Phasing-Out Fossil Fuel Subsidies in Venezuela: A Transportation Planning Perspective

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Phasing-Out Fossil Fuel Subsidies in Venezuela: A Transportation Planning Perspective

A Thesis

Submitted to the Graduate Faculty of the University of New Orleans in partial fulfillment of the requirements for the degree of

Master of Urban and Regional Planning in Urban and Regional Planning Transportation Planning

by

Mariana E. Mármol Zubizarreta

BFA and BA, Louisiana State University, 2010

August, 2013
Acknowledgement

I would like to thank the University of New Orleans for allowing me the opportunity to grow as a researcher. To my committee members Professor Catherine Lowe and Professor Steve Striffler, I am extremely grateful for your suggestions and for raising important questions related to future research. To my sister and parents for always encouraging and supporting me through this stressful time. To Christian Raschke, the best Economics tutor, whose patience I definitely tested a number of times, I am grateful for all the help and encouragement provided. Most of all, I am fully indebted to Professor John Renne, my committee chair, who guided me through this investigation and believed in this work.
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Glossary of Terms and Acronyms

AD, Acción Democrática, or Democratic Action: is a people’s political party established in 1941 that played an essential role in the early years of Venezuelan democracy and led during the country’s first democratic period (1945-1948).

bpd, barrels per day.

Bolívar Fuerte (Bs.F), VEF: currency in Venezuela since 2008 that replaced the Bolívar at the rate of Bs.F. 1 = Bs. 1,000 in order to facilitate transactions and accounting.

Conferry, Consolidada de Ferrys C.A.: Venezuelan shipping company that operates freight and passenger services to the islands of Margarita and Coche.

COPEI, Comité de Organización Política Electoral Independiente, or Committee for Independent Electoral Political Organization: is the working-class political party in Venezuela.

EEC-GNV, La Entidad Ejecutora de Conversión a Gas Natural Vehicular, or the Executing Agency of CNG Conversion is a Bolivian agency in charged of converting gasoline- and diesel-powered vehicles to natural gas-powered vehicles.

IESA or Instituto de Estudios Superiores de Administración: known in English as the Institute of Advanced Studies in Administration is Venezuela’s leading business school, tripled accredited by the three leading global business school accreditation associations and ranked among the seven best in South America.

NGV, or natural gas vehicles.

PDVSA, Petróleos de Venezuela: government-run oil company in Venezuela.
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Abstract

This research examines the feasibility of a gasoline and diesel consumer subsidy phase-out in Venezuela from a transportation planning perspective. It surveys the literature and discusses case studies from Iran, Brazil, and Bolivia in order to identify the lessons that Venezuela can learn from these countries’ successes and mistakes. It examines how strengthening and investing in the public transportation system can be used as a means to gain public support for the reform. I discuss the current political, social, and economic conditions that make a fossil-fuel subsidy reform difficult, and offer suggestions from a transportation planner’s perspective on how the transition can be made as smoothly as possible. Finally, I explore the opportunities that present themselves to transportation planners in shaping the country’s future approach toward transportation.
I. Introduction

This thesis examines the role of transportation planners in a potential phase-out of fossil fuel subsidies in Venezuela. Specifically, gasoline and diesel are subsidized directly in Venezuela, and the artificially low prices of gasoline products over the last few decades have resulted in auto-centric planning. If the subsidies are to be phased-out, then transportation planners have the unique opportunity to play a central role in ensuring a smooth transition, as well as shape the future of the country’s public transportation systems.

The Venezuelan government maintains strict price controls over the prices of gasoline and diesel. Specifically, the government directly sets prices far below market value and consumer gas and diesel prices have been nominally fixed since 1996. For the last seventeen years the prices have been 0.07 BsF \textit{(Bolivares Fuertes)} per liter for 91 octane gasoline, 0.097 BsF/liter for 95 octane gasoline, and 0.048 BsF/liter for diesel.\(^1\) For ease of comparison with the United States, Table 1 shows per gallon prices of gasoline and diesel denominated in Bolivares Fuertes as well as US dollars. Note that the prices are fixed in nominal Bolivares Fuertes and therefore the price in US dollars depends on the exchange rate between the two currencies. As of June 2013, Venezuela maintains a fixed exchange rate with the US dollar of 6.30 BsF/USD.\(^2\)

\begin{table}[!h]
\centering
\begin{tabular}{lcc}
\hline
\textbf{Oil Product} & \textbf{BsF per gallon} & \textbf{$\$\text{US per gallons}$} \\
\hline
Diesel & 0.18 BsF & $0.029$ (3 cents) \\
Gas (91 octane) & 0.27 BsF & $0.043$ (4.3 cents) \\
Gas (95 octane) & 0.37 BsF & $0.059$ (6 cents) \\
\hline
\end{tabular}
\caption{Gasoline and Diesel Prices in Venezuela, June 2013}
\end{table}

\textit{Note: Octane numbers refer to the octane rating according to the RON method. Prices in USD use the June 2013 official fixed exchange rate of 6.30 BsF/USD.}

\(^1\) Note that there are different conventions used in calculating the octane value of gasoline across different locations. The most common octane rating method worldwide—which is also the method used in Venezuela—is the “Research Octane Number” (RON). In the United States, most gas stations show octane ratings using a “Anti-Knock Index” that is sometimes written as “\((R+M)/2\)” on the pumps. 91-octane (RON) gasoline in Venezuela is regular gasoline that corresponds to 87-octane regular gasoline at US gas pumps.

\(^2\) The Black Market rate/parallel rate/market rate quadruples the official rate to about 31.5 BsF/USD (as of June 2013).
The cost of selling gasoline to the population below market value is substantial: In a recent study, Barrios & Morales (2012) calculate that gasoline subsidies in Venezuela represented 3.16% of GDP in 2010.³ This is a larger proportion of GDP than all social transfer programs combined (2.30% of GDP), and it is also a larger proportion of GDP than many other important social expenditures (Barrios & Morales, 2012). For example, education expenditures account for 2.51% of GDP, health expenditures for 2.02% of GDP, and citizen security for 0.34% of GDP (Barrios & Morales, 2012). Since the market price of gasoline fluctuates and depends on a number of economic variables, the cost of maintaining a fixed consumer price varies over time. Using the same methodology as Barrios & Morales, I calculate that by 2012, the gasoline subsidy had doubled to roughly 6.1% of GDP.⁴

Typical reasons for why developing countries support fossil-fuel subsidies include alleviating poverty, promoting economic development, and securing political stability. However, subsidizing fossil fuels to consumers has a number of negative unintended consequences. Subsidies encourage wasteful consumption of natural non-renewable resources, the use of automobiles as well as auto-oriented development. These also encourage fuel smuggling across borders, which leads to a product loss that could otherwise be exported. The distortion in the energy markets creates barriers to clean energy investment, discourages investment in bio/alternative energy infrastructure, and increases CO₂ emissions and local pollution. Moreover, fossil-fuel subsidies tend to disproportionately benefit the middle and upper classes of society: the very poor are still unlikely to be able to afford a car or otherwise benefit from the low price of gasoline products.

Environmental challenges, aggravated by the rapid urbanization of cities and growth of the global population, have caused a big push for developing countries, producers and exporters of oil and its derivatives, to phase-out consumer subsidies to fossil fuels. The phasing out of consumer fossil fuel subsidies is advocated by international organizations such as the International Monetary Fund, the World Bank, the German Agency for International Cooperation, and the United Nations, among others.

In Venezuela, raising gasoline prices has become a taboo topic and supporting an increase in prices can be considered political suicide. No serious attempts have been made in recent years to increase prices at the national level. Due to the sensitivity of the issue, the government has only been able to implement some purchasing restrictions in specifically targeted areas. In particular, individuals may not purchase more than 10.8 gal every other day

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³ Gasoline for private vehicles represents 52.3% of the total subsidized amount.
⁴ See Section IV for details regarding this calculation
in some areas in order to curb the problem of smuggling cheap gasoline from the northeastern Venezuelan state of Zulia across the border to Colombia, where prices are much higher.\(^5\)

**Thesis Statement**

In this thesis I examine the feasibility of a gasoline and diesel consumer subsidy phase-out in Venezuela from a transportation planning perspective. I look at what could be the role of transportation planners in a possible fossil fuel subsidies phase-out reform in Venezuela. In other words, how can planners help guide the process of becoming a more sustainable nation? Specifically, I investigate how strengthening and investing in the public transportation system can help ease the transition.

Part of the reason for the strong public resistance to any increase in gasoline prices is the fact that transportation system has increasingly relied on the fact that gasoline is very cheap, and important infrastructure has been neglected over the years for the sake of supporting the price controls. I examine how strengthening an investing in the public transportation system can be used as a means to gain public support for the reform. I discuss the current political, social, and economic conditions that make a fossil-fuel subsidy reform difficult, and offer suggestions from a transportation planner’s perspective on how the transition can be made as smoothly as possible. Finally, I explore the opportunities that present themselves to transportation planners in shaping the country’s future approach toward transportation.

