

GREEN TRANSPORTATION

The Outlook for Electric Vehicles in Latin America

Estefania Marchán and Lisa Viscidi

The electrification of the transportation sector is crucial to tackling global climate change. According to the International Energy Agency (IEA), in order to limit average global temperature increases to 2°C – the critical threshold that scientists say will prevent dangerous climate change – by 2050, 21% of carbon reductions must come from the transport sector.¹ To achieve this goal, the agency says, three fourths of all vehicles sold by 2050 need to be electric, including plug-in hybrid and battery electric vehicles. These projections would also require nearly full de-carbonization of the electricity sector through increased renewable energy generation.²

Globally, electric vehicle (EV) penetration has grown rapidly over the last decade, albeit from a small base, thanks to a variety of new car models coming to the market, significant cost reductions in components such as batteries and a range of public policies to promote electric mobility. Innovations in battery charging infrastructure and new business models such as car sharing have also made it easier for consumers to access electric cars. The total stock of electric vehicles more than tripled to 665,000 in 2014 from 180,000 in 2012.³

Despite these advances, however, EV deployment remains concentrated in a handful of countries, including the United

States, Japan, China and several European countries, and EV market share is still below 1% in all but four countries in the world.⁴ There remain many challenges to expanding the use of electric vehicles. Many countries have insufficient charging infrastructure, and consumers are concerned about the limited range that electric vehicles can drive without recharging. There are also concerns in some regions about electric grid reliability and whether

Latin America faces many barriers to expanding electric transport with few of the incentives that have encouraged electric vehicle sales in other regions.

Foreword

I am pleased to present “Green Transportation: The Outlook for Electric Vehicles in Latin America,” a new report by Estefania Marchán, Consultant at the Inter-American Development Bank, and Lisa Viscidi, Director of the Energy, Climate Change and Extractive Industries Program at the Inter-American Dialogue.

Expanding the use of electric vehicles, including private cars, taxis, buses and rail, is a critical component of advancing a sustainable transport agenda, reducing air pollution and cutting global greenhouse gas emissions. This report analyzes the outlook for electric transportation in Latin America, focusing on four case studies in Colombia, Mexico, Brazil and Chile. The authors conclude with key policy recommendations for increasing electric vehicle adoption in the region.

The report highlights findings from the *Latin America Clean Transport Forum* in Mexico City, which was hosted by the Inter-American Dialogue on September 2, 2015. The forum convened representatives of the Mexican government, NGOs and research institutions focused on clean transportation and private sector leaders in electric mobility to discuss successful electric mobility policies

around the world and challenges and opportunities to promoting the use of electric vehicles in Latin America.

This effort is a product of the Energy, Climate Change & Extractive Industries Program, which informs and shapes policies that promote investment while encouraging economically, socially and environmentally responsible development of natural resources.

The Inter-American Dialogue engages our network of global leaders to foster democratic governance, prosperity and social equity in Latin America and the Caribbean.

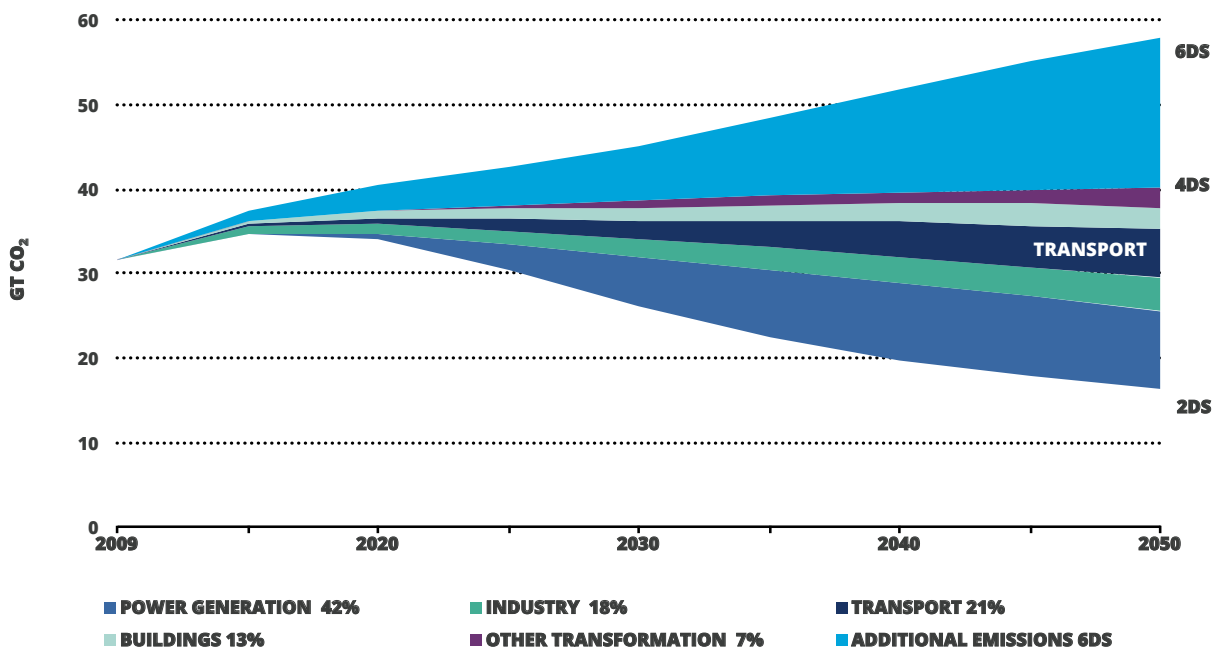
This report was made possible through the generous support of BMW Group. The views expressed in this report are those of the authors and do not necessarily reflect the perspectives of the Inter-American Dialogue or its sponsors.

