greenhouse Gases
ICAO	International Civil Aviation Organization
INCOFER	Costa Rican Institute of Railways
LAIF	Latin America Investment Facility
NAMA	Nationally Appropriate Mitigation Actions
NCRE	Non-conventional Renewable Energies
NDCs	Nationally Determined Contributions
PIMUS	Integrated Plan for Sustainable Urban Mobility
SIECA	The Secretariat for Central American Economic Integration
SITRAMSS	Integrated Transportation System of the Metropolitan Area of San Salvador
SMEs	Small and medium-sized enterprises
SUMP	Sustainable Urban Mobility Plan
TELCA	Electric Freight Train to the Atlantic
TEU	Twenty-foot Equivalent Unit

Executive summary

Objectives of the Study

The purpose of this study is to understand the general situation of urban logistics and mobility, referencing the capitals of the countries studied throughout the region, and the existing plans to improve their respective situations. A focus on the market sector, its structure, current situation, trends, regulations, and sustainability, is done to provide recommendations for action to the relevant stakeholders.

Similarly, the study compiles data from a range of reliable secondary sources and virtual meetings with key stakeholders in this sector. The latter information is then processed to result in a prospective analysis of the contemporary state of Green Logistics and Urban Mobility in the region, offering multiple examples of trends and projects that are in the works. This makes it possible to identify some of the existing business opportunities in the region, ranging from consulting in the design of systems to the construction of large-scale works.

Moreover, efforts to consolidate the sector under the provisions aligned with sustainability have previously proven somewhat futile due to the existing conditions that are un conducive with the rapid modernization and increased efficiency demanded by such policies. This study ultimately aims at understanding these conditions and their corresponding efforts in order revamp the sector and line up its prospects and aspirations with that of a key sustainable market.

The remainder of this section will summarize the status of the market in the region, its opportunities, its barriers, and lastly, a set of recommendations for action that stakeholders can abide by when dealing with the sector.

General overview of the Green Logistics and Urban Mobility Sector in Central America

Before delving into the sector's positioning within the region, we must understand the sizing of the latter. The Central American sub-continent comprises of an area of 522,760 km². This specific report focuses on the following six countries: Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua, and Panama. These amounted an aggregate Gross Domestic Product (GDP) of USD 254,9 billion in 2020 and its population reached 50.6 million inhabitants by the same year.

Shifting the focus to the Green Logistics and urban Mobility, transportation, as a sector, has low sophistication, lack of integration, low financial capacity for many actors, and other obfuscating issues. As to repeal such conditions, the industry will have to face the challenge of transforming itself to achieve higher levels of efficiency and productivity, whilst also complying with the climate commitments assumed by the region's governments. In parallel, governments must design systems, incentives, and policies that help the industry cope with changes and generate changes in individual behavior that promote sustainable mobility.

Transportation, of people and goods, represented between 5.0% and 5.3% of the Central American Gross Domestic Product (GDP) between 2007 and 2016. Participation by country is not uniform. In Panama, for example, due to the canal's presence, the contribution to the economy is more significant. In contrast, in the region's countries with the less sophisticated economies like Nicaragua, the share of transport in GDP is lower, signaling the disparity of perceptions towards the sector.

Despite its importance in the Central American economy and globally, the transport sector faces one of its most significant challenges: reinventing itself as a sector to meet the goals of the Paris Climate Agreement. These standards have been set by the international community

to be conducive with sustainable growth which can prove fortuitous for a sector that clearly needs revamping.

Reaching the limits of said agreement requires a significant reduction in greenhouse gas (GHG) emissions, and transportation represents 23% of the world's energy-related carbon dioxide emissions. In Central America, about half of the fuel emissions result from motor vehicles. This is quite indicative of the amount of work that is to be done for the sector to ensure its compliance with the established set of standards.

Furthermore, a conduit for the fulfillment of said sustainable practices can be established through the realization that improvements in the sector can directly translate into the interests of relevant stakeholders. Trade infrastructure in the region, which directly ties into the sectors being analyzed, offers a platform for the continuity and establishment of existing and neophyte initiatives that aim to improve overall productivity.

The region's economic integration process promotes trade between relevant stakeholders through private and public sector projects and agreements. Despite the logistics difficulties, there is an intense trade of a variety of goods in the region. These primarily circulate through the so-called Pacific Corridor, which stands out as the leading logistics corridor in the region. This corridor begins at the border post of Tecún-Umán in Guatemala and extends all the way to the Panama Canal. Trade within the corridor represents a multitude of products from a variety of supply chains.

However, regardless of existing projects that are clearly all-encompassing (in terms of the participation of products and stakeholders), the region's potential is not reached yet. To take full advantage of these agreements and projects (like the Pacific Corridor) and to permeate more effective productivity, there is a need for greater logistics efficiency. Performance in Central America lags, except for Panama. There are deficiencies in practically all the areas examined by the World Bank's Logistic Performance Index. Three of the six countries that make up the region are below position 100 in the general ranking. This leaves great room for improvement which directly translates to opportunities for growth, which we will highlight in the following section.

Opportunities

From the revision of the regulatory framework of the different Central American countries, there are features promoting green logistics and sustainable Urban Mobility in place. Yet, as we have pointed out previously, the levels of sophistication within these sectors are still comparably low regarding expectations. Therefore, Central America still processes significant potential to increase its current capabilities in various transportation and logistics technologies. Going back to the Paris Agreement and its demand for sectors to gradually evolve, there are four principal measures to promote compliance that can be seen as a roadmap for the opportunities in the region. The four measures are: generation of electricity through renewable sources, or other low-carbon sources; electrification of vehicles, boilers, and heating replacing fossil fuels; the increase in the use of public and non-motorized transport, as well as changes in land use planning that decrease support mass transport and finally take advantage of ecosystem services and restoration for carbon fixation.

Furthermore, Central America has the potential to develop as a multimodal logistical hub due to its geographical location. This would take shape following the existing strategy of integration into international markets. For example, countries in the region have signed multiple trade agreements (DR-CAFTA with the US and Association Agreement with the EU). As a result of this strategy, the trade of goods has grown. Many multinational companies have established factories in the region, close to the US market, and take advantage of the free trade agreements.

As a result of a shift in focus into these logistic hubs, achieving higher levels of efficiency in logistics will allow the countries of the region to create favorable conditions to take advantage

of trends like nearshoring. Reducing travel distances of goods could result in lower GHG emissions if the transport mechanisms are comparable. And the comparative advantages that the countries have, such as its proximity to the US market may enable this option.

Improving logistics in the region can be obtained by different means. Logistics efficiency is affected by three components: (a) regulatory and institutional framework; (b) infrastructure (road, port, airport, and rail, logistics platforms, warehouses, distribution centers, and border crossings); (c) services (road, sea, river, air, rail transport, and logistics services. For example, the provision of infrastructure improvements allows reducing costs, transportation times and facilitating the movement of inputs or products within a country or internationally, creating suitable conditions for companies' growth and employment generation. The European Union works together with the regional institutions to update the regulatory framework and facilitate the interoperability between countries and institutions.

Lastly, efforts of a shared vision are to be continued. For example, SIECA and COMITRAN developed the Central American regional framework of mobility and logistics policy between 2015-2017. This framework gives the vision and goals for the region to 2035. It defines four strategic objectives: (i) contribute to economic development and improve the regional competitiveness; (ii) contribute to better integration to improve quality and efficiency in the mobility of people and the supply chain; (iii) generate a more significant economic, social, territorial, and sub-regional integration; (iv) improve the quality of life of the population.

Furthermore, many global organizations and funds are dedicated to advocate the climate crisis in Central America. Some examples are, The Green Climate Fund (GCF), COMITRAN, CABEL, among others. These initiatives are not to be taken lightly as a shift in the consensus over the sectors can allow them to fulfill their full potential through the alignment of interests.

Barriers and challenges

Moreover, there are also important barriers of entry to consider when mentioning the opportunities. Most of the following challenges are caused by the persistence of monopolistic policies, outdated or unfocused stimuli, and limited technical knowledge of new generation technologies. Similarly, there exists no shared vision of logistics and urban mobility in the region. Even though there are initiatives in place, alignment of interests within the stakeholders is difficult to achieve under the existing circumstances. As a result, each country has sought to develop its plans and strategies independently.

Continuing, the dynamism of the region in regard to the alignment of interests, one of the main challenges the regional framework faces is that it is indicative that it is not mandatory for the countries. Hence, they depend on national plans and financing for their fulfillment. As a result, sustainability advocacy in Central America deals with many obstacles. With low education and high poverty levels, it is very difficult for individuals and organizations to advocate for sustainable change. Therefore, there are not many organizations that advocate for specific causes in these countries. Instead, advocacy can be seen through government actions and plans that come to fruition due to citizen's demands.

Logistical barriers are also significant. The World Bank estimated delays at the border crossing that take up to 48 hours, and the average speed of ground freight is 18.6 Kms. Another problem noted is the empty return of trucks, which translates into higher operating costs for carriers. It estimated the cost of ground freight in Central America at US\$ 0.17 ton/Km, which is exceptionally high. Also, the insecurity of the region forces carriers to take preventive measures that imply that costs related to safety reach 22% of the total cost of transport.

In general, Central American logistics is characterized by low development, although there are some more sophisticated examples in all countries. These cases are mainly associated with local subsidiaries of external companies (free zone companies, multinationals operating in the region). In contrast, local small and medium-sized companies face more significant difficulties

for an effective logistics process. Green logistics is not a vital component of the national plans or the regional. In the best of cases, it is a consequence of the proposed actions.