**Methodology**

I conduct a case study investigating the feasibility of a gasoline/diesel subsidy phase-out plan in Venezuela. I describe the history of oil in Venezuela and its impact in the country’s society, culture, economy and politics. I also analyze the present economic and political conditions using recent financial indicators from international organizations like the International Monetary Fund, the World Bank, the German Society for International Cooperation (GIZ), the Institute for Transportation and Development Policy (ITDP), and the Global Subsidies Initiative.

Several other countries have attempted to phase out fossil-fuel subsidies and have experienced varying degrees of success. I survey the literature and discuss case studies from Iran, Brazil, and Bolivia in order to identify the lessons that Venezuela can learn from these countries’ successes and mistakes. I look at how these countries managed and offset the rising prices of goods and services that will result from a phase-out of gasoline subsidies. Rising prices particularly affect the low-income population, and I emphasize the potential benefits of transportation investment and how a strong transportation network facilitates social progress.

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\(^5\) Similar restrictions also apply to the state of Táchira and the Amazon region.
For this thesis, I chose the multiple case study research approach in order to compare what different countries have done in terms of transportation policy and planning previous, during and post fossil-fuel phase-out reform. Additionally, I examined the different outcomes that these reforms have had on the transportation sector of each country. These cases were informed through the scrutiny of decrees, acts, policy briefs, newspaper articles, as well as economic indicators from the U.S. Energy Information Administration and other international organizations.

The remainder of this paper is structured as follows. Section II provides detailed background information about the historical, social, and economic context in Venezuela. Section III discusses a number of case studies from subsidy phase-outs in other countries. Section IV describes the tasks that transportation planners face in order to make a phase-out successful. Section V concludes with planning and policy recommendations.
II. Background Information about Venezuela

The Bolivarian Republic of Venezuela is located in northern South America and covers an area of 916,000 square kilometers (353,670 square miles). The nation is divided into 23 states and has a total population of more than 29 million. Roughly four million people reside in the capital city, Caracas. With more than 297.57 billion barrels, Venezuela is home of the biggest proven crude oil reserves in the world and in 2010 it was the eighth-largest net oil exporter in the world (Energy Information Administration, 2010; OPEC, 2012). See Figure 1 below.

**Figure 1: Top 10 Oil Exporters in 2010**

<table>
<thead>
<tr>
<th>Country</th>
<th>Thousand Barrels per Day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saudi Arabia</td>
<td>6,844</td>
</tr>
<tr>
<td>Russia</td>
<td>4,888</td>
</tr>
<tr>
<td>Iran</td>
<td>2,377</td>
</tr>
<tr>
<td>Nigeria</td>
<td>2,341</td>
</tr>
<tr>
<td>United Arab Emirates</td>
<td>2,142</td>
</tr>
<tr>
<td>Angola</td>
<td>1,928</td>
</tr>
<tr>
<td>Iraq</td>
<td>1,914</td>
</tr>
<tr>
<td>Venezuela</td>
<td>1,645</td>
</tr>
<tr>
<td>Norway</td>
<td>1,602</td>
</tr>
<tr>
<td>Mexico</td>
<td>1,460</td>
</tr>
</tbody>
</table>

**Historical Context of Oil in Venezuela**
Before the discovery, exploration and subsequent production of oil in Venezuela, the country’s economy was primarily relying on agriculture, largely depending on coffee production and to a lesser extent, on cacao production. By 1914, Venezuela exported one million bags of coffee, more coffee than any other country except Brazil (Frederick & Tarver, 2006). Venezuela became an oil producer under the dictatorship of Juan Vicente Gómez (1908-1935) when the first commercial oil well was drilled on Lake Maracaibo, Zulia in 1914 (Organization of the Petroleum Exporting Countries (OPEC), 2012). Production and the first oil exports were delayed until 1917 due to World War I. The Gomez government offered incentives to the petroleum exploration enterprise and, as oil became essential to industrialization throughout the world, foreign investors’ interest in Venezuelan oil intensified.

The first Law of Hydrocarbons was enacted in Venezuela in 1920. The law incorporated references to Mexican law and US law, and it marks the beginning of regulation of the oil industry in Venezuela. Landlords were given preferential right to concessions on their lands, limited to one year. A new Hydrocarbon Law was passed by 1921, and the new version established relatively high royalty rates to be paid to the government for the exploration of natural resources. This was done under the guise that the country’s natural resources are a national patrimony. However, since the dictator Juan Vicente Gomez maintained tight control over the government at the time, the law seems to have rather been designed to benefit Gomez’s relatives and political friends. Concession dealers and oil companies united to promote a third Law of Hydrocarbons in 1922 to reduce the royalty rates to be paid to the government and offer former concessionaries the opportunity to extend their title deeds for a longer period of time. By 1928 Venezuela had become the biggest oil-exporting country in the world. More than 100 million barrels of oil were exported from Venezuela that year, surpassing the previous biggest exporter Mexico (Frederick & Tarver, 2006).

The Great Depression resulted in decreased worldwide demand for consumption goods. This particularly affected Venezuela’s agricultural exports, primarily because coffee and cacao were considered luxury goods at the time. Combined with an appreciation of the Bolivar against other currencies, this resulted in a 21 percent decrease of export value in Venezuela (Cartay, 1996). While the oil sector also contracted during the crisis, it recovered much faster compared to other sectors. As a result, Venezuela’s government became increasingly dependent on the oil industry as a source of fiscal revenue, and the oil industry became increasing important to the economy as a whole.

---

6 The official name of the law is Ley sobre Hidrocarburos y demás Minerales Combustibles en Venezuela
7 Venezuela remained the biggest oil exporter until 1970 when it was surpassed by the Middle East—Saudi Arabia, Iran, and Iraq.
Various income tax schemes that started being implemented throughout the 1940s resulted in increased government revenues from the oil industry. By 1948 a “fifty-fifty” rule was implemented and companies and investors had to split their profit with the State at least 50%-50%. The Organization of Petroleum Exporting Countries (OPEC) was established in 1960 and all oil-exporting countries and developing countries claimed Permanent Sovereignty over Natural Resources (UN, 1962). This “OPEC Revolution” resulted in the eventual nationalization of the oil and gas industry in 1976, with the establishment of Petróleos de Venezuela Sociedad Anónima (PDVSA). At that point international tenant companies were downgraded to service providers.

PDVSA provided the revenues necessary to invest in social programs, specially favoring health and education. However, as oil prices were declining significantly during 1983 and 1984, this led to cuts in spending on social transfer programs throughout the 1980 and led to the gradual impoverishment of the middle-class.

In February 1989, president Carlos Andres Pérez, having just recently taken office for his second term, launched a neoliberal/free-market reform characterized as a “shock program” of economic austerity measures following the recommendations from the International Monetary Fund. Pérez’s Plan de Ajuste Economico lacked political support due to its sudden implementation. Most importantly, the plan included the withdrawal of subsidies and price controls on a broad range of public services and consumer goods, including gasoline prices. The reform also initiated the apertura, or the opening of the economy to the world, once again allowing PDVSA to enter into joint ventures with foreign companies and allowing private investors back into the Venezuelan oil and gas industry (Mommer, 2004). The government’s austerity measures, coupled with the sudden increase in consumer prices, and fueled by the perception of the government continuously mismanaging funds contributed to mounting tensions among the new middle-class poor.

The tensions among the population mounted and eventually resulted in several days of rioting and looting in Caracas and other major cities in Venezuela around February 27, 1989. These riots are now known as the infamous El Caracazo event that left hundreds dead in the country’s worst outbreak of violence in decades. The disturbances consisted primarily of the burning of urban transportation vehicles as well as the looting and destruction of commercial properties, causing extensive damage to both public and private property. The government was forced to order the mobilization of the military in order to contain the revolt.

---

8 The plan included sweeping reforms that affected all aspects of the economy. Foreign exchange markets and interests rates were to be liberalized, trade restrictions reduced, and controls on foreign direct investment relaxed. Additionally, the plan included a very ambitious privatization program.

9 Read: corruption.
While *El Caracazo* was sparked by an increase in the price of bus fares resulting from increased fuel costs, of course there were many other factors that led to tensions rising to such an extent. However, the memory of the event is frequently employed in current political rhetoric as an example of how capitalism and neoliberal measures impoverish people. Since fuel prices were at the heart of the issue that triggered the violence, politicians are unwilling to publicly entertain the thought of reforms involving the fossil-fuel subsidies.

Perez’s reforms were only partially implemented, but nonetheless affected the livelihoods of all Venezuelans, particularly the poorest. This discontent resulted in the failed 1992 coup d’état attempt led by Hugo Chávez Frías. During his campaign to be elected president by legal means in 1998, Hugo Chavez Frías presented the narrative that some people benefited more than others from the oil rent and revenues. He again drove home the point that capitalism impoverishes people and he guaranteed that—once elected—oil would be for everyone. He emphasized that “el petróleo es de todos,” which translates roughly into the sentiment that Venezuela’s petroleum, considered the biggest national heritage, is the people’s to enjoy.

There are several important facets to the slogan “el petróleo es de todos”. On one hand, it means that the revenues generated from the exploitation of the country’s oil reserves should be spent on social programs that will benefit the general population. This idea resonated very strongly, especially among the poor, who felt that they had been neglected for the previous 40 years of democratic rule. On the other hand, the slogan also presents a very direct claim on the resource itself. If the oil is there for everyone to enjoy, then not only is the revenue generated from the oil industry the people’s to enjoy, but the petroleum products themselves are promised to the people.