MICHAEL SHIFTER
President

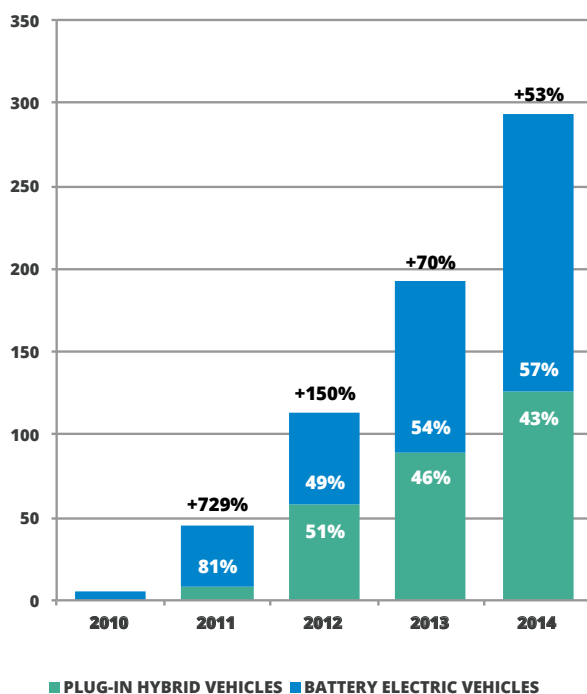
This report analyzes the outlook for electric transportation in Latin America, focusing on four case studies in Colombia, Mexico, Brazil and Chile.

FIGURE 1: ROLE OF TRANSPORT IN CO₂ REDUCTION (% = 2050 ESTIMATE)

Source: International Energy Agency (2012), Energy Technology Perspectives 2012, OECD/IEA, Paris. Note: Sector percentages represent cumulative contributions to emissions reductions relative to the 4DS (4°C Scenario, which is based on proposed policies).

**FIGURE 2: GLOBAL EV SALES (ANNUAL SALES IN THOUSANDS)**

Source: Global EV Outlook 2015, International Energy Agency



power sources are adequate to support widespread expansion of electric vehicles. Perhaps the greatest obstacle remains the high upfront cost. While battery costs have been cut by more than half since 2008, most electric vehicles remain more expensive than similar cars that run solely on gasoline or diesel, although the total cost of ownership over the life of an electric vehicle is often lower due to fuel savings and lower maintenance costs.⁵

Several countries have introduced measures that have proved successful in promoting EV uptake. Financial incentives such as consumer tax credits make electric vehicles more competitive by reducing upfront costs and have driven EV sales in many countries.⁶ Policies to implement stronger fuel economy standards which give car manufacturers incentives to invest in EV technology, eliminate fossil fuel subsidies that favor petroleum vehicles and introduce separate metering for residential EV charging have also borne fruit. Non-financial incentives, such as preferred road and parking access, have also boosted electric vehicle sales. In addition, local governments are encouraging electric transport by acquiring electric taxi, bus and rail fleets and developing public education campaigns highlighting the benefits of electric vehicles.

Latin American electricity generation is cleaner than the global average due to reliance on hydropower and limited coal-fired generation, amplifying the potential benefits of electric transport.