Recommendations for Action for the EU and European Stakeholders

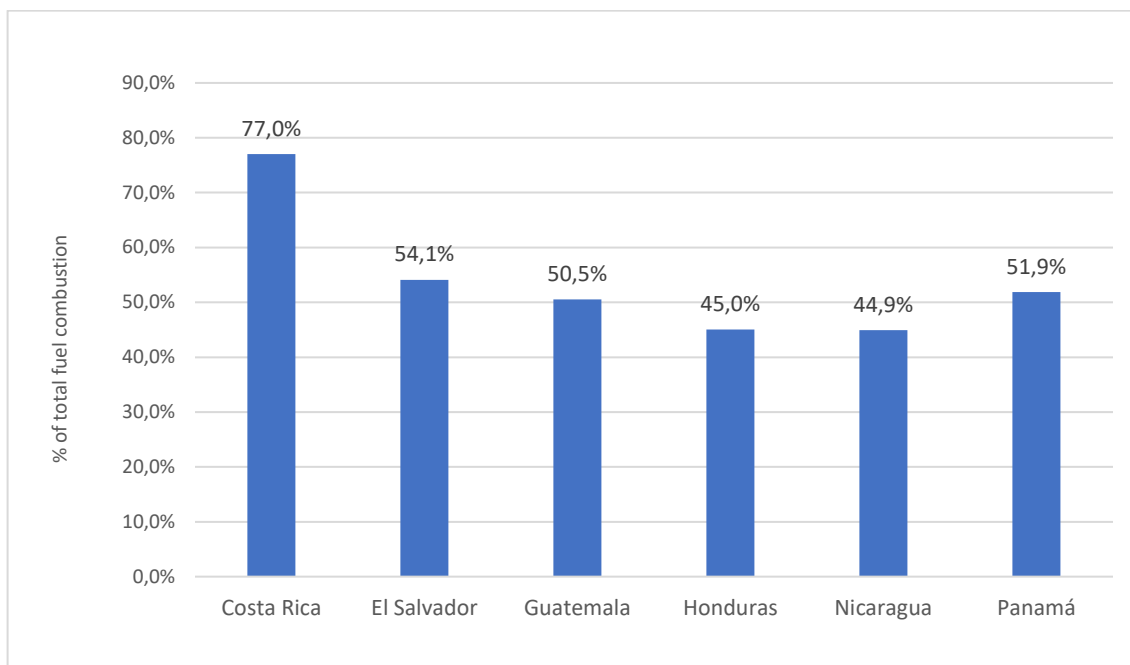
Despite the logistical complexity in the Central American region, leading European companies in the sector have taken advantage of the opportunities, making both greenfield-type investments and buying local logistics operators. DHL, one of the leading logistics operators globally, has made considerable investments in Central America, where it has operations in all countries and its warehouses. For its part, the Maersk group has ventured into different businesses ranging from operating various maritime routes to port operations, which has allowed these ports to achieve productivity levels like those registered in more advanced countries.

1. Background

Transportation (of people and goods) represented between 5.0% and 5.3% concerning the Central American Gross Domestic Product (GDP) between 2007 and 2016. Participation by country is not uniform. In Panama, due to the canal's presence, the contribution to the economy is more significant. In contrast, in the region's countries with the less sophisticated economies (Nicaragua and Honduras), the share of transport in GDP is lower (Escoto, 2018).

Despite its importance in the Central American economy and globally, the transport sector faces one of its most significant challenges: reinventing itself as a sector to meet the goals of the Paris Agreement. The Paris Agreement established limits for increased temperature (1.5 or 2 ° C) concerning pre-industrial levels. Reaching these limits requires a significant reduction in greenhouse gas (GHG) emissions, and transportation represents 23% of the world's energy-related carbon dioxide emissions (The Road to Sustainable Transport | International Institute for Sustainable Development, 2021). In Central America, about half of the fuel emissions in the region result from motor vehicles (Figure 1).

Figure 1: CO2 emission from transport (2018).



Source: International Energy Agency, 2020.

There are four principal measures to promote compliance with the Paris Agreement, two of them are related with transportation means. The four measures are: generation of electricity through renewable sources, or other low-carbon sources; electrification of vehicles, boilers, and heating replacing fossil fuels; the increase in the use of public and non-motorized transport, as well as changes in land use planning that decrease support mass transport and finally take advantage of ecosystem services and restoration for carbon fixation (Machado et al., 2020).

In Central America, the transportation sector has low sophistication, lack of integration, low financial capacity for many actors, among other problems. The industry will have to face the challenge of transforming itself to achieve higher levels of efficiency and productivity and comply with the climate commitments assumed by the region's governments. In parallel, governments must design systems, incentives, and policies that help the industry cope with changes and generate changes in individual behavior that promote sustainable mobility.

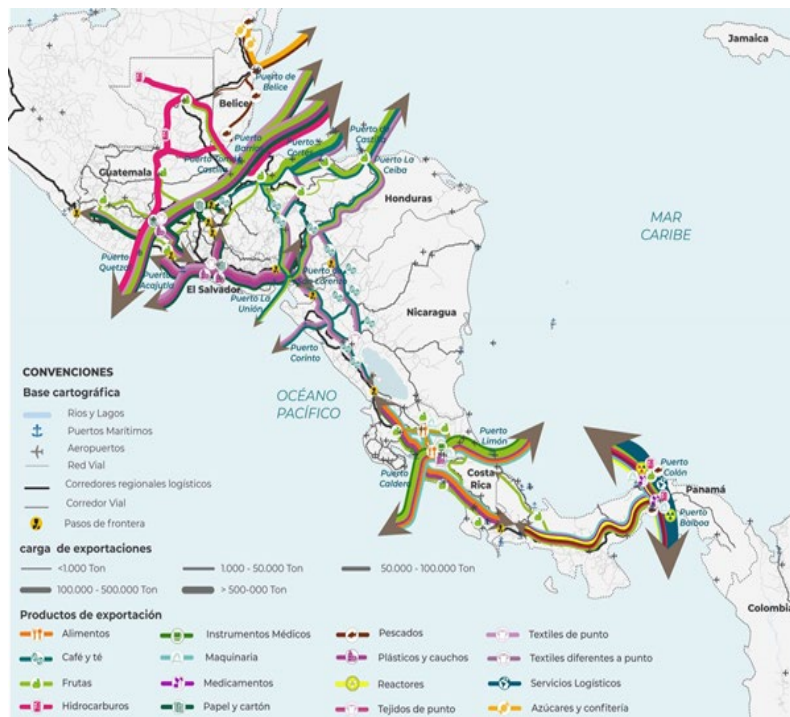
This document describes the general situation of urban logistics and mobility (taking as references the capitals of the countries) and the existing plans to improve the current situation. These plans make it possible to identify some of the existing business opportunities in the region, ranging from consulting in the design of systems to the construction of large-scale works.

2. Logistics and Urban Mobility in Central America

Central America has the potential to develop as a multimodal logistical hub due to its geographical location. These countries have followed a strategy of integration into international markets. For example, they have signed multiple trade agreements (DR-CAFTA with the US and Association Agreement with the EU). As a result of that strategy, the trade of goods has grown. Many multinational companies have established factories in the region, close to the US market, and take advantage of the free trade agreement.

The region's economic integration process promotes trade between countries, and for most of Central America is the second market for exports after the US. Despite the logistics difficulties, there is an intense trade in goods in the region. They circulate by the so-called Pacific Corridor, which stands out as the leading regional logistics corridor. This corridor begins at the border post of Tecún-Umán (Guatemala-Mexico) and extends to the Panama Canal. Goods from different value chains of the region circulate through it: paper and cardboard, textiles, fruits, plastics, and rubber in the north of the Corridor (Guatemala, El Salvador, and Honduras); textiles, coffee and tea, food, and fruits in the middle part (Nicaragua, Costa Rica) and machinery; plastics, medical instruments, hydrocarbons and medicines in the southern part of the Corridor (Costa Rica and Panama) (Cañele et al., 2021).

Figure 2: Central America: Value Chains and Logistics Corridors.



Source: (Cañele et al., 2021).

However, the region's potential is not reached yet. To take full advantage of these agreements and to improve productivity (another challenge) require greater logistics efficiency. Performance in Central America lags, except for Panama. There are deficiencies in practically all the areas examined by the World Bank's Logistic Performance Index. Three of the six countries that make up the region are below position 100 in the general ranking.

Table 1. Central America Results in the Logistics Performance Index (2018).

Country	Overall LPI score	Customs	Infrastructure	International shipments	Logistics quality and competence	Tracking and tracing	Timeliness
Panamá	3.28 (38)	2.87 (45)	3.13 (42)	3.31 (34)	3.33 (35)	3.4 (36)	3.6 (46)
Costa Rica	2.79 (73)	2.63 (70)	2.49 (84)	2.78 (76)	2.7 (79)	2.96 (67)	3.16 (83)
Honduras	2.6 (93)	2.24 (125)	2.47 (88)	2.66 (93)	2.72 (75)	2.68 (93)	2.83 (118)
El Salvador	2.58 (101)	2.30 (120)	2.25 (114)	2.71 (86)	2.56 (91)	2.47 (117)	3.1 (90)
Guatemala	2.41 (125)	2.16 (132)	2.2 (122)	2.33 (130)	2.25 (136)	2.42 (122)	3.11 (88)
Nicaragua (2016)	2.53 (102)	2.48 (90)	2.5 (83)	2.5 (107)	2.55 (96)	2.47 (107)	2.68 (134)
Germany	4.2 (1)	4.09 (1)	4.37 (1)	3.86 (4)	4.31 (1)	4.24 (2)	4.39 (3)
United States	3.89 (14)	3.78 (10)	4.05 (7)	3.51 (23)	3.87 (16)	4.09 (6)	4.08 (19)

Source: (Arvis et al., 2018).

World Bank estimated delays at the border crossing that take up to 48 hours, and the average speed of ground freight is 18.6 Kms. Another problem noted is the empty return of trucks, which translates into higher operating costs for carriers. It estimated the cost of ground freight in Central America at US\$ 0.17 ton/Km, which is exceptionally high compared with US\$0.13 in Nigeria, US\$0.11 in Burundi, US\$0.09 in Rwanda, and \$0.02 in the United States. But also, the insecurity of the region forces carriers to take preventive measures that imply that costs related to safety reach 22% of the total cost of transport.

Achieving higher levels of efficiency in logistics will allow the countries of the region to create favorable conditions to take advantage of trends like nearshoring. Reducing travel distances of goods could result in lower GHG emissions, if the transport mechanisms are comparable. And the comparative advantages that the countries have, such as its proximity to the US market may enable this option.

Improving logistics in the region can be obtained by different means. Logistics efficiency is affected by three components: (a) regulatory and institutional framework; (b) infrastructure (road, port, airport, and rail, logistics platforms, warehouses, distribution centers, and border crossings); (c) services (road, sea, river, air, rail transport, and logistics services) (Calatayud & Montes, 2021). For example, the provision of infrastructure improvements allows reducing costs, transportation times and facilitating the movement of inputs or products within a country or internationally, creating suitable conditions for companies' growth and employment generation. The European Union works together with the regional institutions to update the regulatory framework and facilitate the interoperability between countries and institutions (see Box 1).

Box 1. Central American and Regional Economic Integration Project

The Central American and Regional Economic Integration Project (INTEC) consists of three components. With the support of the European Union, the Central American Economic Integration Secretariat seeks to strengthen ties between countries and can improve regional logistics.