While the government has funded numerous social programs to benefit the poor, the idea that “petroleum is (truly) everyone’s” has yet to materialize. Control over oil revenues are used as a political leverage. The fact that the redistribution of oil rent is entirely up to the discretion of the government has been used to reward supporters of the current regime as well as to punish their detractors. The government has used the premise that the oil resources belong to the people not to empower citizens in the managing of their own incomes, but rather to empower its executive branch. The exception, of course, is the price of gasoline: it is still subsidized heavily and prices are held artificially low (refer to Table 1 in the first section.)
**Economic Conditions related to the Subsidy Phase-out**

When discussing a potential phase-out of fossil fuel subsidies in Venezuela, it is necessary to consider current economic conditions. A removal of price subsidies can be considered a type of austerity measure if government expenditures in other areas of the economy are not increased simultaneously. Decreases in government expenditures are generally considered contractionary fiscal policy, and therefore a phase-out of the subsidies has the potential to further hurt an already weak economy. This point becomes even more important when considering the size of the subsidy: Barrios and Morales (2012) estimate that the magnitude of the domestic gasoline consumption subsidy is 3.16% of GDP.

**Table 2 Economic Indicators in Venezuela**

<table>
<thead>
<tr>
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<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP per capita ($US)</td>
<td>6,200</td>
<td>4,800</td>
<td>13,500</td>
<td>12,700</td>
<td>12,700</td>
</tr>
<tr>
<td>GDP growth (percent)</td>
<td>3.2</td>
<td>-9.2</td>
<td>4.8</td>
<td>-1.9</td>
<td>4.2</td>
</tr>
<tr>
<td>Inflation (percent)</td>
<td>13</td>
<td>31.1</td>
<td>30.4</td>
<td>28.19</td>
<td>26.09</td>
</tr>
<tr>
<td>Gross public debt (percent of GDP)</td>
<td>31.893</td>
<td>49.294</td>
<td>24.553</td>
<td>38.361</td>
<td>45.5</td>
</tr>
<tr>
<td>Current account balance (percent of GDP)</td>
<td>10.12</td>
<td>14.14</td>
<td>11.86</td>
<td>4.88</td>
<td>8.60</td>
</tr>
<tr>
<td>Oil consumption per capita (liters)</td>
<td>1,232</td>
<td>1,273</td>
<td>1,895</td>
<td>1,531</td>
<td>1,585</td>
</tr>
<tr>
<td>Poverty headcount ratio at national poverty line (% of pop.)</td>
<td>46.3</td>
<td>62.1</td>
<td>32.6</td>
<td>32.5</td>
<td>31.9</td>
</tr>
</tbody>
</table>

Source: CIA World Factbook, The World Bank, The International Monetary Fund
The gross domestic product (GDP) per capita in Venezuela for 2012 was estimated at US$13,200 (Central Intelligence Agency, 2013). Additionally, in 2012 Venezuela ranked in the top ten countries with highest inflation among 224 countries with a rate estimated at 20.9% (OECD, 2012) (Central Intelligence Agency, 2013). Today, the petroleum sector dominates the Venezuelan economy. Oil revenues account for approximately 94% of exports, more than 50% of federal budget revenues, and around 30 per cent of gross domestic product (OPEC, 2012).10

Venezuela’s currency, the Bolivar Fuerte (BsF), has been increasingly overvalued since currency exchange became controlled in 2003. While there have been some adjustments of the fixed exchange rates with the US dollar, the parallel (i.e. black market) exchange rates are still several orders of magnitude higher than official rates. Figure 2 shows Bolivar Fuerte’s official and parallel exchange rates from 2003-2013. The difference between the official and the parallel exchange rates has been increasing dramatically over the last few years. This suggests

10 Interestingly, despite politicians’ popular rhetoric against the United States, the U.S. is Venezuela’s most important export and import partner. More than 40% of Venezuelan exports are exported to the U.S. and almost 29% of Venezuelan imports are coming from the U.S. (Central Intelligence Agency, 2013).
that a devaluation of the Bolivar Fuerte is likely to occur soon, and is indeed necessary. However, officials are reluctant to devalue due to fears of increasing inflation. With inflation rates of more than 35 percent during the first two quarters of 2013 alone, any policy that has the potential to add to inflation is problematic.

The Role of the National Oil Company

Petroleos de Venezuela (PDVSA) has financed the Executive’s social programs, or misiones sociales, since 2004. This is done through the Fund for Social and Economic Development of Venezuela (FONDESPA) that was created to redistribute the oil rent via social programs. The misiones include education, health, housing, energy, and cultural programs that aim at securing the basic needs of the poorest segments of the Venezuelan population. Since prices for basic necessities such as food have been rising sharply, PDVSA also supports Pdval, a subsidized food program that is charged with providing affordable food to Venezuelans. However, even these supermarkets—as well as the other government-run store Mercal—are plagued by the scarcity of products.

PDVSA has been charged with a number of responsibilities in many public arenas, but it has several internal issues that are hurting its operations. First, the conditions of Venezuela’s refinery system are deteriorating, primarily due to a lack of investment in maintenance as well as poor management. During the first 9 months of 2012, PDVSA had reported forty-five incidents for that year, many of them major (Trujillo, 2012). For example, a gas leak at the Amuay refinery on August 25, 2012 triggered an explosion that killed 42 people, injured a dozen more, and damaged about 1,600 homes (Parraga, 2012). Amuay is the world’s second largest oil refinery complex and the largest refinery in Venezuela. Together with a second accident at the El Palito facility that occurred about the same time, these incidents resulted in a 45 % drop in Venezuela’s exports of oil derivatives to the United States (Tovar, 2013). In fact, the accidents caused a large spike in imports of oil byproducts from the United States.

Despite the fact that Venezuela is very oil rich, its refining capacity constraints and problems cause a lot of petroleum products to be imported. In December 2012, Venezuela imported 6.1 million barrels of total petroleum products from the United States, out of which 2.9 million barrels were finished motor gasoline. During the entire years of 2012, Venezuela imported a total of 12.6 million barrels of finished motor gasoline. This is a very large increase compared to the 1.0 million barrels that were imported in 2011 (U.S. Energy Information Administration, 2013). See Figures 3a-3b for the recent development in Venezuelan imports of petroleum products.
Since the imported gasoline is sold domestically at heavily subsidized prices, but must be purchased internationally at the market price, the direct expense due to maintaining the gasoline subsidy is significant. Phasing out the price subsidies, and investing the saved expenditures in infrastructure maintenance and development, as well as spending some of the saving on social programs to directly counteract the effect of rising prices is becoming an increasingly attractive option.

The Gasoline Subsidy and Gasoline Consumption

Gasoline (and diesel) subsidies have existed in Venezuela for as long as forty to fifty years. Gasoline and diesel prices are set by the Ministerio del Poder Popular de Petróleo y Minería. Venezuela has the lowest gasoline prices in the world averaging less than 2 US cents per Liter or between 4.3 and 6 US cents per gallon depending on the octane (Wagner, 2010/2011).

A primary reason that governments implement policies to subsidize gasoline (and other energy or fossil fuels) is to make energy affordable to low-income people. However, the gasoline (and diesel) subsidy in Venezuela is a Conditional Cash Transfer (CCT), where the condition is driving. According to Barrios and Morales, private vehicles consume 52.3% of the total subsidized amount of gasoline (Barrios & Morales, 2012). Even more interesting is the fact that 62% of the private consumption can be attributed to the richest quartile of the population (Barrios & Morales, 2012). Public transportation only accounts for 30.62% of all internal road sector gasoline consumption (Barrios & Morales, 2012). This means that higher income households are benefiting more from the subsidies than the lower-income population.

Table 3 shows that realized prices have stayed at the same low level, while the level of internal consumption has increased 28.22% since 2008. It is very likely that low real prices at the pump are encouraging wasteful consumption. Table 3 also shows that throughout the years, with the exception of 2009, the implicit cost of the gasoline subsidy has increased as percentage of GDP. Additionally, Figure 2 illustrates that Venezuela has one of the highest levels of road sector gasoline fuel consumption (in kilograms of oil equivalent or kgoe) per capita in the region—including the United States. Venezuela’s per capita consumption is even higher than the more productive developing countries like Argentina, Chile, Panama, Uruguay, and Mexico (See Appendix A for a Regional Comparison of Diesel Fuel Consumption, GDP per Capita and Fossil-Fuel Consumption Subsidies).
The implicit cost of the gasoline subsidy in 2012 was of 6.09% of GDP, roughly doubling 2010’s percentage of GDP. In terms of total expenditure levels, the implicit cost of the gasoline subsidy was US$ 23.21 billion in 2012, which was approximately five times more compared to what was invested that year in transportation infrastructure and public transit.