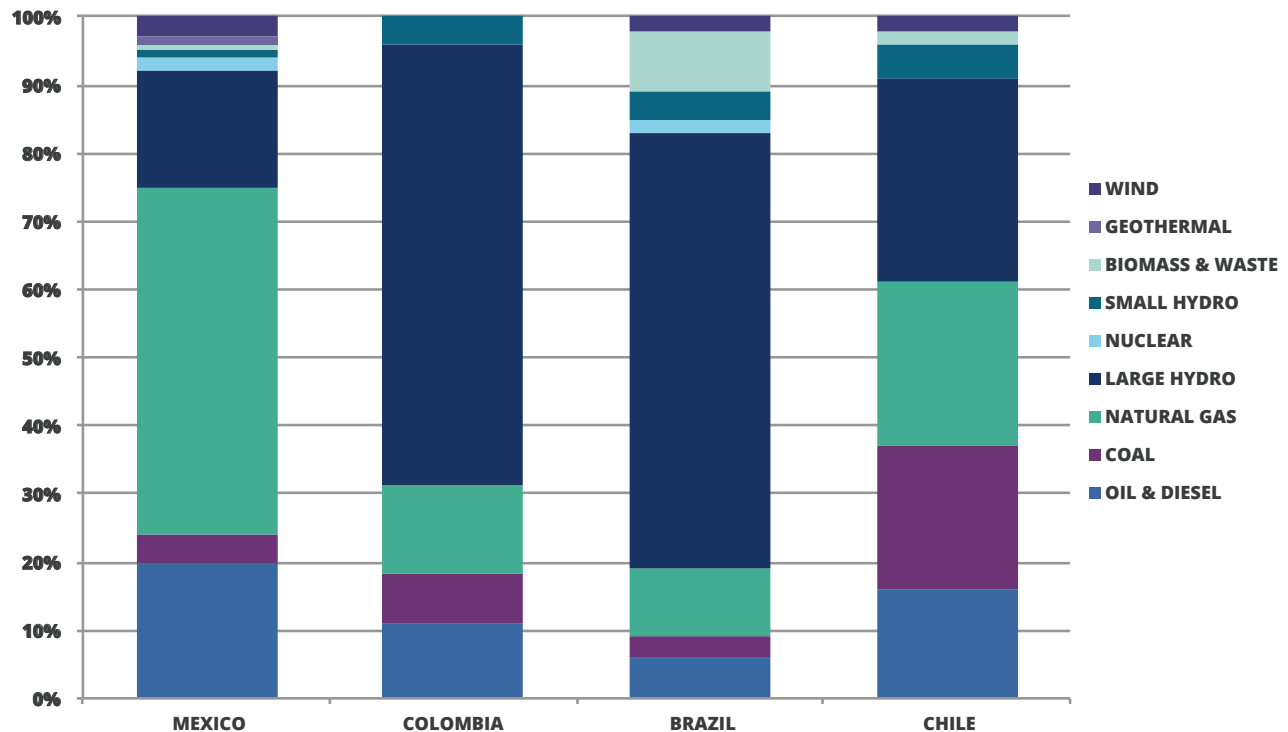
In Latin America, electric transport is in early stages, with just a few thousand vehicles in circulation in the entire region. Most of those vehicles are for corporate or government use, taxis or public transportation, with only a few hundred electric vehicles owned by private individuals. Latin America faces many of the barriers to expanding electric transport with few of the incentives in place that

have encouraged electric vehicle sales in other regions. The top barriers are high upfront costs and lack of public charging infrastructure. Concerns about grid reliability and competition from other industries have also stifled EV market growth. Meanwhile, existing incentives, such as limited tax breaks and exemptions from road access restrictions, are generally not sufficient to compensate for the perceived disadvantages of owning an electric car.

However, expanding electricity mobility in Latin America would offer many benefits in terms of improving air quality and public health and reducing carbon emissions. Many Latin American cities have severe air pollution and a large number of old and inefficient vehicles on the road. The transport sector is the largest and fastest-growing source of energy-related emissions in the region. At the same time, Latin American electricity generation is much cleaner than the global average due to heavy reliance on hydropower and limited coal-fired generation, amplifying the potential benefits of electric transport. And even in countries where fossil fuels are the source for over 50% of electricity generation, such as Chile and Mexico, electrifying transportation will still improve air quality and reduce emissions.

FIGURE 3: INSTALLED CAPACITY BY GENERATION SOURCE, 2013

Source: Bloomberg Climatescope 2014



While EV markets are only incipient in Latin America today, in the long-term, electric vehicles – in combination with higher fuel efficiency standards for conventional cars, improved public transportation and better conditions for bikers and pedestrians – are a critical part of a clean transport agenda. The four countries included in this report – Colombia, Mexico, Brazil and Chile – are among the most advanced in electric vehicle penetration in the region. They provide examples for other Latin American countries of successful electric transport policies, as well as lessons in what remains to be done.

Colombia

Within Latin America, Colombia has been at the forefront of efforts to achieve sustainable transport. In 2012, the country adopted the Low Emission Development Strategy as part of its National Development Plan in an effort to mitigate climate change-related greenhouse gas (GHG) emissions. Since then, its actions have focused strongly on the transport sector. Electrification of the country's public transport fleet, including buses and taxis, was identified as one of the top priorities,⁷ resulting in the launching of Latin America's largest electric vehicle taxi fleet and a pilot project for electric buses. Though obstacles remain, these efforts provide a strong platform from which to expand EV adoption in the long run. Given that 75% of Colombia's electricity is generated from hydraulic energy, the electrification of the country's vehicle fleet could result in important reductions of greenhouse gas emissions.

Electric vehicles were first introduced in Colombia in 2012, when Condesa and Emgesa – two Colombian electric companies – partnered with Mitsubishi to test a 15-car fleet of the automaker's I-MIEV model.⁸ That same year, the city of Bogota launched an electric taxi pilot project in partnership with Condesa, civil society groups and local taxi companies. The participating taxi companies tested the Mitsubishi I-MIEV and Chinese automaker's BYD E6 models and selected BYD to make up the eventual fleet of 43 EV taxis. Renault's Kangoo and Twizy – a small truck and 2-passenger messenger car – were introduced in 2014 and 2015 respectively, and the BMW i3 model and Nissan LEAF became available in 2015. There are 126 electric vehicles in circulation in the country, though only an estimated 25 belong to private versus corporate owners.⁹

Although national and city governments have made progress on their goal to increase the adoption of

electric vehicles, obstacles remain. As in the rest of Latin America and globally, the cost of EVs remains high for the average Colombian consumer, and sales of most EV models are therefore targeted at corporate entities instead of private consumers. The Mitsubishi I-MIEV, for example, cost around \$44,000 in 2012 when purchased by Condesa and Emgesa and is not readily available to the public. The Nissan LEAF is also currently only being sold to corporations.¹⁰ The Renault Twizy, starting at around \$16,000, and the BMW i3, starting at around \$60,000, are the only EVs with wider distribution.