The first component seeks to reduce obstacles to competitiveness in Central America through processes that facilitate trade; update the regulatory framework of the integration process and strengthen the capacities of Central American companies to conduct business in Europe.

The second component consists of the Central American digital trade platform (PDCC) that will allow interoperability, transparency, and regional traceability between customs, migration, internal taxes, health, agriculture, and livestock systems that operate independently among the region's countries.

The third component of the INTEC project seeks to strengthen the capacities of micro, small and medium-sized enterprises (MYPIME) to take advantage of the association agreement.

Source: SIECA (2021).

Logistics problems are also affected by urban dynamics. Regional logistics routes cross the main urban areas, affecting both logistics costs and people's mobility. But urban mobility has its own issues. In Central America, the rapid growth of the population and the lack of territorial planning create conditions for a poor mobility performance because the lack of infrastructure for all transport modes. The public transportation systems is uncoordinated, with an old fleet and in most of the cases unsecure. The low performance of the public transportation system and the increase in the private vehicle fleet created favorable conditions for the rise in traffic congestion in the cities, traffic accidents, higher levels of pollution that affect the negative quality of life. If the region does not change the current model of urban mobility, the region will not achieve the reduction of GHG required for comply with the Paris Agreement. Through the Euroclima+ program, the European Union seeks to strengthen local capacities for developing sustainable urban mobility plans that allow the cities of the region to improve the quality of life of their citizens (see Box 2).

Box 2. Urban Mobility

In urban mobility, the European Union, through the EUROCLIMA+ program, provides support to 12 Latin American countries, including Central America. The mobility component of this program seeks to strengthen national urban mobility policies and programs, and integrated multimodal and participatory planning at the city level accelerates the transition of Latin American cities towards sustainable, low-carbon mobility. It intends to identify mitigation measures for the effects of climate change and facilitate their implementation.

In this sense, it seeks to strengthen national urban mobility policies and programs (NUMP) and sustainable urban mobility plans (SUMP) and formulate pilot projects at the local level. In Central America, pilot projects are being carried out in Guatemala and Costa Rica.

Source: Euroclima+ (2021).

3. Regulatory and Institutional Framework

In Central America, there are no shared vision of logistics and urban mobility. Each country has sought to develop its plans and strategies independently. To create a shared vision, SIECA and COMITRAN developed the Central American regional framework of mobility and logistics policy between 2015-2017.

This framework gives the vision and goals for the region to 2035. It defines four strategic objectives: (i) contribute to economic development and improve the regional competitiveness; (ii) contribute to better integration to improve quality and efficiency in the mobility of people and the supply chain; (iii) generate a more significant economic, social, territorial, and sub-regional integration; (iv) improve the quality of life of the population (COMITRAN et al., 2017).

The main expected impacts of the framework are: (i) increase the productivity of the transport sector; (ii) reduce de costs of logistics; (iii) ensure the adequate mobility of people; (iv) boost and facilitate trade; (v) improve regional connectivity; (vi) increase investment; (vii) create jobs and facilitate access to goods and services; (viii) adapt mitigation measures for climate change (COMITRAN et al., 2017).

Table 2. Goals for 2035 by the axis of the regional framework of mobility and logistics (2019).

Axes	Main Challenges	Goals for 2035
Maritime - Port	<ul style="list-style-type: none"> Obsolete regulation Weak port administration Security and environmental regulations Low productivity Low development of intermodal transport 	<ol style="list-style-type: none"> 1. Improve the supply of maritime transport. 2. Improve the operational capacity of the ports. 3. Develop port logistics zones 4. Improve the capacity and competence of maritime administrations. 5. Conserve marine and coastal spaces.
Aeronautic - Airport	<ul style="list-style-type: none"> Insufficient and outdated cargo infrastructure Inefficient customs services Budget constraints for investments 	<ol style="list-style-type: none"> 1. Expand and modernize the airport infrastructure 2. Promote the development and competition of the air market. 3. Identify an investment portfolio for areas of logistics activity in regional airports. 4. Expand the aeronautical offer and make public-private investments in the sector (APP). 5. Identify innovative financing mechanisms for priority investments in the sector. 6. Align institutional frameworks with ICAO practices and recommendations.
Railway	<ul style="list-style-type: none"> Obsolete regulation Lack of funds Abandoned infrastructure 	<ol style="list-style-type: none"> 1. Promote the regional rail mode for goods and people, interconnecting railway projects nationwide. 2. Develop the intermodal connection infrastructure. 3. Strengthen the administration of the railway systems in the region. 4. Train the personnel of the railway system. 5. Relocate settlements established on railways.

Axes	Main Challenges	Goals for 2035
		6. Define sustainable financing mechanisms in the railway model.
Ground transportation	Maintain road infrastructure Intermodal connection of ground transportation Low development of logistics services Low productivity on ground transportation Lack of funds Climate change effects on infrastructure	1. Improve the quality and capacity of the road network. 2. Strengthen the sustainability and sustainability of road infrastructure. 3. Increase the coverage and connectivity of the road network, in a multimodal way, including rural roads. 4. Improve road safety and resilience. 5. Improve the quality of the supply of transport services, the institutional capacity, and its regulatory framework.
Coordinated border management	Limitations of transport, mobility, and logistics infrastructure Obsolete and non-functional border crossing designs Restrictions on interoperability, security, and information updating Little coordination between institutions linked to border processes and private actors	1. Modernize the infrastructure and equipment at the border posts. 2. Streamline border controls to increase operational efficiency and the movement of people and goods 3. Harmonize the regulatory framework in customs, immigration, health, commercial, and security matters. 4. Promote institutional strengthening and technical and operational capacities at border posts.
Urban mobility	Little territorial planning, urban development, people and cargo transport systems Lack of data and information to develop transport models Inefficient distribution of goods in cities and little interaction in the planning of urban public transport systems	1. Connection of strategic logistics corridors with access to urban areas. 2. Modernization and development of infrastructure and equipment of logistics platforms that favor distribution in urban areas. 3. Improvement in the quality of the services 4. Strengthening of the institutional framework that has competencies in the axis.

Source: SIECA & COMITRAN, 2019.

One of the main challenges the regional framework faces is that it is indicative that it is not mandatory for the countries. Hence, they depend on national plans and financing for their fulfillment.

3.1. Costa Rica

In 2019, Costa Rica presented the National Decarbonization Plan to make the country carbon neutral by 2050. This plan consists of 10 axes, the number one being transport and sustainable mobility since these are the primary sources of emissions in the country. The table shows the main actions and goals established for them.

Table 3. Costa Rica: Main commitments within National Decarbonization Plan related to transportation.

<p>Development of a system mobility based on safe public transportation, efficient and renewable, and in mobility schemes active and shared.</p>	<p>In 2050 the public transport system (Buses, Taxis, TRP) will operate in an integrated manner.</p> <p>In 2035 70% of buses and taxis will be zero emissions, and the fast passenger train will use 100% electricity.</p> <p>In 2050 100% of buses and taxis will be zero emissions.</p> <p>Increase of at least 10% of the displacements in non-motorized modes within the main urban areas of the greater metropolitan area (GAM).</p>
<p>Fleet transformation light vehicles to zero emissions, nourished by renewable energy.</p>	<p>By 2050, 60% of the light vehicle fleet - private and institutional - it will be zero emissions, with percentages higher for those with commercial and government use.</p> <p>In 2035, 25% of the fleet will be electric.</p> <p>By 2050, 100% of new light-vehicle sales will be zero-emission vehicles.</p> <p>By 2025, Costa Rica will adopt standards for motorcycle purchases turn towards zero emissions (and, where possible, shared).</p>
<p>Promotion of a transport of load that adopts modalities, technologies and zero energy sources emissions or the lowest possible.</p>	<p>By 2050 at least half of freight transport will be highly efficient and have reduced emissions by 20% compared to 2018 emissions.</p> <p>By 2022 the country will have public data on the cargo truck fleet's carbon emissions (and criteria pollutants). It will taste pilot projects to increase the efficiency of the trucks through a smart logistics approach.</p>

Source: Government of Costa Rica.

The national decarbonization was the basis of the update of the Costa Rica NDC. It has significant implications for moving the country closer to green logistics and improving urban mobility.

Box 3. Catalyzing the low carbon transition and electric mobility development in Costa Rica through BNCR

This project (sponsored by the UE) seeks to catalyze financing to low carbon and resilient climate transition in Costa Rica. The National Bank of Costa Rica (public bank) receives support to develop a climate finance strategy. The bank will build internal capacity to support the sectors most likely to contribute to climate change mitigation in Costa Rica (e-mobility in particular).

The bank will adapt its products and services to propose customized solutions to finance climate-related assets/investments. Transport operators benefit from technical and financial support to convert their business model towards e-mobility.

The Government of Costa Rica committed to the entry into operation of the Electric Passenger Train in the GAM (powered by renewable energies). Also, the operation of the electric freight

train to the Atlantic (TELCA). In 2030, at least 8% of the public vehicle fleet will be zero emissions, and that same percentage of light vehicles will be electric.

Other commitments are related to the improvement of the bus system, the regulation of motorcycles, and improvements in the conditions that allow non-motorized mobility. By 2025, Costa Rica will first establish sustainable logistics models in the country's main ports, urban areas, and logistics consolidation centers (Ministry of Environment and Energy, 2020).

3.1.1. Logistics

Costa Rica lacks an articulated vision of the logistics system. Although the National Plan for Cargo Logistics 2014-2024 seeks to create such articulation, the results have not been satisfactory. In recent years, Costa Rica made significant investments in logistics infrastructure (a new port in the Caribbean Sea and road infrastructure development that facilitates land transit between production centers and the port in the Caribbean). However, multiple gaps identified in the plan persist.

In the maritime route, the primary mode of transportation for Costa Rica's foreign trade, the problems are the lack of competition between naval transport services and vertical integration with land transport services. Vertical integration hinders the power negotiation of the producing companies. The complementary logistics infrastructure to the ports is a fragmented extra-port model in separate warehouses (BID, 2014). There is a saturation of the main port in the Pacific (Caldera), and contractual difficulties for its expansion since the current concession ends in 2026.