An additional problem is the massive amount of gasoline that is smuggled across the borders into Colombia, Brazil, and Guyana. Smuggling began in the early 2000s when oil prices began to rise. Since then, the price gaps between Venezuela and its neighboring countries have widened as a result of the different energy policies these countries have adopted. The smuggling of gasoline is a direct consequence of subsidies the Venezuelan government grants to the consumption of gasoline produced in Venezuela. It is difficult to calculate how much of the gasoline consumed is actually gasoline that is being smuggled across the borders. Horacio Medina, a former manager of the state-owned oil company, suggests that the volumes involved...
in these operations are not merely carried out by individuals who fill up their tanks and cross the border, but by the use of tank trucks and river barges transporting thousands of gallons across the border every day to sell them in Colombia for profit (Delgado, 2012). This is a very lucrative business: Gasoline purchased at 1.5 cents per liter in Venezuela can be sold just across the border in Cucutá, Colombia for $1.30 a liter—a 117-times price difference (Delgado, 2012).

In the border areas, the cost of maintaining the price subsidy also includes the expenditures on efforts to counteract the smuggling of gasoline. At the border with Colombia, this includes the administration of the program that implants a computer chip in motorists’ vehicles, restricting the amount of gasoline purchased to 41 liters (10.8 gallons) every other day. At the Brazilian border, Brazilians traveling into Venezuela are required to get a certificate from their Federal Revenue agency, enabling them to purchase fuel at one specific gas station that is supervised by Venezuelan Jungle Infantry Battalion, at a price of $1.77 a gallon (Rohter, 2006). This is still one-third of the Brazilian pump price, but more than 40 times the price at other gas stations in the area. Administering these programs significantly adds to the cost of maintaining the subsidy, at no direct benefit to the Venezuelan people.

Table 3 Evolution of the Implicit Gasoline Subsidy

<table>
<thead>
<tr>
<th></th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
</tr>
</thead>
<tbody>
<tr>
<td>Export Prices ($US per Liter)</td>
<td>0.65</td>
<td>0.43</td>
<td>0.54</td>
<td>0.73</td>
<td>0.74</td>
</tr>
<tr>
<td>Average Official Exchange Rate</td>
<td>2.15</td>
<td>2.15</td>
<td>3.26</td>
<td>4.3</td>
<td>4.3</td>
</tr>
<tr>
<td>Export Prices (BsF per Liter)</td>
<td>1.4</td>
<td>0.93</td>
<td>1.77</td>
<td>3.139</td>
<td>3.182</td>
</tr>
<tr>
<td>Realized Prices (BsF per Liter)</td>
<td>0.01</td>
<td>0.01</td>
<td>0.01</td>
<td>0.01</td>
<td>0.01</td>
</tr>
<tr>
<td>Gasoline Subsidy (BsF per Liter)</td>
<td>1.39</td>
<td>0.92</td>
<td>1.76</td>
<td>3.129</td>
<td>3.172</td>
</tr>
<tr>
<td>Internal Consumption of Gasoline (Bn of Liters)</td>
<td>16.66</td>
<td>16.83</td>
<td>18.28</td>
<td>17.00</td>
<td>23.21</td>
</tr>
<tr>
<td>Total Gasoline Subsidy (Real 2010 Bn BsF)</td>
<td>56.40</td>
<td>30.16</td>
<td>49.28</td>
<td>87.79</td>
<td>99.82</td>
</tr>
<tr>
<td>Total Gasoline Subsidy (Real 2010 Bn $US)</td>
<td>26.23</td>
<td>14.03</td>
<td>15.12</td>
<td>20.42</td>
<td>23.21</td>
</tr>
<tr>
<td>Total Gasoline Subsidy (%GDP)</td>
<td>3.61</td>
<td>1.99</td>
<td>3.3</td>
<td>5.65</td>
<td>6.09</td>
</tr>
</tbody>
</table>

Sources: PDVSA, MENPET, BCV, BLS, and EIA.
Figure 4 US Exports to Venezuela

(a) US Exports to Venezuela of Total Petroleum Products

(b) US Exports to Venezuela of Crude Oil and Petroleum Products

(c) US Exports to Venezuela of Finished Motor Gasoline

Source: U.S. Energy Information Administration
Other considerations

The government of Hugo Chávez Frías as well as his successor have focused on “oil diplomacy” with other Latin American countries. For those countries that share the late president Chavez’s Bolivarian Revolutionary agenda, such as Bolivia’s Evo Morales, Nicaragua’s Daniel Ortega, and Cuba’s Castro brothers, the Venezuelan government provides inexpensive to free oil for various foreign-policy reasons. In addition to free oil, the Venezuelan government has built a number of refinery and energy facilities throughout the continent. These foreign give-away policies generate international support from neighboring nations, but have been a source of discontent internally given the deteriorated condition of the country’s infrastructure and economy. Increases in domestic prices for petroleum products will certainly be met with some opposition if consumers believe they have to pay for something that foreign partner countries get for free.

Summary

The oil industry has been, and still is, an important player in all aspects of the Venezuelan society. While there is a strong sense of entitlement for oil products in the minds of many
citizens, problems with the national oil company make it very difficult to continue maintaining the large price subsidies. Since the national oil company is involved in aspects of the economy and everyday life—such as social welfare programs and even supermarkets—changes in the prices of gasoline are likely to have very far-reaching consequences. As a transportation planner, it is not possible to address all of the challenges that occur due to a phase-out of the price subsidies. However, an increase of fuel prices has a most direct impact on individuals’ personal transportation situations. Therefore, I focus on a transportation planner’s point of view in providing recommendations that could make a phase-out of price subsidies for gasoline as smooth as possible. Moreover, I provide suggestions for investments in the transportation infrastructure that have the potential of promoting equity and economic development, without the need for artificially low energy prices.
III. The Fossil Fuel subsidies Phase-Out Solution

Case Studies

The case studies in this section explore two oil-producing and exporting countries—Iran and Brazil—and one oil-importing country—Bolivia—that have adopted reforms to phase out subsidies to energy products. I lay out the background for each of these countries at the time the reform is adopted. I explore the political and socio-economic objectives of the phase-out as well as some of the mitigation measures. I also expand on what each country did or had been doing in terms of public transportation and infrastructure. Finally I summarize and analyze the importance of these cases in the Venezuelan case.

The three case studies were selected because each has a clear link with or influence over Venezuela. Overall the main government is in charged of planning and organizing public transportation in these three countries as well as in Venezuela. Even though municipalities or local governments might have some liberties when it comes to planning, the provision of public transportation is for the most part centralized. Brazil and Bolivia share geographical proximity, socio-economic conditions and political characteristics with Venezuela. Venezuela’s next-door neighbor, Brazil, was able to phase out subsidies to gasoline, diesel and LPG in a period of a decade without major resistance—a feat for any major economic reform. However, Brazil’s most recent protests generated by increasing fare prices of low-quality public transportation raises the question of whether investing in public transportation earlier or even previous to the reform would have helped today’s outcome. Additionally, these events emphasize the important role that public transportation plays in the long-term success of a phase-out reform and in the future stability of developing countries.

On the other hand, Bolivia’s case is a reminder that a reform implemented too fast, with a weak plan, and lack of transparency and communication to the public can be catastrophic. Bolivia is a perfect example as well because the two countries share Hugo Chavez’s popular political agenda of “socialism of the 21st century.” Finally, Iran—though geographically distant—shares close economic ties with Venezuela. The two governments currently collaborate in many projects. Over the last decade, the two nations have signed more than 270 treaties, which have included trade deals and agreements on automobile factories, construction projects, energy initiatives, and banking programs (Mungin & Shoichet, 2013). If there is one thing that Venezuela should learn from Iran, it is how to approach a phase-out reform successfully, avoiding making the same mistake of incrementing prices too fast.
The Case of Iran

One of the most recent successes in subsidized energy reform is Iran. In March 2010, the parliament ratified the *Targeted Subsidies Reform Act*\(^\text{11}\), which called for a gradual increase of energy prices within a five-year period (2010-2015). Most specifically, the Reform Act comprised various policies meant to increase the prices of numerous goods and services that were subsidized. The reform included the phase out of retail prices of petrol, diesel, fuel oil, kerosene and liquefied petroleum gas (LPG) to at least 90% of Persian Gulf free on board (FOB) prices. Electricity and Water prices are also set to increase to cover full cost price. In addition, the reform act also stipulates gradual subsidies elimination for food items and services like the postal, air and rail services within the same period of time.

In December 2010, the Iranian Government undertook bold economic reforms to phase out energy subsidies, replacing them with nationwide cash transfers as compensation for rising energy prices. The reform was adopted in order to promote higher standards of living and minimize income inequalities.

Objectives of the Reform

As international oil prices reached their highest in July, 2008 at $143.95 (Europe Brent Spot Price) per crude oil barrel, and gasoline prices around the world hovered at more or less $2 per liter, Iran’s domestic prices remained at an unsustainable price of US$0.10 per liter—ten times more than the price of gasoline in Venezuela (Guillaume, Zytek, & Reza Farzin, 2012). However, like Venezuela, Iran was forced to increase imports of gasoline and oil-based products in order to supply domestic demand. In addition to fuel waste, fuel smuggling to neighboring countries where energy prices were sold at higher prices pressured officials to find a permanent fix to these problems.

The main objective of the reform was to reduce waste by rationalizing consumption. In order to reduce energy demand effectively, the Government believed the price increase had to be meaningful. Price increases had to be sufficient to reduce excessive demand and discourage inefficient substitution. Compensating households for energy price increases would allow consumers to purchase more of other goods and services while at the same time discouraging gasoline consumption.