The city of Bogota has pledged to convert 50% of its taxi fleet to electric vehicles in the next 10 years and hopes to substitute all of its bus fleet with hybrid and electric vehicles by 2024.

Other obstacles to greater EV adoption include the lack of recharging infrastructure available in the country and the bureaucratic hurdles associated with finding public spaces where charging stations can be installed. Although EVs have been in circulation since 2012, the first and only public charging station opened in Bogota in March 2015.¹¹ Installing the necessary infrastructure for home charging is also expensive, costing around \$1,000.¹²

Despite these obstacles, Colombia provides a good example of how local and federal governments alongside private actors can work together to provide meaningful – albeit limited – incentives to reduce the cost of EV ownership. As a result of the national government's goal to support the adoption of electric vehicle technology, up to 750 EVs priced under \$52,000 FOB are exempt from the standard import duties of 35% every year.¹³ At the city level, Bogota enacted Decree No.677 in 2011 to support the EV taxi pilot and broader EV adoption. Electric vehicles are exempt from the city's "Pico y Placa" regulation, which

limits the number of days a vehicle can circulate, and the first 50 EV taxis are exempt from permitting requirements, which can double the vehicle's upfront cost.¹⁴ Condesa supported the taxi project by building the necessary charging infrastructure on private grounds.

Expanding private adoption of EVs should be prioritized as private light duty vehicles are set to increase more than any other class of vehicle, from 16% of Colombia's vehicle fleet in 2009 to 36% by 2040.

In order to increase EV adoption in the future, Colombia should leverage its existing success in electrifying Bogota's public transport fleet and focus on expanding EV adoption for high-use vehicles such as taxis. Turning Bogota's taxi pilot into a viable commercial project required years of learning. Overcoming obstacles such as the high cost of permits for taxis and securing appropriate financing to purchase the vehicles, for example, required trial and error and the collaboration of various stakeholders. The fact that Bogota's EV taxi fleet is projected to expand to 1,000 taxis in 2016 is no small feat.

The benefit of focusing on electrifying high-use vehicles is two-fold: it has significant environmental benefits as these vehicles operate more frequently than private cars, and it demonstrates the effectiveness of EV technology to a large number of people. The focus now should be to fine tune the project and expand it to cities such as Medellín. The government could support this expansion by exempting more EV taxis from operating permits, raising the current limit of 50 vehicles. EV taxis could share a permit with existing conventional taxis with a plan to retire the latter within a set time frame, for example. This system would still limit the total number of taxis on the road.

A second way the government could support the expansion of an electric public transport fleet is by aiding in the financing process. In Bogota, the taxi companies themselves had to secure financing with their own collateral. The Clean Technology Fund created by the Inter-American Development Bank (IDB) and the Colombian government to assist in implementing the country's urban transport and energy efficiency goals can play an important role in providing concessional financing for the project's future expansion.

Finally, the goal of expanding private adoption of EVs should also be prioritized as private light duty vehicles are set to increase more than any other class of vehicle, from 16% of Colombia's vehicle fleet in 2009 to 36% by 2040.¹⁵ Additional fiscal incentives could be offered to consumers, such as subsidies for purchasing the vehicle and home charging infrastructure. Other incentives including free tolls and access to preferential parking and driving lanes can also be part of a comprehensive package.

It is clear from the government's actions thus far that Colombia is interested in supporting broader EV adoption in the long run. The city of Bogota alone has pledged to convert 50% of its taxi fleet to electric vehicles in the next 10 years and hopes to substitute all of its bus fleet with hybrid and electric vehicles by 2024.¹⁶ Wider adoption of electric transport will be critical if Colombia is to stay on track with its low-carbon development goals. Although Colombia's carbon emissions are relatively low, they are projected to double by 2040 if no mitigating action is taken.¹⁷ The transport sector will be responsible for the majority of the increase.¹⁸

Mexico

In recent years Mexico has emerged as a leader among developing nations in addressing climate change. The country passed an ambitious climate change law in 2012 and has since pledged to reduce GHG emissions by 40% by 2030.¹⁹ De-carbonizing the country's transport sector – itself responsible for 22% of yearly emissions – will be critical if Mexico is to meet its goals. The recent introduction of electric vehicles into the market represents an important opportunity to advance electric transportation in Mexico, but doing so will require long-term commitments from public and private actors, as the obstacles to widespread EV adoption remain high.