The land distribution system supplies national needs such as trade with Central America and Mexico. In this sense, land logistics face challenges that involve both infrastructure and service provision. The National Plan for Cargo Logistics 2014-2024 (BID, 2014) identify:

- The road infrastructure lacks high-capacity roads connecting the primary production, consumption, and foreign trade nodes. In contrast, the connection outside the nodes is through routes that hinder the transport of goods. Additionally, the road infrastructure is highly vulnerable to hydro-meteorological events that generate interruptions in critical roads.
- Inland cargo services providers face high operational costs and relatively high empty return rates (44%). The fleet has a high level of obsolescence, and it does not adapt to the country's road network conditions. There is a high level of informality in the sector. These factors harm the performance and cost of services, also affected by structural elements such as infrastructure and long waiting times at border posts in foreign trade.
- Rail freight transport is almost non-existent. It only operates in the Caribbean area, offering short routes from the Limón-Moín port to its interior. The railway network is limited to approximately 160 km in single-track operating conditions and on tracks without electrification.
- In Costa Rica, there are first-class logistics facilities. They share spaces with some local industry and free trade zones. But the use of technologies for the automation of logistics management at the business level is still low compared to the world average due to the costs for end customers, especially for SMEs and micro-enterprises.

3.1.2. Urban Mobility

Urban mobility in the San José metropolitan area faces multiple challenges that go beyond the specific issue of mobility. A diagnosis of transport and mobility (Sánchez Hernández, 2018) identifies:

1. The low population density of the city promotes many trips and the existence of dormitory cities where people work and carry out leisure activities in different places where they live.
2. Governance problems of the metropolitan area. In Costa Rica, there is no regional institution that can plan the territorial development of the city, which creates that planning is an independent process carried out by about 30 municipalities. To this must be added that the management of public transport is the responsibility of the national government, which results in mobility lacking a governing body.
3. The insufficiency of the road infrastructure is incapable of meeting the growth of the vehicle fleet, partly due to the exhaustion of space but mainly due to the low levels of public investment and the slowness in execution.
4. Inefficiencies in the design of the public transport system. The current system works on a radial system, which has its vertex in the center of San José. It does not correspond to the travel patterns of the citizens and causes the need for transfers, where passengers may require walking a long distance to change lines. The transportation system lacks integration into the payment system, which increases the cost for users. Due to these conditions, public transport ends up being an unattractive alternative to a private vehicle.
5. Current mobility patterns promote pollution. Transportation is one of the top factors of emissions in Costa Rica. Those are consequences of traffic congestion and the average age of the fleet (it is worth mentioning that the average age of the bus fleet is less than ten years, but in the case of cars, it exceeds that figure).

The sustainable urban mobility program for San José (AC&A & Gessler, 2017) proposes improving mobility in the metropolitan area of this city based on five main actions:

- Prioritize the development of accessible pedestrian infrastructure, which will favor walking.
Consolidate an integrated public transport system with high-capacity and high-frequency lines. The train is considered a vital structuring axis of this process. As part of the system, there will be stations that facilitate transfers between different modes of transport.
- Prioritization of areas to be densified to strengthen the operation of the high-capacity system. The starting point of this process will be the center of San José.
- Development of safe and comfortable infrastructure for cycling for mobility within the territory and complement public transport to solve the "last mile."
- Pedestrianization of roads with a large pedestrian volume in areas of great commercial or service activity.

This program proposes an investment portfolio close to US\$ 3.5 billion that must be complete for 2035.

3.2. El Salvador

El Salvador included the transportation sector in its first NDC. In it, the country undertook to review and update the sectoral legislation to adapt it to the circumstances posed by climate change. It also promised to put the second phase of SITRAMSS, which will serve the north-south axis (Ministerio de Medio Ambiente y Recursos Naturales, 2015).

3.2.1. Logistics

El Salvador has a regulatory framework (policies and plans) established to develop the logistics sector. The main ambition in these frameworks is that improving logistics efficiency helps increase the country's competitiveness and social development.

To achieve this goal, El Salvador must overcome a series of obstacles that prevent good logistics performance. National Cargo Logistics Plan (Fioravanti et al., 2019) identified the following barriers:

1. El Salvador's development strategy promotes diversification. But diversification generates fragmentation of the load, which makes it challenging to create economies of scale.
2. Limitations at sea transport, a weak supply of complementary services, and the lack of cabotage services make integration with the international market difficult. In addition, the location of the leading destination markets affects the use of ports in the Caribbean Sea (El Salvador does not have a coast in this sea), which increases costs due to land transportation and difficulties at border crossings.
3. At the airport, the cargo area and transport services are limited. The planes that arrive in El Salvador are for passengers mainly.
4. There is no freight rail, and the ground transportation is by truck. The Metropolitan area of San Salvador (AMSS) concentrates consumption and manufacturing of the country. It has high levels of traffic congestion, and there are no logistics nodes in other areas of the country.
5. The country also faces a scarce supply of value-added logistics services.

Solving these barriers requires a public-private collaboration that has the potential to offer business opportunities to different actors. Among these solutions, the following were identified (Fioravanti et al., 2019):

- Generate scale through collaborative logistics solutions.
- Reduce logistics costs.
- Guarantee the cold chain for perishable products.
- Modernize the port supply and adopt modes of short-distance maritime services coordinated with the ports of greater capacity in neighboring countries to take advantage of the higher frequencies and capacity these ports offer.
- Strengthen the airport offer.
- Increase the provision of infrastructure (secondary and tertiary networks) for access to production.

3.2.2. Urban Mobility

The growth of the metropolitan area of San Salvador (AMSS) is extensive, which causes an increase in the distance traveled. Citizens travel for work to the city center and return to their

homes outside the city in the afternoon. Displacements are made by motor vehicles (private, public transport) while other forms of mobility are not expected.

The bus system is inefficient, with urban routes sharing space with the buses coming from other departments. In addition, the fleet is an average of 15 years old, and only 1% has accessible characteristics. The system is also unsafe; more than 40% of robberies and thefts occur on buses and bus stops; sexual harassment behaviors are presented mainly towards women (COAMSS/OPAMSS, 2020).

The characteristics of the system create incentives for private mobilization, between 30 and 35% of the population moves by private vehicle, which represents 81.7% of the total number of motor vehicles, while 70% of the population moves by public transport, whose fleet represents 2.5% of the vehicle fleet (Grande Ayala, 2018). Because of the vehicular situation, air pollution exceeds the limit values established by the Ambient Air Quality Standard (COAMSS/OPAMSS, 2020).

In 2015, AMSS Integrated Transportation System (SITRAMSS), a Bus Rapid Transit (BRT) system, started to work. In 2017, a court ruling eliminated the use of the exclusive lane for the buses, which reduced the attractiveness to use it (COAMSS/OPAMSS, 2020). The containment measures of the COVID19 pandemic suspended the operation of the SITRAMSS. Although its operation was authorized again at the end of 2020, as of the date of this report (August 2021), it is still not operating since the concessionaire alleges financial impossibility due to restrictions on authorized passenger capacity.

Other weaknesses detected for the formulation of the AMSS mobility policy are the residual role of the bicycle as a means of transport. In the case of pedestrian mobility, the difficulties that people face when walking in the city. Pedestrians face insecurity when walking; insecurity increases at night due to the lack of adequate lighting. They also face multiple obstacles on the sidewalks, such as occupation by vehicles parked on them, informal trading posts, or the absence of sidewalks (COAMSS/OPAMSS, 2020).

3.3. Guatemala

Guatemala is in the process of updating its NDC. In 2015, the Government presented the first version of the NDC with three sectors prioritized. The transport sector is among those prioritized, along with forests and agriculture.

In the specific transportation case, the NDC highlights the investment opportunities in urban mobility based on the implementation and improvement of the Transmetro system that works in Guatemala City; it will boost productivity and contribute to a significant reduction in emissions. In addition, the Government undertook to establish a program of tax incentives and subsidies focused on the use of clean energy for public and private transport, including regulations to regulate GHG emissions in collective and individual public transport (República de Guatemala, 2015).

3.3.1. Logistics

Like other Central American countries, Guatemala lacks a well-developed logistics system and green logistics seems to be a low priority issue. There are a series of structural barriers that make it challenging to achieve higher levels of efficiency in logistics, both internally and internationally. The National Strategic Plan for Cargo Logistics 2015-2030 (Martínez & Venot, 2016a) identified a series of barriers that need to be overcome.

- The state of the road network is poor, and although it has a network functionally qualified as trunks but without access control in its design. The lack of access control

creates significant delays and a drastic reduction in an operational capacity. Despite the above, traffic congestion and road safety problems force the construction of new bypasses.

- The state of the infrastructure affects road transport, the dominant mode in domestic and intraregional trade. Road transport companies have weaknesses such as overloading, old vehicle fleet, and low average utilization. Vehicles used in internal transport are in poor condition, and there is a shortage of refrigerated units. Informality is high, and the sector faces a problem of insecurity that makes it necessary to travel by convoy and with an armed escort, which raises operating costs and the prices of services.
- The maritime port sector shows signs of congestion with delays in docking, insufficient depth in some ports, and limited equipment. Added to this is the perception of high costs influenced by the land segment (vertically integrated), which has adverse effects mainly on value-added products.
- There are optimization efforts in the cargo area of the Guatemala airport. Still, it faces capacity restrictions and requires a comprehensive reorganization of the site dedicated to complementary functions of the airport.
- In Guatemala, the availability of dedicated logistics centers is limited, and there are growth opportunities in packaging and consolidation services, especially for perishable products. The current offer of value-added services is concentrated in industrial zones, mainly in free zones. In general, the logistics offer is fragmented and is in the metropolitan area of Guatemala City.

3.3.2. Urban Mobility

The population of the metropolitan area of Guatemala is about 4.7 million inhabitants, the largest city in Central America. Public transport is the usual way to travel in the town (around 68% of total trips) and 23% by individual private transport. However, the road space allocated to personal vehicles is 76% and 22% to dedicated infrastructure for public transport (Granada et al., 2019).

Three central public transport systems coexist in the metropolitan area, the traditional (red buses), Transurbano, and Transmetro (BRT). The Transmetro began operations in 2007 and operates six routes that extend for 95 km. The aim is to complement this system with shared public bicycles, which today function as feeders for two Transmetro lines (Granada et al., 2019).

The Transmetro system improved the mobility of Guatemala City. However, it did not solve the existing problems since it only covers the main lines. It does not provide a natural alternative to private vehicles (Consenza, 2021).

The traditional bus system and the Transurbano have a series of deficiencies (Consenza, 2021):

1. The poor condition of transport units (buses) and infrastructure.
2. Lack of training of service providers.
3. Poor operating conditions of the service (lack of regulations, procedures, controls).
4. Exclusion of people with reduced mobility.
5. Environmental pollution caused by the poor condition of the transport units.