\(^{11}\) For a copy of the *Targeted Subsidies Reform Act*, see Appendix I. Subsidy Reform Law from *Iran-The Chronicles of the Subsidy Reform*, by Guillaume, D., Zytek, R., & Reza Farzin, M. (2012).
Preparing the field for Reform

It was essential that the government ensured low rates of inflation before the start of the reform, due to the intrinsic price increments of other goods and services once the subsidies were lifted. Mid 2008, the Central Bank forecasted that inflation would fall into the single digits by fall of 2010 from 30% to 7%, which was in fact evidenced by the appreciation of the Iranian Rial in September of 2010 (Guillaume, Zytek, & Reza Farzin, 2012). Administrative policies were also used to stabilize prices, preventing producers and retailers from price gauging in anticipation of the reform.

In June 2007, an electronic card system for gasoline rationing was introduced on par with “free market” priced gasoline. Once the quota of gasoline was met, price of fuel increased as well but remained below the full price at which the population could purchase unlimited amount of fuel. Households received a substantial amount of cheap gasoline per month that was gradually reduced in 2010, stimulating the demand for fuel at higher prices (Hassanzadeh, 2012).

Preceding the reform, officials frequently met with the different sectors of the economy to discuss their concerns in hopes to better understand the potential impact of the reform on their businesses (IMF Survey Magazine, 2013). Fifty-eight percent of companies analyzed were selected to receive targeted assistance through either direct assistance or through the sale of limited quantities of fuels at a subsidized or discounted rates to lower the impact of the price increases on the input costs (Guillaume, Zytek, & Reza Farzin, 2012).

The Banking Sector in Iran played a huge role in the reform process, as banks are in charge of distributing the targeted subsidies to households. Transfers are made directly to bank accounts instead of through cash donations by regional and local governments. This method allowed the recipients to see the transfers before the actual price increase, which was important in gaining the public’s approval for the reform.

Mitigation Measures

A multi-tier pricing system was implemented to mitigate the reform’s impact and encourage rational energy consumption. Multi-tier tariffs were used on electricity, natural gas and water in an effort to moderate the impact of the price increases on the poor. These price increases also took into account regional disparities in availability and regional conditions.
Households received up to fifty percent of the fiscal revenue resulting from price increases through in-cash and in-kind payments as well as through the creation of a social security system that includes the introduction of health insurance and house mortgage loans. Authorities first thought cash transfers would be targeted to the poorest in society; however, denying compensation for the upper income groups risked evoking public discontent among the biggest energy users. Everyone was allowed to apply for the transfers, however the richest households were discouraged to apply. The approval rate to receive compensatory cash transfers was extremely high for applicants (98%) and by May 2011, seventy million Iranians (of 75 million) had registered to receive the transfers (Guillaume, Zytek, & Reza Farzin, 2012). Distribution of the cash transfers or “targeted subsidies” took place over four weeks preceding the price increase. On October 19th the government started depositing money into beneficiaries’ accounts. These deposits were frozen until the day energy prices increased.

Additionally the reform designated a 30 % share of the revenue from price increases to support industries and producers through interest subsidies on loans for the adoption of new energy-saving technologies and credit lines to reduce the impact of higher energy costs on cash-flow. The remaining 20% share is for the government to cover its subsequent increases in costs and to improve infrastructure.

**PR to sell the Reform**

An extensive public relations campaign preceded the reform to educate the population on the real costs of low energy prices. Meetings and seminars were held to educate people on the inefficiency and wastefulness of low energy prices. Officials emphasized the social inequalities as a result from cheap energy. The authorities stressed from the get go that the reforms were not about eliminating subsidies completely, but transferring subsidies from products to households. Therefore benefiting the poor who would get cash benefits, while it is generally accepted that cheap energy mostly benefits higher-income groups.

**Impacts of the Reform**

The reform failed to define a rate on which prices should reach their international market price within the five-year period. The government took the “shock therapy” approach increasing prices to counteract wasteful consumption. This resulted in an exacerbated rate of inflation (Guillaume, Zytek, & Reza Farzin, 2012). Immediately after the start of the Reform on December 19, 2010, price controls were imposed on most products forcing companies to reduce consumer and industrial goods prices. Additionally, the authorities have efficiently addressed
many immediate problems by reducing energy prices or allocating additional quotas at low prices to the most vulnerable groups, thus guaranteeing social stability.

**Transportation Sector**

In order to cushion the effects of rising energy prices on other basic commodities, and control inflation, the Iranian government classified the post-reform prices into three categories: subsidized, semi-subsidized and free market prices. Subsidized and semi-subsidized prices were allocated to the transportation sector. For instance, gasoline prices were held at a subsidized rate of 1000 rials/liter for governmental vehicles used in the industrial and agricultural sectors, while domestically manufactured vehicles with an engine size of less than 2L were allowed to purchase semi-subsidized gasoline at 4,000 rials/liter (Hassanzadeh, 2012). Additionally, the government held a semi-subsidized diesel price (1,500 rials/Liter) for public transportation in order to ensure that transit fares would remain low and to encourage its use.

**Table 3** Fossil-Fuels Price Increase

<table>
<thead>
<tr>
<th>Fuel Product</th>
<th>Pre-Reform Price (IRR/Liter)</th>
<th>Post-Reform Price (IRR/Liter)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Subsidized</td>
<td>Semi-Subsidized</td>
</tr>
<tr>
<td>Gasoline</td>
<td>1000</td>
<td>4000</td>
</tr>
<tr>
<td></td>
<td>1500</td>
<td>-</td>
</tr>
<tr>
<td>Diesel</td>
<td>165</td>
<td>1500</td>
</tr>
</tbody>
</table>


Previous to the implementation of the reform, the Iranian government seems to have anticipated the importance in maintaining and supporting a reliable and affordable public transportation network throughout the country. In fact, Iran began revamping its public transport system in the early 2000s. The country started moving towards supporting a more sustainable form of urban mobility and living well before the fossil-fuel phase out reform was adopted.

In 2007, in addition to adopting a program to ration gasoline and diesel consumption, the government of Iran passed a law requiring carmakers to manufacture dual-use cars that can run on gasoline or natural gas. Since Iran has the second largest reserves of natural gas in the world, compressed natural gas (CNG) could be an alternative energy source. The government also examined alternative means of transportation. That same year, the Iranian parliament passed a public transportation bill titled the *Public Transportation Development and Fuel Consumption Management Law* designed to improve and expand subway, railway, and bus...
systems (Mohammadi, Maknoon, & Arabyarmohammadi, 2011). Article 1 of this law makes the government responsible of developing urban and suburban mass transit as well as of managing fuel consumption. The law establishes that public transportation must be optimized through technical inspections, the development of a rail transportation network, the conversion of gasoline and diesel burning vehicles into dual fuel vehicles, and innovations in fuel efficiency. Article 6 of this law also requires that the share of public transportation in total trips within cities increase from 41% to 75% (Mohammadi, Maknoon, & Arabyarmohammadi, 2011).

Iran currently has three Bus Rapid Transit (BRT) systems, one of which is located in the capital, Tehran. The year the reform went into effect, Tehran’s BRT added 4 more lines to the 3 existing ones. By 2011 the system had a total of 150-km of BRT. Two of the most recent lines to open saw an increase in the number of people using public transportation by 31% and 35% and a decrease in commuting times of 24% and 42% respectively (Intelligent Transportation Systems Research Institute-AUT, 2012). The success of Tehran’s BRT system and the growth of ridership experienced in the last five years has led to plans to expand the system, adding more routes and buses. As of September 2010, the Tehran municipal government has also implemented a bike rental program to add to the existing—and expanding—transportation network, which also includes a Metro system. Additionally, other major cities have also invested heavily in public transportation. Two other major cities—Shiraz and Tabriz—are undergoing construction for subway systems, and a third city—Kerman—has been approved to also get a metro system.

Although it is still too early to assess the long-term outcomes that the fossil-fuel products’ price liberalization will have on transportation patterns, transit use, and even in land use policy and planning, there are clear indicators that Iran chose early on to invest in public transportation over vehicles; a decision that is likely to have made a greater difference to a large part of the population after the gasoline and diesel subsidies were removed completely. The government invested to diversify transportation options and help alleviate some of the effects of liberalizing fossil-fuel prices.

Lessons Learned

Iran’s experience with the phase-out reform has been successful for the most part, because the government established early on communication with the public. Additionally, previous to the implementation of the reform, the government was very effective at preparing the country’s economy, a process that took three years. A number of measures were adopted before the reform in order to prepare and familiarize citizens to the phase-out prices. Thus making people more receptive of the gradual change and less likely to demonstrate.