Mexico's electric vehicle market is incipient but promising. In June 2014, the Nissan LEAF became the first EV available in the country, followed by the Renault Twizy and the BMW i3 and i8. Mexico's EV fleet is small; although Mexico does not provide official figures on electric vehicle circulation in the country, most experts estimate that there are approximately 200 EVs in circulation, out of 35 million vehicles in the country.²⁰ In addition, Mexico City tested a hybrid bus from December 2014 to January 2015, though it has not yet tested any purely electric buses.²¹

Low EV adoption in Mexico largely results from well-known global obstacles: high upfront costs and scarce supporting infrastructure hinder the large-scale proliferation of EVs. These barriers are further amplified by local idiosyncrasies, particularly the slow overall modernization of the Mexican vehicle fleet and the high and uncertain cost of electricity. Together, these obstacles will make widespread EV adoption in Mexico a long-term process. Nevertheless, there are many steps that the country can take to incentivize greater EV adoption.

The principal challenge to broader EV adoption is the vehicles' high cost. With upfront costs starting at \$36,000 for a Nissan LEAF and \$49,000 for a BMW i3, EVs compete in the Mexican luxury car segment, which only a small fraction of the population can afford.

High costs are compounded by a sparse network of public charging infrastructure and a lack of incentives for private distributors to expand them given the government's historical monopoly of the electricity market. There are over 150 public charging stations located in high traffic areas around the country.²² For now, many stations offer services free of charge – a benefit provided by automakers and businesses to encourage EV use until services can be commercialized.

Finally, although the available financial and non-financial incentives are a good start, their ability to shift consumer preferences away from fossil fuel vehicles is limited. EV owners are currently exempt from a "new vehicles" tax, a yearly vehicle ownership tax and environmental inspection requirements.²³ Recently, Mexico's Federal Electricity Commission (CFE) also introduced a scheme to install separate residential electric meters for EVs, thereby preventing consumers from being penalized with higher tariffs for greater electricity consumption as is typical in Mexico. In Mexico City, moreover, EVs are exempt from the "Hoy No Circula" program, which limits the days that vehicles can be on the road.

Mexico's electricity reform, which opened the sector to private participation and is expected to result in lower electricity tariffs, can create new business opportunities to participate in the EV ecosystem.

Yet these same incentives can also apply to fossil fuel vehicles. In Mexico City, for example, newer vehicles are exempt from the "Hoy No Circula" program, and vehicles priced under 350,000 pesos (around \$23,000) are exempt from paying the state's ownership tax, meaning that cheaper, less fuel-efficient vehicles also receive this benefit. The current EV incentive structure reflects the lack of a comprehensive strategy for sustainable transport that includes EVs.

In the long run, broader EV adoption should be part of the country's strategy to modernize its vehicle fleet and ensure that the Mexican car industry, which represents approximately 6% of GDP, remains competitive.²⁴ A significant share of today's vehicle fleet is older, made up of cars that can no longer be sold in the United States.²⁵ Yet Mexico's domestic car market is set to grow, potentially reaching 70 million vehicles by 2030.²⁶ A new round of stricter fuel efficiency standards for 2017-2025 could incentivize automakers and dealers to regard Mexico as a long-term target market for EVs and more efficient vehicles.

In the short and medium run, expanding financial and non-financial incentives for EV adoption could prove effective. Local and federal governments and the private sector should work together to create a network of incentives that ensures that the economic, environmental and public health benefits of EVs outweigh their estimated total cost of ownership. Focusing first on more environmentally vulnerable cities like Mexico City could amplify the

benefits of subsidies. Increasing other incentives such as extending EV access to preferential vehicle lanes and parking can be the low-hanging fruit added to a comprehensive incentives package.

Finally, Mexico's recent electricity reform, which opened up the sector to increased private participation and is expected to result in lower electricity tariffs, can create new business opportunities for companies wishing to participate in the EV ecosystem. Private utility distributors, for example, could begin to commercialize EV charging schemes and even negotiate preferential rates with Mexico's CFE for recharging. This would result in stronger incentives to build the necessary charging infrastructure and cleaner power generation. It could also allow schemes for high-use vehicles fleets, such as EV taxis, to be commercially viable once a competitive rate for electricity has been established.

In Brazil, although sales have increased greatly in the last few years, most global EV automakers are still testing local conditions by marketing to corporations or by participating in pilot projects.

Mexico's electricity reform and momentum focused on addressing climate-change represent an opportunity to set the stage for the long-term adoption of electric vehicles. Ultimately, electric vehicles are part of a larger ecosystem of sustainable transport and cleaner energy generation, which is also called for in Mexico's climate change law. Mexico can begin to close the circle on a cleaner energy sector with EVs. Curbing fuel consumption and emissions from the growing transport sector must become a national priority.

Brazil

Brazil has all the makings of a promising market for electric vehicles. The country produces more than 85% of its electricity from renewable sources and is committed to tackling climate change by aggressively reducing GHG emissions and promoting new sources of renewable energy.²⁷ Brazil, one of the largest markets for the sale and production of automobiles, has also been a leader in clean transport since the 1970s when it launched "ProAlcool," a federal initiative to promote the use of sugarcane ethanol for transport. Sugarcane ethanol produces fewer GHG emissions than gasoline or diesel and is renewable.