Additionally, the insecurity problems of the country affect the public transport system, where extortion, attacks, and robberies occur. Women are the primary users of the system (around

56%). They feel unsafe due to the problems mentioned above and those of sexual harassment that they are victims (Granada et al., 2019).

Improving the public transportation system of the Guatemala metropolitan area faces the challenge of financing. The rates currently charged are insufficient to guarantee the quality of the service even with the subsidy provided by the government. The tariff and the subsidy do not cover the operating costs; it causes low quality (Consenza, 2021).

With the contribution of the Korean Cooperation, a consultant team is developing the transportation master plan for 2040. But currently, the Municipality of Guatemala implements a transportation plan which seeks that 85% of the city's inhabitants live at 500 meters from a public transport station. Among the growth axes of the project are (Palacios, 2020):

- Electrify line 5 of the Transmetro.
- Develop a cable car system for public transport. The Municipality granted the construction and operation process at the end of 2020 for 25 years.
- The Metro Rail System seeks to develop a train system on the old railway lines (FEGUA) that cross the city from North to South.
- Restructuring of the bus transportation system and increasing the coverage of the bicycle lanes so that they function as feeders for the other methods (Transmetro, Aerometro, Metro Riel, and buses).

3.4. Honduras

In the update of the Honduras NDC (MiAmbiente+, 2020), some objectives could impact both logistics and urban mobility. Honduras will seek to move towards a renewable energy matrix, which would affect fossil fuels in cargo vehicles. To this must be added the emphasis on energy efficiency, in which the existing freight and public transport fleets seem not to meet international standards due to age. Finally, goal 6 establishes electromobility as one of the country's priorities. Achieving this priority requires the generation of policies, strategies, regulatory frameworks, schemes, and incentives, programs, and projects to adopt electric mobility in Honduras. With these strategies, the Government expects to foster improvements in public transportation and private transportation.

3.4.1. Logistics

Logistics in Honduras has taken a qualitative leap in recent years due to the results of the Puerto Cortés concession. The port improved its performance and became an option for exporters from Nicaragua and El Salvador.

The entry into operation of the new airport in the vicinity of Tegucigalpa will be at the end of 2021. It will offer a specialized cargo terminal overcoming one of the barriers companies face in this region. However, there are persistent problems that require both public and private investments to improve logistics performance (Martínez & Venot, 2016b), among them:

- The road infrastructure in Honduras has a low density, so there are inequities in the connectivity of the different regions. Other problems in road infrastructure are deficiencies in design, capacity, and a high vulnerability to natural disasters.
- The infrastructure at the country's border posts is deficient and faces congestion problems and access limitations that reduce the speed of cargo transfer to other Central American countries. It generates a negative impact on the logistics performance of the country, especially land transport.
- In addition, ground transportation companies have an old fleet, and there is a limited formal offer of services. There are also problems due to: a) overload practices, b) low

fleet utilization due to a high proportion of empty returns (48%), c) limited supply of refrigerated vehicles, d) high freight rates and operational costs, and e) growing insecurity (assaults, cargo, and equipment theft).

- In the case of maritime logistics systems, the Honduran port system reflects two realities. Puerto Cortés (the main port in the country) reached international efficiency standards due to the given concession. However, other ports in the country operate with low levels of efficiency and lack the infrastructure and equipment necessary for the adequate mobilization of cargo.
- At the provision of transport services, the main difficulty is the high cost of maritime freight. The high price is due to low volumes of cargo and its seasonality, the vertical integration of shipping companies with land transport, and the lack of collaboration agreements between producers to negotiate the freight cost.
- Honduras has two main airports with different conditions. The airport near Tegucigalpa faces restrictions due to the runway's short length (2,021 meters) and its location within the city that limits the supply of cargo flights. The San Pedro Sula airport has better facilities for cargo handling, and the problems it faces are due to management.
- Like other Central American countries, the provision of logistics services is deficient, and there is a lack of logistics infrastructure to support the agricultural sector. There are insufficient storage systems and appropriate facilities to maintain the cold chain and product preservation. It is also worth highlighting the inexistence of specialized logistics infrastructure at borders and the absence of formal logistics areas to support the carrier.

3.4.2. Urban Mobility

Honduras is the only country in the Central American region where two independent and relatively similar metropolitan areas coexist, the first Tegucigalpa and the second San Pedro Sula.

Tegucigalpa

In 2012, with the support of the IDB, a consultant team developed the Sustainable Urban Mobility Plan (SUMP) for the metropolitan area of Tegucigalpa-Comayagüela. The SUMP (ALG & LeVote, 2012) determined that 60% of the trips were made by public transport and 32% by private vehicle. Each transport mode has its problems:

- In the public transport service (buses and minibuses and taxis), there is an oversupply and overlap in the main corridors of the central area of Tegucigalpa. However, in terms of operational efficiency, the results are low.
- Commuting on foot and by bicycles are infrequent as modes of transport since there is a lack of adequate and safe infrastructure to carry out this type of movement, evidencing a lack of pedestrian connectivity both in the main road corridors and between neighborhoods and neighborhoods of the city.
- Within the city, the SUMP identified indicators of capacity saturation and congestion of roads (lateral parking, poor signage, and road surface conditions) that reduce the capacity of the road axles. To this must be added the predominance of the private vehicle and the collective taxi.

In 2010, the construction process of the Trans 450 (BRT) Metrobus started. However, until August 2021, the system has not worked, and the facilities have suffered from neglect. Some

lines are currently being redesigned and adding new construction, and the local government expects that by the end of 2021 (Redacción El Heraldo, 2021).

San Pedro Sula

The transportation system in San Pedro Sula has more than 1,500 buses, 7,000 taxis, and private vehicles that number more than 300,000 (including cars and motorcycles) (Rivera, 2020).

In 2017, the Municipality presented the urban development plan. The plan seeks to transform San Pedro Sula into a smart city. It includes an urban mobility component in which it proposes (IBI et al., 2017):

1. Incorporate information and communication technologies into public transport systems.
2. Infrastructure improvement (vehicular, non-motorized, and public transportation).
3. The development of an integrated transport system, among other aspects, must be worked on.

A group of experts points out that the main challenge facing mobility is the governance of urban public space. Informal vendors took over some streets of the city, and the authority of the mayor's office has been lost. Without land-use planning, they consider that any effort to modify public transport in isolation will fail (Rivera, 2020).

3.5. Nicaragua

Nicaragua is in an internal political conflict, and the government of that country has been sanctioned by the United States, Canada, and the European Union, among others. The political crisis generated a decrease in economic activity and a weakening of public-private relations, affecting the development of plans and policies, and in many cases deepening the challenges that the country faces for development.

In 2020, the Government of Nicaragua updated its NDC to increase its ambition. The transport sector is not part of the priorities established by the country, but the NDC mentions it for future development. There are three main sectors included in the NDC (Ministerio del Ambiente y los Recursos Naturales, 2020):

- The Government proposes to increase the proportion of renewable energies from 60 to 65% of the electrical matrix.
- To increase the carbon absorption capacity by 25% concerning the reference model
- In the industrial sector, the goal is to reduce the consumption of fluorinated gases considered in the Kigali amendment.

About transportation, the update of the NDC refers to implementing the project "Promotion of Environmentally Sustainable Transportation in Metropolitan Managua" within the priorities to reform the public transportation system in the Metropolitan area of Managua, as stated reflected in the Comprehensive Transportation Plan. Implementing this plan will directly reduce 892,000 tons of CO₂ emissions over the next 20 years. Additionally, the NDC appoints that in the coming years, the Government will design the electromobility strategy for the public transport of Managua and a NAMA in the energy sector's transition towards cleaner transport in Nicaragua. (Ministerio del Ambiente y los Recursos Naturales, 2020).

3.5.1. Logistics

Transforming logistics of Nicaragua into green logistics requires to solve structural problems. Nicaragua is the largest country in Central America. One of the country's characteristics is the unbalanced development of the coastal regions of the Caribbean concerning the Pacific. Most of the population lives on the Pacific coast, and there is relatively appropriate transport infrastructure.

But in the Caribbean, there is a lack of infrastructure. Until 2019, the first highway linking the South Caribbean with the rest of the country was completed. In the rainy season, multiple roads are no longer passable.

The only international port is in the Pacific. There is no commercial port in the Caribbean, so Nicaraguan exporters or importers use Honduras or Costa Rica ports, facing greater distances and transportation costs. Additionally, the Port of Corinto in the Pacific faces difficulties due to limited expansion capacity and the lack of adequate facilities and equipment for cargo handling (Mendoza López et al., 2018).

Regarding the air sector, Nicaragua has only one international airport located in Managua, which has facilities for cargo transportation. The development of airports in the Caribbean would facilitate the efficient export of high-value seafood to global markets (CTI Engineering International Co. & Yachiyo Engineering Co., 2014).

To improve logistics performance in Nicaragua is necessary to strengthen the infrastructure at all levels (seaports, highways, and airports), the infrastructure and technological capabilities, optimization of processes related to international trade, and the infrastructure for intra-regional exchange. In addition, it is necessary to strengthen the competence and quality of logistics services and transport operators and the development of logistics parks in strategic locations (CTI Engineering International Co. & Yachiyo Engineering Co., 2014).

3.5.2. Urban Mobility

Sustainable mobility in Managua faces many challenges. The development model of Managua, as with most Latin American cities, uses land extensively. The extension of the town added to the increase in motorization, and the poor quality of transport (70% disapproval) and its infrastructure create conditions that affect the sustainability of mobility (Eguino et al., 2014).

In Managua, the transport service is not articulated. The bus system is provided by private companies and cooperatives, while taxis are another relevant operator in the scheme. The transport market is in direct competition between the different players, and their income depends on the number of passengers and the fare charged. The low quality provided by public transport favors personal mobility. (Eguino et al., 2014).

Although there are plans to develop a BRT system since the late 1990s, it is not yet operational. At the beginning of 2021, the Mayor announced that the works for the Metrobús would begin. Still, critics point out that it is more of a propaganda announcement given the elections at the end of 2021 than an actual project since the economic resources to carry it out are lacking (Redacción, 2021). In general, the city requires an Integrated and Hierarchical Public Transport System with structuring corridors of mass transport; it would articulate with non-motorized modes (Eguino et al., 2014).

Despite the mention in the NDC of the "Promotion of Environmentally Sustainable Transportation in Metropolitan Managua" plan, it is not available to the public, and the actions are unknown to society. However, there are some solutions that can improve urban mobility.