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In terms of transportation, Iran has been transitioning into supporting a more sustainable transport system since the early 2000s when the government started investing in the expansion of the country’s transportation network, specifically benefitting public transit projects. The country has added 3 BRT systems and a metro system, while a number of BRT lines and 2 more subways are currently under construction. Transportation operators are granted a semi-subsidy of diesel fuels so that transport fares remain low. In addition, 30% of the amount saved by the government will be used to strengthen and expand public transportation, as well as fuel and energy reduction infrastructure, industry and farming.
The Case of Brazil

Background

During the 1960s cross-subsidies were introduced to equalize prices for consumer prices of petroleum products across Brazil. A single pricing strategy was adopted for oil products nationwide regardless the differences in transportation and refining costs. During the 1970s and 1980s, fueled in large part by two oil crises, international oil prices increased. Brazil’s economy was plagued with high inflation, low growth and fiscal imbalances. According to the International Monetary Fund, inflation in Brazil averaged 272% and economic growth was about 3 percent (Clements, et al., 2013). Brazil’s net public debt increased from 24 percent GDP to 40 percent of GDP from 1981 to 1989 (Clements, et al., 2013). The discretionary policies used to adjust oil prices had adverse consequences for the sector, especially under the unstable macroeconomic conditions. Consequently, oil underpricing contributed to low investment in exploration and refining capacity. The country still imported about eighty per cent of its domestic oil consumption (Clements, et al., 2013). These deplorable conditions pressured officials to shift away from the country’s import-substitution policies and liberalize the economy. However, half a century of energy subsidies created resistance to subsidy removal from important stakeholders. The government’s opposition saw these reforms as a constraint on industrial growth.

Objectives of the Reforms

Besides the removal of subsidies, the reform agenda encouraged private investment and competition (De Oliveira & Laan, 2010). In the 1990s the import-substitution policies were abandoned and liberalization and privatization of the energy sector and Brazilian economy as a whole began. The objective was to introduce competition and improve economic efficiency. Competition would reduce costs and provide real prices to consumers, which would in turn promote energy conservation and efficiency, while also increasing government revenue.

In order to minimize opposition from groups that benefitted from the previous energy policy, the removal of subsidies and movement to free-market prices was gradual. To build public support, the government assured consumers that privatizing and liberalizing the energy sector would lower energy prices and improve services, thus rewarding consumers for the subsidies removal. Liberalizing of fuel prices, which also happened in various steps, began in the early 1990s with the liberalization of prices for petroleum derivatives used mainly by firms such as asphalt and lubricants. Following, a more extensive liberalization included gasoline prices for consumers (1996), LPG for final consumers (1998), and diesel prices for consumers (2001).
Table 4  Gradual Liberalization of Fossil-Fuel Prices

<table>
<thead>
<tr>
<th>Year</th>
<th>Liberalization</th>
<th>User</th>
</tr>
</thead>
<tbody>
<tr>
<td>1991</td>
<td>Lubricants, residuals, kerosene</td>
<td>Final consumers</td>
</tr>
<tr>
<td>1993</td>
<td>Gasoline for airplanes</td>
<td>Final consumers</td>
</tr>
<tr>
<td>1996</td>
<td>Ethanol and gasoline</td>
<td>Final consumers</td>
</tr>
<tr>
<td>1997</td>
<td>Asphalt</td>
<td>Final consumers</td>
</tr>
<tr>
<td>1998</td>
<td>LPG</td>
<td>Final consumers</td>
</tr>
<tr>
<td>1999</td>
<td>Gasoline and fuel oil</td>
<td>at refinery gates</td>
</tr>
<tr>
<td>2000</td>
<td>Naphtha for petrochemicals</td>
<td>at refinery gates</td>
</tr>
<tr>
<td>2001</td>
<td>Gasoline, diesel and LPG</td>
<td>Final consumers</td>
</tr>
<tr>
<td></td>
<td>adjusted to Brent prices every 3 months.</td>
<td></td>
</tr>
</tbody>
</table>

Note. Adapted from Lessons Learned from Brazil’s Experience with Fossil-Fuel Subsidies and their Reform, p. 7, by Adilson de Oliveira and Tara Laan, 2010.

**Mitigation Measures**

In 2001, the government introduced a new tax on petroleum derivatives import and marketing. The tax-raised revenues are used to subsidize ethanol producers and the transportation costs of hydrocarbons; fund the gas voucher program for low-income families; fund projects concerned with environmental protection, and fund the construction and expansion of roadways (Clements, et al., 2013). In 2002, after the removal of general LPG subsidies, the government introduced a new subsidy for LPG through the allocation of gas voucher to help low-income families. Until 2012, the government also subsidized the supply of fuels to thermal plants in the Amazon region. And finally, conditional cash transfer programs were also set into motion. For instance, *Bolsa Escola* (2001-2003) was a program that “provided mothers of poor households a monthly stipend conditional on their children’s regular school attendance” (de Janvry, et al., 2005).

**Transportation Sector**

The fossil-fuel phase out reform in Brazil cannot be said to have spurred a whole lot of interest and investment from the federal and local governments to provide public transportation. Though many Brazilian cities do offer public transportation either through complex bus networks or metros, most of the investments—as well as the public policies behind them—have been mainly in support to expand roads and build bridges to counteract congestion and unequivocally encourage private vehicle travel (Vasconcellos, 2005). Cities throughout Brazil—with the exception of Curitiba—are lagging behind when it comes to public transit and infrastructure investment, even when taking into account the number of Bus Rapid Transit (BRT) systems that have cropped up in light of the 2014 FIFA World Cup and the 2016 Summer Olympics Games (Martins Izidoro, 2011). For instance, experts agree that São Paulo
Metropolitan Region (SPMR), comprised of 39 cities and a population of approximately seventeen million people, has one of the worst traffic problems in the country due to the decrease in the use of public transit and the increase in the use of private cars (Martins Izidoro, 2011; Vasconcellos, 2005). An anecdote gathered from a report by the Economist Intelligent Unit (2011) makes reference to a 182-mile long traffic jam that clogged the streets of São Paulo in June 10th 2009, while in 2010 the average daily back up was 67 miles long.

Nevertheless, it is safe to assume that without the fossil-fuel subsidy phase-out reform of the last two decades, the traffic problem in São Paulo and other auto-centric cities would be much worse today. As mentioned earlier, subsidies to gasoline and diesel consumer prices generate wasteful consumption and in many cases it makes driving more appealing—and overall less expensive trip-wise—than riding public transit.

In contrast, it is likely that the phase-out reform did not affect cities like Curitiba to the same extent that it did auto-centric cities like São Paulo. Jaime Lerner’s pioneering integrated transportation network in Curitiba is in many ways the model of sustainable transportation. The city’s major accomplishment was the integration of transportation and land use planning through its Master Plan. Such integration encouraged commercial development along the five transport axes that radiate out from the city center. Therefore, the city center is very pedestrian friendly and inaccessible to private automobiles. Land within two blocks of the main axes is zoned for high density, which helps generate more ridership. Zoned residential densities decrease as you move farther away from the main transit axes. Additionally, due to the high densities and close arrangement of businesses and residential areas, walking and biking are viable means of getting around in the city. A 2007 study shows that walking accounts for 35% of the daily trips while collective transport accounts for 28% and individualized transportation (i.e. taxi, automobiles, motorcycles, and bicycles) accounts for 37% of all trips (CAF, 2011).

The idea of an integrated system of buses that operates urban, suburban and periurban routes was first conceived in this city, about thirty years ago by a group of cost-conscious and environmentally-friendly planners. Bus Rapid Transit (BRT) is effective because ideally it should integrate and encompass a hierarchical system of services, which includes the different types of fleet present in that city. In Curitiba, for instance, mini buses travel through neighborhoods and residential routes, feeding them into conventional buses that travel on circumferential routes around the central city and on inter-district routes. The system’s backbone comprising of the Bus Rapid Transit, operate in 5 main axes through dedicated bus lanes that lead into the center of the city. The cylindrical, see-through tube stations (bus stops) require passengers to pay their fares as they enter the stations similar to subway stations, making the transaction much faster and safer.
Lessons Learned

Brazil’s experience on phasing out subsidies consisted of a series of policies adopted and implemented throughout a 2-decade period. Brazil’s success was largely due to the gradual approach in implementing subsidies removal. In order to build public support for the reform, and avoid strong opposition from interest groups, subsidies that benefitted politically weak stakeholders were removed first, while the politically more difficult were removed last. Targeted social programs, including conditional cash transfer programs and the gas voucher, have also helped compensate for the increase of certain products after prices have been liberalized. In terms of public acceptance, liberalization reforms have more chance to succeed under a popular government.
The Case of Bolivia

Background

Although Bolivia exports ample amounts of natural gas, the country does not produce enough crude oil for internal consumption. Bolivia, as a net importer of fuels, has had to spend great amounts of public resources to import gasoline and diesel and subsidize them to make them cheaper for consumers. In 2010, the total oil production was 47,877 barrels of oil per day, while daily consumption was of 54,353 barrels per day (U.S. Energy Information Administration, 2012). In addition to the expense that these subsidies mean, Bolivia also copes with the loss of fossil-fuels due to the smuggling across borders into Chile, Peru, Paraguay, Brazil, and Argentina, where consumer prices are between two and three times higher than in Bolivia.