Yet, the expansion of EVs in Brazil has been slow and faces steep obstacles. Instead of support, it faces strong competition from a powerful ethanol lobby alongside the more universal obstacles to widespread EV adoption. While these obstacles will not prevent EV adoption altogether, they will ensure that it remains a slow and long-term process.

There are 3,000 light and commercial electric vehicles in circulation in Brazil.²⁸ Yet, although sales have increased greatly in the last few years, most global EV automakers are still testing local conditions by marketing to corporations or by participating in pilot projects such as the small, 10-13 car taxi fleets introduced in 2012 and 2013 in Rio de Janeiro and São Paulo respectively. Although the Mitsubishi i-MiEV, Nissan LEAF, Renault Twizy and BMW i3 have entered Brazil, only the BMW i3 is available to retail consumers. With respect to charging infrastructure, there are only 50 charging stations nationwide, and most are concentrated in São Paulo and Rio de Janeiro. The Companhia Paulista de Força e Luz, one of Brazil's electric utility companies, announced that it will establish 100 more charging stations in the coming years.²⁹

Brazil also began testing electric buses last year in the cities of São Paulo, Campinas and Rio de Janeiro. These buses formed part of the country's already diverse fleet, including buses running on biodiesel, ethanol and diesel, as well as electric trolleybuses. In July 2015, Campinas announced that it would acquire 10 electric buses – the largest fleet in the country. Moreover, it announced that Chinese automaker BYD would open production plants for electric buses and solar panels in the area.³⁰ A Volvo plug-in hybrid is scheduled to be tested in Curitiba in early 2016.³¹

Given the size of Brazil's vehicle fleet, the EV market remains small. Unlike in most large or even nascent EV markets, the Brazilian government offers very few incentives for EV adoption. At the federal level, incentives for greater EV adoption are indirect at best. Under INOVAR auto, the country's policy to promote local production of fuel-efficient vehicles, "super credits" are extended to automakers that produce EVs, helping them meet their overall efficiency standards more easily. At the state and local levels, EVs are exempt from the annual car ownership tax in the states of Ceará, Maranhão, Pernambuco, Piauí, Rio Grande do Norte, Rio Grande do Sul and Sergipe and enjoy a reduced rate in Mato Grosso do Sul, Rio de Janeiro and São Paulo. In 2014, the city of São Paulo passed a law to exempt electric, hybrid and fuel-cell vehicles from "Rodízio Veicular," a scheme that restricts vehicles' circulation.

While important, these incentives are not enough to compensate for the obstacles that currently prevent more widespread EV adoption in the country. As in many other Latin American markets, the high cost of EVs and a lack of supporting charging infrastructure constitute large barriers to adoption. But in the case of Brazil, a high tax burden adds to the already high upfront cost of EVs, making them a luxury good. Depending on the state, taxes on imported electric vehicles can add up to an estimated 120%, resulting in an average final price of around \$100,000.³² Compounding this problem is the lack of direct incentives to stimulate EV sales. Electric vehicles were excluded from Brazil's official green-car incentive program announced in 2014, which reduces import duties only on hybrid cars.³³

Another major obstacle that is specific to Brazil is strong competition and opposition from the country's long-standing ethanol fuel program. Brazil presently leads the world in the use of biofuels for road transport and many of the major global automakers now build flex-fuel capability – the ability to run on gasoline or ethanol – into every car manufactured in the country. Today, an estimated 20 million of the country's vehicles are equipped with flex-fuel engines.³⁴ However, Brazil's ethanol industry has been struggling in recent years as fuel price caps kept gasoline and diesel prices low, encouraging consumers to shift away from relatively expensive ethanol. As of 2013, only 23% of flex-fuel vehicle owners used ethanol regularly.³⁵ UNICA, the Brazilian sugarcane industry association, is a powerful lobbying group that opposes EV adoption in Brazil out of concern that greater adoption will impact ethanol consumption.

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Although these obstacles are steep, Brazil has the potential to become one of the largest markets for electric vehicles in Latin America over the long run. There are many steps the country can take in the next few years in order to lay the groundwork for greater future adoption.

As a first step, Brazil should extend its federal green-car initiative to include electric vehicles. Legislative support in the form of tax incentives or rebates will be critical in order to lower the cost of owning an EV. The official rationale for excluding EVs from the policy was that the country's electricity grid does not have the capacity to handle an influx of electric vehicles. Yet it's unlikely that extending tax breaks for EVs is going to induce sudden and speedy EV adoption. Regardless of the incentive structure, the mass commercialization of EVs in Brazil is going to be relatively slow. According to a study by the Associação Brasileira do Veículo Elétrico, a business group promoting EVs in Brazil, if 10% of the current car fleet was made up of electric cars, it would require an increase in power generation of around 2%, thereby producing minimal disruptions to the grid in the short to medium-term.³⁶

In the meantime, Brazilian officials, the private sector and other interested stakeholders should study the environmental and long-term economic benefits of broader EV adoption more carefully. Support for the Brazilian ethanol industry began in the wake of the oil crisis of the 1970s as an effort to shield consumers from the high and volatile price of oil. The environmental benefits of deploying ethanol in road transport were secondary, albeit welcome. If Brazil is to make progress on its pledges to curb climate change, the success of its ethanol industry should be seen as proof that cleaner forms of transport are achievable with proper incentives.