The National Transportation Plan for Nicaragua (CTI Engineering International Co. & Yachiyo Engineering Co., 2014) proposes improving mobility by ordering bus routes, designing and constructing passable roads throughout the year, and creating links between land transport and other forms of transportation.

As part of the actions, the plan proposes the Construction of a Trunk-Neighborhood Bus Service Network System (Hub-and-Spoke). Larger buses will operate the trunk services connecting several departments, and smaller for neighborhood services. It is necessary to build bus terminals (CTI Engineering International Co. & Yachiyo Engineering Co., 2014).

3.6. Panamá

In Panama, the energy sector (electricity generation and transport) are the primary source of GHG emissions. In 2019, the transportation sector represented 47.4% of that, followed by 19% industrial consumption, 17.1% commercial and public services, 16% residential, and 0.5% others (Ministerio de Ambiente, 2020).

In 2020, Panama presented the update of the NDC. Among its goals, the Ministry of the Environment proposes a scenario called the Energy Transition Agenda (ATE) that includes post-COVID19 reactivation measures such as investments in conventional infrastructure and climate investments of non-conventional renewable energies (NCRE), energy efficiency, and electric mobility. In the public transport sector, the NDC will follow the Integrated Plan for Sustainable Urban Mobility to 2030 (PIMUS), establishes a roadmap for the public transport system.

Regarding logistics, the NDC of Panama's proposal is to develop logistics infrastructure (ports, airports, roads, and bridges) resistant to climate change (Ministerio de Ambiente, 2020). Although the focus on logistics within the NDC seems to be hardware-centric, private fleets have their own goals in terms of electric mobility.

In terms of electric mobility, it is proposed in the updated NDC that 10% of vehicles in private fleets be electric by 2030, 25% in personal vehicles, 20% in public transport, and 30% in official fleets. By 2050, electric vehicles will be 30% of private fleets, 75% of personal vehicles, 60% of public transport, and 90% of official fleets (Ministerio de Ambiente, 2020).

Complementary to the goals proposed in the NDC, Panama's national electric mobility strategy establishes plans for the development of charging networks, differentiating between long-range trips that require fast charging points. In contrast, slow loading points are considered in the zones in urban areas since the displacements are short. From the regulatory point of view, it is necessary to update and create the regulations for the use of electric vehicles, the development of infrastructure, commercialization and operation of electric mobility, and financing mechanisms (Rebolledo, 2019).

3.6.1. Logistics

Unlike the other countries in the region, Panama prioritizes logistics as one of its main development bets and has a National Logistics Strategy towards 2030 (SPIM-ABECEB-Briher, 2017). The strategy seeks to take Panama from the regional port Maritime Hub to a Logistics Hub that integrates the centrality of ports and airports with the generation and attraction of logistics activities. The maritime port sector would continue to be the base.

Reaching this goal requires significant efforts since, although Panama is the Central American country with better logistics performance indicators, it is mainly due to the activity related to the interoceanic zone (Canal) with services and infrastructures of an international level. But internal logistics do not maintain similar standards.

There are three subsystems that the strategy identifies and on which the actions will focus: the consolidation and strengthening of the Central Interoceanic Hub, national logistics integration, foreign trade logistics. A fourth element pointed out is the need to strengthen the governance and institutional framework of the Panamanian logistics system. Among the main characteristics of each of these subsystems are:

- In the Central Interoceanic hub, the expansion of the Canal allowed the growth of ship and cargo traffic significantly. This Hub has a port system with high connectivity, although with some opportunities for improvement due to cargo concentration on the west-east road. Within the Hub, there is the Panama airport with facilities for the management of cargo, a complementary network of airports, and the leading global logistics operators.
- Increasing value-added logistics services is challenging because these services are in the Colon Free Zone and the Panama Pacific Zone but not in the rest of the country. The functional lack of coordination of the Interoceanic Zone Corridor is the Hub's main weakness, affecting everything from territorial planning to information systems.
- The second subsystem corresponds to national logistics. In this subsystem, the reality is like that of other countries in the region with a deficient level of accessibility and logistical connectivity in various national areas, notably in agricultural production. The road transport sector has high costs and fees due to high rates of empty returns and operational restrictions at ports and border crossings. Additionally, this subsystem faces the challenge of urban logistics since the differences in the urban distribution of goods -mainly precedent- and the needs of the Central Hub of the Interoceanic Zone are unknown at a functional level.
- Foreign trade logistics faces significant challenges. On the one hand, the functional part in borders faces criticism about the control processes and the efficiency in the operation of public and private actors. There is a lack of logistics services oriented to foreign trade because Panama has limited export offers and logistics companies concentrated in transshipment operations.
- A limitation that Panama will have to face is strengthening specialized human resources. The shortcomings are low quality of training, insufficient training in the company, poor coordination between the academic sector and companies, and a lack of institutional leadership.

Within the limitations to international logistics in Central America, some legal provisions prevent free competition and hinder the movement of goods. In October 2021, a new law was approved in Panama that precluded foreign companies' participation in maritime cabotage (Perea, 2021). That regulation also exists in land freight transportation, where companies whose capital is Panamanian are the only ones approved to mobilize internal cargo (Gobierno de Panamá, 2017).

3.6.2. Urban Mobility

Although urban mobility in Panama City is the most developed in Central America, it does not imply that it is free of challenges. The public transport system includes the subway, Metrobus, and traditional buses and personal vehicles (taxis, informal taxis).

In Panama, high dependence on private vehicles persists due to the characteristics of urban development, in which complete communities are absent. The Metrobus system shares infrastructure with personal cars, generating very high and unattractive travel times for a possible modal shift. It also lacks integration, and there are functional and operational

deficiencies (Cal y Mayor y Asociados & IBI, 2015). The metro system is starting (with less than a decade of operation) and in development.

Non-motorized mobility presents challenges; pedestrian infrastructure is in poor condition or non-existent. The infrastructure and urban planning design are not adequate to non-motorized means since they do not consider the space and facilities required by pedestrians and cyclists (Cal y Mayor y Asociados & IBI, 2015).

Based on the PIMUS and as part of the 2020 NDC, the Metro will be the base of the system, and it will be a restructuring process of the bus route system and the Metrobus. These routes will be a supply system and complement the operation of the Metro, which will allow increasing the coverage of the Metro without the need to extend the lines. The PIMUS proposed to adapt the transportation units according to the demand of each segment to seek better results between operational costs and transportation quality. Finally, the PIMUS raises the need to promote infrastructure development for non-motorized modes (pedestrian and bicycle travel), integrated with motorized modes of public transport (Cal y Mayor y Asociados & IBI, 2015).

3.7 Advocacy and Regulatory Advocacy

Sustainability Advocacy in Central America deals with many obstacles. Education being one of its biggest problems, because Central America is a region with a limited education system. It is estimated that about 23 million children in the region between the ages of 4 and 17 do not belong to a formal education system. With low education and high poverty levels, it is very difficult for individuals and organizations to advocate for sustainable change. Therefore, there are not many organizations that advocate for specific causes in these countries. Instead, advocacy can be seen through government actions and plans that come to fruition due to citizen's demands.

Nonetheless, many global organizations and funds are dedicated to advocate the climate crisis in Central America. Some examples are, The Green Climate Fund (GCF), COMITRAN, CABEL, among others. COMITRAN, for example, recently approved a plan titled "Incorporation of Disaster Risk Reduction and Sustainable and Inclusive Adaptation to Climate Change in road infrastructure projects". The project's goal is to reduce loss and damage caused by disasters by including risk mitigating mechanisms in public works in the region. Such advocacy and plan for action is needed in the region (Cepal, 2021). It is also significant to mention that there is already collaboration between Central America and the European Union in this area as well. The EU, SIECA and Inter-American Development Bank are collaborating on the "Digital Platform for Central American Commerce", which seeks to optimize movement among the countries under a methodology centered in interoperability, transparency, and traceability (SIECA, 2020).

Costa Rica:

Costa Rica is a leader in the region in terms of climate performance as proved by a defined mitigation target of 44% reduction in emissions against business as usual by the year 2030. This translates directly to its innovation in green mobility and logistics. In the area of green or sustainable mobility the country is looking to reach decarbonization by 2030 with a plan which mandates that 70% of buses and taxis be zero emissions and passenger trains 100% electric. This same plan has action items in green logistics ordering that 100% of new commercial, residential, and institutional buildings be designed and built with low-emission and client-resilient systems. This plan is just the first example of the products of strong advocacy for the environment to which the government must respond to. Costa Rica has many sustainable mobility projects in planning stages such as the electric train, the main advocates for the financing of this project are the Green Climate Fund as well as the Central American Bank for Economic Integration.

Guatemala:

Guatemala, as part of its Nationally Determined Contributions, is working to reduce its GHG emissions by 2030 targeting 11.2% (unconditional) to 22.6% (conditional) reduction. The Conadur (National Urban and Rural Development Council) along with the Secretary of Planning and Programming of the President's Office are the entities behind the management and establishment of Guatemala's national development plan, striving to advocate and improve the countries green logistics and urban mobility projects. The K'atun 2032 National Development Plan targets to reduce 15% in industrial use of firewood by 2027 and improve energy savings in the industry and commerce sectors by a 25% in 2027.

Central America is a region known for its coffee production, and Guatemala had the privilege to host the First SCA (Specialty Coffee Association) Sustainability Conference, with the sole purpose of attracting sustainability experts and passionate advocates from across the coffee value chain throughout the whole region, to provide them with the opportunity to learn from one another about the different global issues affecting the coffee production.

Panama:

The Panamanian Government established specific sectoral climate goals, focusing on increasing carbon sinks, renewable energy, and sustainable forestry. The government is advocating to increase reforested areas by 1m hectares by 2030, and the participation in international emission trading.

Aside from the government, Panama is one of the only countries in the region to have an Environmental Advocacy Center (CIAM). The CIAM is a group of lawyers and scientists that enforce environmental laws and defend the human right to a healthy environment, one of its many targets is to influence the decision making of governmental and business actors through the mobilization of public opinion, the sensibilization of the citizenry and the documented reporting of irregular practices for dissemination in the media.

Honduras:

The Honduran government aims to endure its improvement towards creating a climate policy framework which goes hand in hand with its innovation in green logistics and urban mobility. The government's targets include, reducing national GHG emissions by 15% in 2030, also prioritizing its focus on infrastructure, water resources, risk management, agriculture, among others, that are fundamental urgencies of the National Climate Change Agency.