Objectives of the Reform

Bolivian president, Evo Morales, justified the increase of fuel prices by capitalizing on the fact that fuel prices in neighboring countries were even higher than the new non-subsidized fuel prices in Bolivia. Figure 5 shows diesel and super gasoline prices for Bolivia and its neighboring countries as well as Bolivia’s fuel prices post-decree. However, according to journalist Maria Julia Osorio from El Tiempo, minimum wage and the average income, in neighboring countries is anywhere from 1.5 to 4 times higher than in Bolivia (Osorio, 2011). Figure 6 shows GDP per capita based on purchasing power parity for Bolivia and neighboring countries.

Attempting a Phase-Out

On December 26, 2010, the Bolivian government approved Decree 748 to remove the existing subsidies on gasoline and diesel and bring the prices to the international market prices; a political move Bolivians called el gasolinazo. The prices for these commodities increased immediately anywhere from 57 to 83 percent, which is higher than the stipulated gradual 10%-increment (GIZ, 2010). Premium gasoline went from 3,74 bolivianos (54 US cents) per liter to 6,47 bolivianos (93 US cents) per liter, and diesel went from 3,72 bolivianos (53 US cents) per liter to 6,80 bolivianos (98 US cents) per liter (Osorio, 2011). These price increments were of 73 and 83 percent respectively.
**Figure 5** Comparison of Premium Gasoline and Diesel Prices (as of November 2010)

![Comparison of Premium Gasoline and Diesel Prices](image)

Source: GIZ

**Figure 6** Regional GDP per Capita, based on purchasing power parity (PPP)

![Regional GDP per Capita](image)

Source: CIA World Factbook
The high prices that went into effect during the Christmas holidays lasted roughly a week due to heavy protests, strikes, and riots that resulted from the increment. On December 27-28, teachers and bus drivers held strikes that lead to some riots. The mitigation measures adopted by president Morales were announced after the reform had gone into effect and the prices for the fossil fuels had increased. The mitigation measures included a twenty-percent wage increase for state employees and increase of minimum wages.

Although Bolivia has had the third lowest fossil fuel prices in South America, after Ecuador and Venezuela, fuel prices are the highest in the region when compared with the average income. Figure 6 shows a comparison of regional GDP per Capita, based on purchasing power parity.

**Transportation Sector**

In October 2010, two months prior to the reform, the government established the Executing Agency of CNG Conversion scheme (EEC-GNV), an agency exclusively responsible for converting gasoline- and diesel-powered vehicles to natural gas-powered vehicles free-of-charge. Additionally, the agency also oversees other programs related to the maintenance and regulation of compressed natural gas or CNG technology (EEC-GNV, 2013). Such programs ideally aim to cut consumption of diesel, gasoline and LPG in order to decrease the government’s expenditures regarding these fuels’ subsidies (EEC-GNV, 2013). The first phase of this program involves the transformation of vehicles in the public sector (i.e. public transportation). The program became available for private vehicles in November 2012 (EEC-GNV, 2013).

Given that Bolivia is a big producer and exporter of natural gas, these programs are certainly positive steps towards getting rid of the inefficient subsidies on imported fossil-fuels\(^{13}\) (i.e. gasoline and diesel). However, the fact that the free conversion program was only adopted a few months before the reform meant that only 3,450 publicly owned vehicles\(^{14}\) (out of 86,822 vehicles) were converted by the time the reform was implemented (EEC-GNV, 2013). As consequence, the majority of public transportation vehicle operators were highly affected by

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\(^{13}\) Although the dependence on subsidized natural gas could certainly create a new set of problems, decreasing the consumption of diesel and gasoline would factually reduce loss since the government currently has to import these products—paying market price—to then subsidize them for consumers at the pump.

\(^{14}\) It is important to note that publicly owned vehicles include urban mass transit (i.e. cars, microbuses, minibuses, omnibuses, and jeeps) and cargo transportation vehicles (i.e. light-duty, medium-duty, and heavy-duty trucks) and do not include privately owned and operated mass transit units, which in many developing countries can account for up to 50% of public transportation.
the increases of diesel and gasoline prices. Thus, these programs were not implemented early enough to help mitigate the increase of diesel and gasoline prices.

Thirty percent (around 300,000 vehicles) of Bolivia’s 2011 automotive fleet (1,082,979 vehicles) currently runs as natural gas vehicles. Bolivia’s fleet has been undergoing conversions to NGV technology since 2000 (NGV Journal, 2013; Instituto Nacional de Estadística, 2011). These costly conversions were done at the expense of the driver, which discouraged most to switch. From October 2010 to December 2012 the government’s free program has converted 40,624 public and government-owned vehicles to Gas Natural Vehicles or GNVs (EEC-GNV, 2013). Additionally, Hernán Vega, the director of the EEC-GNV program, has said that of the 15,000 vehicles that have been converted in 2013, 60% corresponds to the private sector while the remaining corresponds to the public sector (EEC-GNV, 2013).

Previous to the attempted fossil-fuel phase-out reform, Bolivia did not pursue major investments in transportation infrastructure or public transit. Like in Venezuela, the country’s major cities have a mix of public and private bus operators that lack integration and organization. The failure of the reform, due in large part to the strike from the transportation sector, has encouraged the government to pursue transportation improvement projects that will support a future phase-out of gasoline and diesel subsidies. Bolivia has taken steps into bettering the transportation fleet as a means to make people less dependent on gasoline and diesel. Since Bolivia has the second largest reserves of natural gas in Latin America, Evo Morales’ government invested in 2,000 compressed natural gas (CNG) buses from China in an effort to decrease the consumption—and intrinsic costs—of subsidized diesel. These buses are part of a plan to renew the fleet in the cities of La Paz and El Alto, two neighboring cities in Bolivia that see experience a lot of commute between them.

Lessons Learned

Bolivia’s attempt to phase out fossil fuel (particularly gasoline) subsidies, exemplifies the disastrous results of a poorly planned and implemented reform. The phase-out reform in Bolivia presented major challenges due in large part to the lack of transparency on price regulations and the lack of information given to the public previous to the implementation of the reform. Not only were the price increases poorly communicated to the public, but also the reform was announced in a very short notice, which created a lot of confusion and tension. The plan failed because of a lack of plan to phase out systematically and gradually. Instead, policies were adopted and implemented in a very short period of time without much regard to the macroeconomic conditions of the country. Another obstacle to the reform had to do with its high politicization. The government was deeply involved in discussions of price levels, which
together with the lack of transparency on the specifics of the fossil-fuel new prices really fueled the distrust of opposition constituents and transportation union leaders.

However, the Bolivian government was able to learn from its mistakes and adopted measures that would help lower the consumption of gasoline and diesel. Bolivia encouraged the switch to natural gas vehicles (NGVs) through a government-sponsored program.

**Case Studies Summary**

The case studies investigated above illustrate various fossil fuel subsidies phase-out reforms, and their different levels of success. Table 6 showcases a comparative summary of the three Case Studies: Brazil, Bolivia, and Iran.

Brazil’s experience on phasing out subsidies consisted of a series of policies adopted and implemented throughout a 2-decade period. The country’s success was largely due to the gradual approach in implementing subsidies removal. However, more recently, Brazil’s experience also reveals that a lack of public transportation investment prior to and during the reform can be problematic in the long run. As evidenced by last month’s protests, increasing fares of a poor-quality public transportation system can be very controversial, especially in cities of the developing world where public transportation accounts for most of the daily trips. Vasconcellos (2005) agrees that most cities in Brazil have lagged behind in public transportation investment because most investments prior to and during the reform were geared towards roadways expansion and construction, which primarily incentivizes the use of the private automobile. Although infrastructure investment is important, Brazilian cities would have benefited greatly if they would have followed Curitiba’s transportation oriented development style through the use of the cost-effective Bus Rapid Transit (BRT) and the integration of land use and transportation planning.

Iran’s fossil fuel subsidies phase-out reform narrative is still in the writing, therefore, it is hard to assess whether or not it has been completely successful. The literature suggests that Iran began to think about the importance of public transportation in the early 2000s. In fact, around the time the government implemented the program to ration gasoline and diesel, Iran inaugurated its first BRT line in Tehran, which today counts with six lines. In 2007, the government also passed a law requiring the government to invest on public transportation as well as to increase the level of public transit dependency from 41% to 70%. The reform itself also took the transportation sector into account by allowing either subsidized gasoline or semi-subsidized diesel for vehicles in the agricultural and industrial sector as well as for public transportation. Plan reform and educate, communicate and advocate.
Bolivia although unsuccessful at phasing-out, has adopted new measures in order to decrease diesel and gasoline consumption; thus, making it easier for a future subsidies phase-out. The parliament has approved a government-led program that encourages the switch to natural gas vehicles. By investing in better and more efficient technologies, Bolivia hopes to minimize the consumption of—and the nation’s expenditures on—the imported fuels it currently subsidizes and instead encourage the use of its natural resource.
Table 5 Case Studies Summary Table