Chile

In recent years Chile has emerged as a regional leader in electric vehicle adoption. In 2011, then-president Sebastián Piñera inaugurated Latin America's first public EV charging station in Santiago, the nation's capital, in the same year that Chile introduced its first EV, the Mitsubishi i-MIEV. Chile has remained one of Latin America's most suitable markets for electric vehicles: the country enjoys one of the highest incomes per capita in the region, it is heavily reliant on imported fossil fuels and it suffers from a growing and increasingly polluting transport sector. Chile's transport sector makes up 22% of the country's GHG emissions, which are projected to grow by 40% by 2020 under a business-as-usual scenario.³⁷ Meanwhile Santiago, where over 5 million Chileans reside, faces deteriorating air quality. In June 2015, the government temporarily shut down 900 industries and prevented approximately 40% of the city's 1.7 million cars from circulating to reduce pollution.³⁸ Electric vehicles offer an opportunity to improve air quality and reduce emissions – a fact that has been formally recognized by the Chilean government.

Chile's transport sector makes up 22% of the country's GHG emissions, which are projected to grow by 40% by 2020.

In 2012, Chilean officials proposed two Nationally Appropriate Mitigation Action (NAMA) plans under the UN Framework Convention on Climate Change, incorporating EVs into the country's emissions reduction strategy. Chile's "E-mobility Readiness Plan" and the "Santiago Transportation Green Zone" aim to grow the EV market to 70,000 cars by 2020 and to promote the circulation of low and zero-emission vehicles in urban zones. While commendable, progress on these NAMAs has been slow and both were still under development as of November 2014.³⁹ Today, there are only 136 electric vehicles in

circulation in Chile and 10 publicly accessible charging stations.⁴⁰ Aside from the Mitsubishi i-MIEV, several other EV makes and models circulate the country including the Mitsubishi Outlander, Nissan LEAF, BMW i3, BYD's e6 and the Tesla Model S.

In August 2013, Chile tested its first electric bus – the BYD K9 – in Santiago. Although progress in incorporating additional electric buses has been slow, interest remains. The Ministry of Environment and the city of Santiago proposed a pilot to test the performance of five electric buses and five hybrid buses as part of the Santiago Transportation Green Zone NAMA, which was updated in 2014. By 2020, Chilectrica, a Chilean electric company leading the installment of charging stations, plans to build the necessary charging infrastructure to service 600 electric buses. This is equivalent to 10% of the present public transport fleet and will lead to a monthly reduction of 2,400 tons of CO2 emissions.⁴¹

The slow adoption of electric vehicles in Chile largely reflects their high upfront costs as well as a lack of incentives to reduce them. Widespread EV adoption will require bolder incentives in the short and medium-term and long-term commitments from public and private actors designed to link e-mobility with renewable power generation initiatives in order to lessen the country's reliance on fossil fuels and reduce emissions. Though obstacles remain, the Chilean government has made important progress in laying out a policy framework for greater future EV adoption.

One of the biggest obstacles to broader EV adoption in Chile is the vehicles' often prohibitive price tag. The Mitsubishi i-MIEV entered the Chilean market priced at 30 million CLP, or approximately \$59,000.⁴² Renault's EV models range from 25 million CPL to 28 million CPL, or \$37,000-\$41,000, and the BMW i3 is priced at 37 million CPL, or around \$55,000. Compounding this problem is the lack of an incentive structure strong enough to shift a large amount of consumers away from less expensive fossil fuel vehicles. In Chile, EVs are currently only exempt from paying an annual vehicle registration fee for a period of 4 years and from Santiago's circulation restriction, which prevents vehicles from circulating two days per work week.⁴³

It is also worth noting that a lack of adequate charging infrastructure may not be as big of an obstacle to EV adoption in Chile as it is in many other Latin American countries. According to Chilectra, approximately 200,000 EVs could be served without necessitating the installation

of additional capacity. Moreover, the availability of 220 volt single-phase power in Chilean residences allows for faster and easier home charging.⁴⁴

In the short and medium run, expanding incentives for EV adoption as well as pilot programs could serve to jumpstart demand. Fiscal incentives would likely be most effective in promoting EV adoption by lowering upfront costs. Alternatively, the government can consider options like feebates, which are fiscally neutral and which were originally proposed by the “E-mobility Readiness Plan” NAMA. A feebate would levy a fee on high emitting vehicles and would in turn provide a rebate for low emitting ones. The Ministries of Transport and Environment have showed a willingness to consider policies that use a mix of incentives and disincentives to promote vehicle efficiency. They are currently considering a policy that would permanently restrict vehicles from circulating in the months of May through August, when pollution is at its worst, unless they meet stricter fuel efficiency standards, namely Euro IV, V and VI. Hybrid and electric vehicles would be exempt from this restriction.⁴⁵

Expanding pilot programs for high-use vehicles such as taxis can also raise awareness of EV technology and help build market momentum. As of October 2014, there were 21 electric taxis in Santiago, which are part of a program initiated by the Ministry of Transport.⁴⁶ This program can be expanded to include “colectivos,” or collective taxis, which are a widely used shared taxi service with relatively fixed routes.⁴⁷ Colectivos would expose more passengers to EV technology while allowing them to pay comparably

Chile’s “E-mobility Readiness Plan” aims to grow the EV market to 70,000 cars by 2020.

less for each ride. Securing funding for these pilots should be a central effort in the NAMAs’ implementation.