El Salvador:

Like the other countries in the region, the Salvadoran government has proposed many plans that fit under the sustainable mobility and green logistics categories, these plans prove the need for the government to respond to growing demands in the environmental sector. President Nayib Bukele has been pushing for the creation of a railway network in El Salvador which has been proposed in hand with the Central American Bank for Economic Integration. It is important to note efforts made by the Ministry of Public Works and the Road Conservation Fund in alliance with the Environmental Fund of El Salvador in reforestation to compensate for environmental damage construction may cause.

Nicaragua:

Nicaragua's advocacy on green logistics and sustainable urban mobility is in its early stages compared to the rest of the region. Their latest National Climate Change Policy is currently in the consultation phase, some of the relevant aspects it focuses on includes creating a low-

carbon development strategy and developing green infrastructure. One of the main reasons that they are still in the consultation phase is due to their governmental regime that restricts individual's sustainability efforts.

Even though it is the farthest behind in terms of planning and implementation it proves that all the countries are at least in the developing stages to become more environmentally sustainable. These movements permeate to the green logistics sector as well as the sustainable urban mobility and these plans and governmental responses are evidence of the increasing interest by Central American citizens to continue innovating but with the environment in mind.

4. Business Opportunities

Despite the logistical complexity in the Central American region, leading European companies in the sector have taken advantage of the opportunities, making both greenfield-type investments and buying local logistics operators. DHL, one of the leading logistics operators globally, has made considerable investments in Central America, where it has operations in all countries and its warehouses. For its part, the Maersk group has ventured into different businesses ranging from operating various maritime routes to port operations, which has allowed these ports to achieve productivity levels like those registered in more advanced countries (see Box 3).

Box 4. APM Terminals

APM Terminals is a subsidiary of Maersk; it is based in the Netherlands and is one of the largest port operators in the world. It manages two ports in Central America, Puerto Quetzal in Guatemala and the Moín Container Terminal (MCT) in Costa Rica.

APM Terminals Quetzal has been operating since 2017. Puerto Quetzal is the largest port between Lázaro Cardenas in México, and the Panama Canal, on the west coast of Central America. The terminal has two Ship-to-Shore cranes on a 350m quay and a berth depth of 14.5 meters (APM Terminals 2021b).

APM Terminals built the MCT between 2015 and 2019, and the terminal is on an artificial island off the Caribbean coast of Costa Rica. The project was one of the most significant investments in Costa Rica (approx. €870 million). During the first year of operation of the port (before de pandemic), it was one of the most productive ports of Latin America, and their yields were like European or American ports (Mundo Marítimo, 2020).

The investment plan of MCT includes increasing the capacity to handle four times the size of the ships it currently operates. In later stages, the largest design ship: New Panamax, with 13,000 TEUs, will be received (APM Terminals 2021a).

Additionally, the EU has one of the world's largest multinational lender, the European Investment Bank (EIB), which not only operates inside the EU but also worldwide. They focus on small and large projects, with investments of €25m and above or below, with the possibility of being financed indirectly through a government or financial intermediary, or even directly with the project organizer. The EIB prioritizes the following types of projects:

- Climate change mitigation and adaptation
- Social and economic infrastructure development i.e., water and sanitation.
- Local private sector growth

Also, the EU has one of the largest regional blending facilities, the Latin America Investment Facility (LAIF), which focuses on mobilizing funds for Sustainable Development Goals in the energy, environment, transport, water, and social services sector. LAIF offers technical assistance, investment grants and financial instruments to other countries, and its objectives are the following:

- Improving the infrastructure in Latin American countries by refining its energy efficiency, renewable energy systems, sustainable transport, green logistics, and communication networks.
- Supporting climate change mitigation and increasing environmental protection.
- Promoting sustainable socio/economic development through the enhancement of social service infrastructure and supporting small to medium enterprises.

These EU financial institutions offer many opportunities for the development of green logistics and urban mobility across Central America.

In general, Central American logistics is characterized by low development, although there are some more sophisticated examples in all countries. These cases are mainly associated with local subsidiaries of external companies (free zone companies, multinationals operating in the region) like the example above.

In contrast, local small and medium-sized companies face more significant difficulties for an effective logistics process. Green logistics is not a vital component of the national plans or the regional. In the best of cases, it is a consequence of the proposed actions.

However, green logistics offers multiple opportunities for the Central American region. It supports the adoption of sustainable practices and solves problems of traditional logistics. Some of the projects identified that can improve logistics practices as positive effects on sustainability will be mentioned below.

4.1. Modernization of the transport fleet (cargo and buses)

Most of the cargo destined for the domestic market and a high percentage of intra-regional trade from and to Mexico is by road. Despite the importance of this transport sector, it faces severe problems of informality and productivity. In most countries, the issue of high rates of empty returns was identified, in addition to long waiting times that affect operational efficiency. Transport units (trucks) represent a fundamental link in the chain, but their condition is often deficient with a high average age that also generates losses in terms of operational and energy efficiency and is associated with poor quality service and high levels of emissions (Calatayud & Montes, 2021). The same description can be applied to most of the buses of the region.

In Latin America, there is a trend towards developing clean and safe transportation programs that seek greater environmental efficiency and accident reduction. Among the components of these programs is the increase of the allowed dimensions, limitation of emissions, energy consumption, and devices (telematics, active and passive systems in new trucks) that reduce the accident rate. In the case of Central America, the development of these programs has been slow, and the region is lagging. There are significant difficulties for the fleet's renewal due to access to financing for smaller carriers (Barbero et al., 2020).

Central America can learn from the practices carried out in other Latin American countries where the fleet's renewal was through support programs promoted by the Governments. These programs seek to replace older trucks with more efficient, safe, and clean units. Replacement programs have adopted the scrap component as a way to retire old vehicles (Barbero et al., 2020).

In public transportation, electric buses are profitable over their useful life because they have lower operating costs. However, it requires higher initial investments and more extended payback periods for the bus owners. To solve this problem, in Santiago de Chile, the ownership of the bus fleets was separated from the operation. Now, electric companies can buy electric buses and lease them to public transport operators (Vogt-Schilb et al., 2020).

4.2. Electric freight train in Costa Rica (TELCA)

The project consists of the rehabilitation of the freight train on the Caribbean coast of Costa Rica. Currently, the freight train operates approximately 100 kilometers with diesel locomotives from the port of Limón / Moín to the country's interior.

The new train will be electric, and there is a need for equipment and conditioning the railways. The project seeks to expand the distance to 180 kilometers and add 30 kilometers of new additional railways. It will increase coverage in fruit production areas such as bananas and

pineapples. In addition, the project will improve existing railways, bridges, and other road crossings. The workshops and patios must also be conditioned.

The total investment is estimated at US\$ 440 million, including the electrification, conditioning, and repair of 250 bridges and the development of inter-modal facilities. Currently, INCOFER (www.incofer.go.cr) is the promoting agency of the project, and it is doing the feasibility studies of the project.

Box 5. mUEve

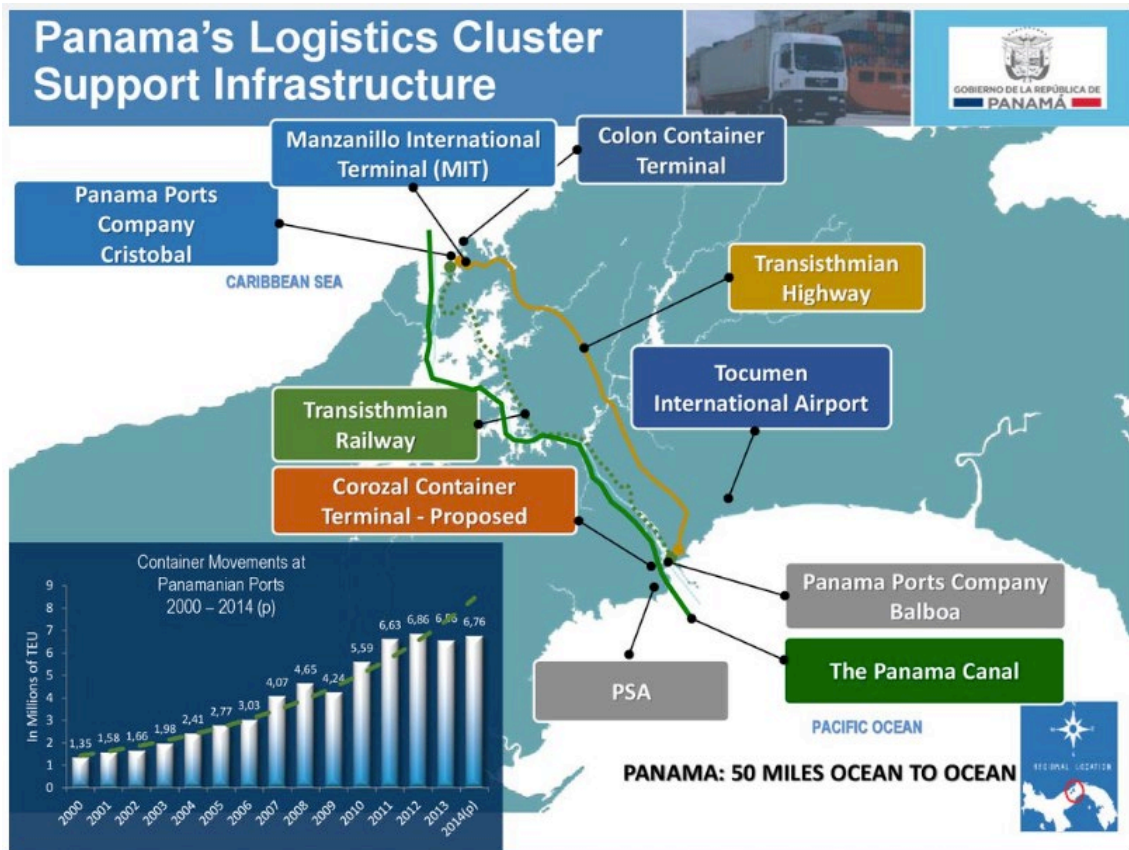
The European Union, thru the mUEve project (Sustainable Mobility, Urbanism, Equipment, Valuation of Public Space and Greening and Equity), collaborates with the urban municipalities of Costa Rica in which the electric train will have direct influence.

This program seeks to strengthen governance in municipalities, ensure the inclusion of vulnerable groups and gender equity concerning transport. It expects to increase economic performance and improve environmental quality in the urban areas impacted.