Finally, in the long run, it will be economically and strategically beneficial for Chile to jointly promote e-mobility and the diversification of its energy matrix. Chile currently imports around 95% of its crude oil, yet it has great renewable energy potential. In 2013, Chile amended the Non-Conventional Renewable Energy Law to achieve a 20% renewable energy target in 2025 by committing 45% of new installed capacity in 2014–2025 to non-conventional renewable energy sources. Reaching this target would have significant environmental as well as economic benefits. According to a study by the Natural Resources Defense Council, reaching this target would represent a net benefit of more than \$1.6 billion to the Chilean economy.⁴⁸ Electric vehicles can be part of this larger ecosystem of sustainable transport supported by cleaner energy generation. This would leave Chile well positioned to establish itself as a hub of innovation in the region.

FIGURE 4: BENCHMARKING ELECTRIC VEHICLE CONDITIONS IN LATIN AMERICA

COUNTRY	LOW-CARBON POWER GENERATION*	EMISSIONS REDUCTION TARGETS	LACK OF FOSSIL FUEL SUBSIDIES	ROAD ACCESS INCENTIVES	FINANCIAL INCENTIVES	EXTENSIVE PUBLIC CHARGING INFRA-STRUCTURE	ELECTRICITY INCENTIVES
Colombia	✓	✓	✓	✓	✓		
Mexico		✓		✓	✓		✓
Brazil	✓	✓		✓			
Chile		✓	✓	✓			

*Fossil fuels make up less than 50% of the energy matrix

CONCLUSION

While electric transport is in initial stages in Latin American countries, there are many opportunities to promote electric vehicles, from private cars to taxis, buses and rail. Expanding electricity mobility in the region would offer many environmental benefits and should be considered a key component of broader targets for boosting clean energy and reducing GHG emissions.

At present, Latin America faces many of the barriers to expanding electric transport but limited incentives compared to other regions of the world where EV adoption has been more widespread. Governments in Latin America can further advance the clean transport policy agenda by focusing on the “low-hanging fruit,” such as non-financial incentives, coupled with longer-term strategies to expand pilot EV programs and incorporate EV adoption into long-term energy and transport sector planning. Below we outline four main policy areas where governments should focus on promoting EV uptake.

1. EXPAND PROGRAMS FOR HIGH-USE ELECTRIC VEHICLES

Latin American cities should expand pilot projects and other programs that promote electric transport for high-use vehicles such as taxis and buses. The focus on electrifying high-use vehicles has significant environmental and public health benefits as these vehicles operate with high frequency and produce zero emissions locally. At the same time, they serve as a tool to demonstrate the effectiveness of EV technology and build widespread public confidence.

2. INTRODUCE STRONGER FINANCIAL INCENTIVES

Financial incentives have been shown to strongly encourage EV sales by reducing upfront costs. In Latin America, the total cost of ownership of EVs remains above that of similar cars that run on oil derivatives. As a result, further financial incentives would be necessary to narrow the cost gap. Such incentives might include tax reductions for EVs and home charging infrastructure purchases or higher taxes on fossil fuel cars. Latin American governments should also eliminate fossil fuel subsidies that favor petroleum vehicles. Fiscal incentives for public charging stations are also critical to promote access to charging stations for consumers when they are traveling long distances from home or are unable to build a charging station in their own residence. Public-private partnerships to install charging stations in offices, for example, could further encourage EV sales in Latin America.

3. INCREASE NON-FINANCIAL INCENTIVES

In cases where financial incentives are undesirable – for example because tax breaks reduce government revenues and higher taxes on traditional cars face too much opposition – non-financial incentives may be more effective. Many major Latin American cities already have programs in place to restrict car use in order to reduce traffic and air pollution. Latin American countries can further extend these road access benefits and introduce additional non-financial incentives, such as access to preferential parking and driving lanes. Latin American governments should also introduce stronger fuel economy standards to give car manufacturers incentives to invest in EV technology.

4. INCLUDE EVS IN BROADER LONG-TERM PLANNING

Latin American governments should consider electric transport as part of their long-term plans for the energy and transport sectors and introduce EV targets in their climate change mitigation goals. Many Latin American countries have been leaders in low-carbon development, setting ambitious carbon reduction targets. The transport sector is the fastest growing source of energy-related GHG emissions in the region. Electric vehicles, in combination with broader clean transport and urban development strategies, are critical to reducing emissions from the transport sector and achieving climate change goals. Governments in the region should also collect and share better data about EV uptake in their countries to support long-term planning.

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