4.3. Panama Canal goes carbon neutral

The Panama Canal finished a major expansion in 2016. The expansion, which cost more than \$5 billion, involved construction of a new set of locks on the Atlantic and Pacific sides of the waterway, creating a third lane of traffic for more cargo, especially from East Asia headed to the East Coast.

The Panama Canal is the most important asset of the transport and logistics cluster of Panama, which is comprised by five ports, Free Trade Zones, railroad dry canal that connects ocean to ocean in 45 minutes, as well as the recent expansion of Tocumen airport (figure 3). According to the Government authorities, the focus now is on value added logistics and linking all the different players in the cluster. Investment opportunities that result will include port concessions, a shipyard, agri-parks and opportunities in LNG power generation and bunkering. These opportunities are valued at \$6 billions.

Figure 3: Panama's Logistics Cluster Support Infrastructure.

Source: Viceminister of the Presidency Republic of Panama, 2014.

The next milestone is to address greenhouse gas emissions. The Panama Canal set the goal to be carbon neutral for 2030. The goal is for its operations, and it does not include the ships that cross the Canal. The Agency behind this project is Panama Canal Authority.

The strategic decarbonization plan includes replacing tugboats and boats for those that use alternative fuels. In 2016 there were 46 tugboats and vessels. The plan also incorporates substituting thermoelectrical plants (164 MW) for renewable energies like photovoltaic plants and hydraulic power.

The latter is a major opportunity for investors. As of today, the Panama Canal has an “A” investment grade with a stable outlook for its long-term issuer default rating and its senior unsecured notes. According to major evaluation agencies, the Panama Canal is an underlying asset that is critical not only for Panama but for international commerce, as demonstrated by its stable volume performance, solid competitive position and well-diversified cargo mix

The Panama Canal administrator Ricaurte Vásquez stated that “This is a fundamental strategy for the waterway’s long-term operation and sustainability. This process will build on our long-standing efforts to minimize our environmental impact, including encouraging customers to use clean fuels and reduce their carbon footprint.”

The Panama Canal first began tracking its carbon footprint in 2013 in line with a global focus on mitigating the effects of climate change. In 2017, it launched its Emissions Calculator,¹ a tool that allows shipping lines to measure their GHG emissions while strengthening the Canal's emissions analysis.

To reduce its own impact, the Panama Canal has also taken steps to find ways to maximize its operational efficiencies, whether by implementing water conservation measures or optimizing transits. Panama's Maritime Single Window (VUMPA) has improved the efficiency and carbon footprint of transshipment procedures by streamlining logistics paperwork for international customers passing through the country, saving up to 3,260 hours and more than 300,000 paper forms each year.

In addition, the Panama Canal also joined the Declaration of the "50 First Carbon-Neutral Organizations," an initiative led by Panama's Ministry of Environment to integrate national efforts to accelerate measurable climate actions. As part of the initiative, the canal will develop an annual greenhouse gas inventory, as well as an action plan with measurable targets to reduce emissions. The canal's efforts will be factored into Panama's National Determined Contribution (NDC), established by the United Nations Framework Convention on Climate Change (UNFCCC), following the Paris Agreement.

The Panama Canal's efforts have since stretched beyond tracking to include initiatives aimed at helping and incentivizing shipping lines to minimize their environmental footprint. Through its Green Connection Environmental Recognition Program, the canal authority recognizes customers who demonstrate excellent environmental stewardship, including the use of low-carbon fuels and environmentally conscious routes. As an enhancement to this program, the Panama Canal is currently analyzing taking into account in its dynamic pricing strategy the vessels' technology and its carbon footprint, which makes it more efficient during transit.

The Panama Canal also promotes the International Maritime Organization's (IMO) efforts to minimize the environmental impact of the shipping industry, from the implementation of its IMO 2020 regulation to its nearby transit separation schemes and vessel speed reduction programs. By supporting the latter, for example, the canal helps shipping lines reduce their risk of colliding with whales migrating near the waterway, while also lowering their GHG and pollutant gas emissions by an average of 75 percent, depending on the type, size and fuel of each vessel.

Facilities (buildings, workshops, among others) and the new infrastructure projects should be environmentally responsible and sustainable. It will be necessary to review and remodel current facilities to meet this objective.

4.4. Guatemala International Airport

Guatemala's international airport is inside the city, which represents a problem for the operation of large aircraft. Expansion possibilities are limited and require a runway overhaul to facilitate the arrival of more aircraft. In total, an investment of US \$ 158 million is required (Bolaños, 2020).

¹ The Emissions Calculator will use the existing technology on board ships to retrieve data and therefore control better the greenhouse gases (GHG). The data collected will be sent to the CO2 Emissions Reduction Ranking, a platform that ranks those who had the least emissions each month

In cargo transportation, the airport has two cargo terminals. The Combex-Im terminal is managed through a public-private partnership and has a size of 22,000 m², and in 2019 it handled approximately 57 thousand tons of cargo. According to Combex demand estimates, the area should expand by 50% in the next ten years. IDB estimates indicate that in the next 25 years, the terminal should reach 60,000 m². To double its area, the airport must make a series of adjustments to its buildings and runway. The investment in this terminal is estimated at US\$ 34.6 million (Bolaños, 2020).

4.5. Dry Port Tecún Umán II

The Puerto Seco Tecún Umán II project consists of developing an intermodal port (rail - truck) on the border between Guatemala and Mexico. The port will serve as a connection to exports/imports between Central America and Mexico. The rail section will be in Mexico and ends on the Guatemalan side of the border, while trucking will take place in the Central American area.

The investment is US\$ 40 million. Guatemala's government plans to develop the port thru a public-private alliance. The designated company will be responsible for designing, building, and operating the port.

In the nearby area, the "Puerto del Istmo" special economic zone is under development. There are currently 5,000 m² of construction. The market that Puerto del Istmo seeks to serve is companies oriented to manufacturing and distributing products in Central America.

4.6. Expansion of Puerto Cortés

Puerto Cortés is the main port in Honduras. Also serves cargo coming or going to El Salvador and Nicaragua.

Central American Port Corporation (CPC), a Philippine company ICTSI Group subsidiary, manages the port. Its commitment with Honduras' government was to invest US\$ 624 million up to 2023. Upon completion of this plan, the port will have 550 meters of new docks, with a capacity of 1.8 million TEUs per year. The port depth will be 15.5 meters, and it will have nine post-Panamax gantry cranes plus additional equipment. The contact capacity for refrigerated equipment will be 4,000 units.

4.7. Metro Rail: Interurban passenger rail transportation

The project will develop an urban and extra-urban passenger railroad complementary to urban mobility systems established at the Municipality of Guatemala. Metro Rail will cover 20.5 km of railroads. Also, the project rehabilitates and completes the Atanasio Tzul highway.

Metro-Riel could capture 252 thousand passengers in a working day with a maximum load in the segment with the highest demand of 8,560 passengers in one day, giving a total of 78 million passengers per year.

The project requires 35 light trains and the construction of the stations. The estimated investment is about US\$770 million and FEGUA and Municipality of Guatemala are the promoting agencies of the project.

4.8. Costa Rica electric train

The Costa Rica metropolitan electric train project (light train) requires an estimated investment of 1.5 billion dollars. The train will have around 200,000 passengers/day.

It will have five lines that will cover 15 municipalities in the greater metropolitan area of San José. The total distance of the network is 73 km with 46 stations, and the train will use the existing rights. However, the construction of some elevated railways will be necessary.

The original design model proposed the construction of the project altogether. However, recent recommendations suggest starting with line 2 since this is the one that the highest estimated demand will cover. Additionally, those suggestions also increase the time between trains from five to eight minutes to reduce the need for rolling equipment. The light train will be the basis for modernizing the public transportation system.

The project has financing offers from the Green Climate Fund and other international financial institutions. However, it has little political support in the Congress of Costa Rica when it needs to be approved.

4.9. Potential projects to monitor

4.9.1. Honduras interoceanic dry canal

During the second half of 2021, the Honduran government concluded the construction of the interoceanic dry canal. This project consists of a four-lane highway (two in each direction) with a length of 396.61 kilometers. The road connects the ports in the Pacific Ocean (Amapala and Henecán) with that in the Caribbean (Puerto Cortés).

The government expects that this project will allow the mobilization of cargo from ships in the Pacific to others in the Caribbean to continue its route or vice versa. However, it will be necessary to design considerable improvements in the port of Amapala (Presidencia de Honduras, 2021), which will only begin the process during the year 2022. Several years will elapse before the project reaches its potential.

4.9.2. Central America Ferry

The ferry facilitates loading between the south of Central America and the north by mobilizing full trucks on the ship, with an approximate journey of 16 hours, while the road section can last a few days depending on the congestion at the border crossings.

The ferry project that would link the port of Caldera (Costa Rica) and La Unión (El Salvador) is paralyzed because both countries must build a floating dock. In the case of Costa Rica, the current contract with the port operator prevents adding new works (Barquero, 2021).

4.9.3. Cargo Airport in Guatemala

In Guatemala, an international cargo airport is being developed on a former military base on the Pacific coast. This project promoted by the government will have the capacity to receive transatlantic trips and seeks to position the country as a logistics center. However, the aeronautical sector has indicated that they consider that the project is not viable because there is not enough market. Also, the distance from Guatemala City (100 km) will increase costs by separating cargo from passenger transport (Agencia EFE, 2021).

4.9.4. Puerto Caldera in Costa Rica

The port of Caldera on the Pacific coast of Costa Rica is saturated. The government is currently designing a bidding poster for the identified improvements' design, expansion, and operation. The plan is that by 2022 the tender will open.

Among the aspects that the future operator must develop are (Presidencia de Costa Rica, 2021):

- Mitigation of the sedimentation problem;
- Container terminal development;
- The construction of an additional berth for the ferry; general cargo, and RORO;
- Improvement of the grain terminal;
- Truck parking area;
- Measures to decrease downtime at station 4 of the port facilities;
- Stabilization of the coast;
- Relocation of the administration offices of the port;
- Development of coast guard facilities.

4.9.5. Nearshoring

The container crisis that occurred at the end of 2021 due to the pandemic can boost foreign investment processes in Central America.

The geographical proximity to the United States and Canada represents an opportunity to promote the arrival of companies whose production plants are in Asia to Central America to shorten the transit times of goods and minimize the political and commercial risks that have increased between the United States and China (Melara, 2021).

In addition to proximity, the region has a network of trade agreements that include agreements with all North American countries and the European Union that facilitate duty-free trade that would favor companies.

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