<table>
<thead>
<tr>
<th>Brazil</th>
<th>Iran</th>
<th>Bolivia</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Policy</strong></td>
<td><strong>Policy</strong></td>
<td><strong>Policy</strong></td>
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<tr>
<td>• (1997) Law No. 9,478 allows other companies into Brazil's oil and gas industry, deregulating it. Petrobras monopoly ends.</td>
<td>• (2010) <strong>Targeted Subsidies Reform Act</strong> adopted in January and implemented in December.</td>
<td>• Reform included only diesel and gasoline prices.</td>
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<tr>
<td>• (1997-2000) Elimination of price regulation of crude oil and oil products.</td>
<td>• Reform included prices for: petroleum derivatives (i.e. diesel, gasoline, LPG, kerosene, fuel oil), services (i.e. water, electricity, postal, air, and rail), and food items</td>
<td></td>
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<tr>
<td>• Reform included prices for: petroleum derivatives such as kerosene, diesel, gasoline, LPG, asphalt, residuals; and other fuels such as ethanol.</td>
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<tr>
<td><strong>Timing</strong></td>
<td><strong>Timing</strong></td>
<td><strong>Timing</strong></td>
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<tr>
<td>1990-2002 (Gradual approach)</td>
<td>2010-2015 (Gradual approach)</td>
<td>2010 (Instantaneous approach)</td>
</tr>
<tr>
<td><strong>Level of Success</strong></td>
<td><strong>Level of Success</strong></td>
<td><strong>Level of Success</strong></td>
</tr>
<tr>
<td>Successful implementation of phase-out.</td>
<td>Successful implementation of phase-out.</td>
<td>Not successful; decree annulled after a week of protests and riots from the public transportation sector.</td>
</tr>
<tr>
<td>Note that current events (protest) indicate public transit investment prior to and during the reform might be necessary.</td>
<td></td>
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<tr>
<td><strong>Communications</strong></td>
<td><strong>Communications</strong></td>
<td><strong>Communications</strong></td>
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<tr>
<td>• Successful public relations campaign, included workshops and meetings to educate major stakeholders and population on the growing costs of low energy prices.</td>
<td>• Extensive publicity in the media.</td>
<td>• No public relations campaign or any kind of public meetings to educate stakeholders and the population of the benefits of phasing-out subsidies.</td>
</tr>
<tr>
<td>• Extensive publicity in the media.</td>
<td>• Households were exposed to new prices before the reform through subsidized, semi-subsidized and free-market prices for fossil fuels and services in gas stations and monthly receipts to familiarize the population.</td>
<td>• Process lacked planning and transparency.</td>
</tr>
<tr>
<td>• Households were exposed to new prices before the reform through subsidized, semi-subsidized and free-market prices for fossil fuels and services in gas stations and monthly receipts to familiarize the population.</td>
<td></td>
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<tr>
<td><strong>Urban Infrastructure and Transit Investment</strong></td>
<td><strong>Brazil</strong></td>
<td><strong>Iran</strong></td>
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<tr>
<td>---------------------------------------------</td>
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<tr>
<td>• During reform there was minimum transit investment; most transportation policies and investments were geared towards roadway construction and expansion.</td>
<td>• Since the early 2000s, public transportation investment has been a primary goal. • (2007) First BRT in operation. • (2010) Expansion of capital’s BRT and implementation of a bike rental program. • (2010-2013) Subway constructions in 2 major cities; and a third one has been recently approved to get a Metro.</td>
<td>• No major investment went into public transportation. Conversions to CNG were expected to reduce gasoline and diesel consumption and mitigate the impact of higher fuel prices; however, only 3,450 public transport vehicles around the country were converted by the time the reform went into effect. • January (2011) government invests in 2,000 CNG buses from China. • December (2012), 40,520 vehicles had been converted to CNG vehicles through the free-of-charge program established by the government.</td>
</tr>
</tbody>
</table>

| **Transportation Aspect of Reform** | **None Available** | **Subsidized gasoline rates (1,000 IRR/L) held for governmental vehicles in the industrial and agricultural sectors. Semi-subsidized gasoline rates (4,000 IRR/L) held for domestic vehicles with engine <2L. And semi-subsidized diesel price (1,500 IRR/L) held for public transportation.** | **None Available** |
IV. Pre-Reform Phase

Regardless of political party affiliations, politicians in Venezuela agree that a phase-out of fossil fuels, especially to gasoline and diesel, is necessary. Subsidies to fossil fuels are not only detrimental to the environment in the long run, but they also encourage wasteful consumption and across-the-border smuggling, facilitate driving, and aggravate traffic congestion. While a general understanding and consensus has been reached about the issue of cheap gasoline and diesel, concrete measures have not been taken due to the possible negative reactions that a reform to raise prices might generate among citizens. Therefore in this section I explore a set of opportunities and threats to a fossil fuel phase out and also offer a few thoughts on how to prepare the country for a successful reform.

Opportunities

Venezuelan Patrimony Fund and Household Transfers

While fossil-fuel subsidies primarily benefit upper-income people, a sharp increase of fossil fuel prices can have significant repercussions on poor households’ budgets. Therefore, in-kind mitigation measures are necessary to ensure that the phase-out reform does not result in increased poverty.

Pedro Luis Rodriguez15 and his father Luis Roberto Rodriguez, propose limiting the Executives’ discretion in deciding how to use petrodollars, while giving citizens a share of the revenues through the creation of the *Venezuelan Patrimony Fund*. The idea is to make citizens true owners of the national patrimony by distributing oil revenue cash equally among citizens. The fund would work as a savings fund, where all the oil revenue is deposited instead of going to the State’s account—FONDEN, FISCO. Every Venezuelan, 18 years old and order, would be entitled to have a trust account within this fund. Citizens would directly contribute to the State by paying a certain tax on the income. This would truly mean that citizens are direct beneficiaries from and owners of the oil rent, as well as responsible contributors to the government and economy. The remaining on each account would be divided into short-term expenses for health, education, and public transportation; as well as for long-term plans such as pensions.

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15 Professor at the International Center of Energy and the Environment (CIEA) at the Institute of Advanced Studies in Administration (IESA).
According to the authors, if this fund would have been implemented in 1997, with a 50% tax over the oil revenues, each beneficiary would have saved around $14,000 (Rodríguez & Rodríguez, 2013). Additionally to this, citizens would be entitled to access an universal health insurance valued at an estimate of $900, based on the popular health system (Sistema Popular de Salud). Even today, if the total net revenue were distributed among all citizens—including children—each citizen would receive $3,000 a year (Rodríguez & Rodríguez, 2013).

**Threats to a successful Phase-Out implementation**

The Bolivia case study and historical events like *El Caracazo* suggest that public opinion can have a powerful influence on the success of a fossil-fuel phase-out reform. Increases of gasoline and diesel prices lead to an increment of prices for other goods and services because the energy that it takes to make, process, or transport these goods is no longer subsidized.

To successfully implement a fossil fuel subsidies phase-out reform, the Venezuelan government must establish open dialogue with the opposition. Given the recent presidential elections and critical political situation in Venezuela, it is necessary that the government establish a healthy dialogue with the portion of the country—49.12% according to the country’s National Electoral Council (CNE)—that does not support the current government. Distrust in the government and public institutions would be detrimental for a major policy and could eventually lead to a *Caracazo*. Moreover, in a country as politicized and divided as Venezuela, it would be more favorable that the government focuses on rationalizing the reform based on a formula and monitored by experts in the matter to create a larger base of supporters, instead of politicizing the reform.

Additionally, it is also very important that the government stabilizes the economy, by stabilizing the exchange rate to limit inflation. At the moment it is estimated that inflation this year will be at 60%, which of course makes this first step very difficult. An increase in gas prices would undoubtedly impact public transportation as well as the transportation of goods and services, which could in turn jack up inflation rates. Another economic measure required would be the stabilization of basic staples and consumer goods prices through administrative policies.

Lastly, educating the public about the benefits of a phase-out reform is an important step to gaining the public’s acceptance. In Iran, the reform was successful partly because the reform had a large media coverage and education campaigns highlighting the social benefits and compensation packages long before the reform was ever adopted. In contrast, Bolivia’s case illustrates that the lack of information about the implications of the reform created distrust among the citizens, who protested until it was reversed.
V. Transportation Infrastructure Investment Plan

Part of the reason for the strong public resistance to any increase in gasoline prices is the fact that the transportation system has increasingly relied on the fact that gasoline is very cheap, and important infrastructure has been neglected over the years for the sake of supporting the price controls. Therefore, strengthening and investing in public transportation in Venezuela is essential to gaining public support for the reform. The key is in making public transit and non-motorized modes of transportation a convenient option. In this section I will discuss the opportunities that present themselves to urban and transportation planners in shaping the country’s future approach toward transportation.

Mobility

Mobility measures the number of trips people in a determined system or space make. This measurement includes time, space, and the reasons for traveling. A transportation system provides the means, structures, and services needed to access goods, other services, activities and places. Urban mobility studies and policies include three aspects: sustainability, accessibility and social inclusion.

In Latin America, urban mobility policies must take into consideration the high levels of inequality and informality that exist in urban spaces as a whole. In other words, urban mobility policies should not only be about sustainable transportation, but they should include land-use actions.

At the urban planning level, Vasconcellos (2005) suggests that structural actions need to focus on two objectives: 1) Accessibility and Equity; and 2) Environment and Energy. The first objective consists of humanizing the urban space by redistributing road space, supporting non-motorized and public transportation modes, and limiting the automobile. The second objective involves reducing distances and the use of motorized transport by adopting and implementing land-use and density policies that support non-motorized (i.e. walking and biking) and public transport. This approach realizes a profound transformation of the space both physically and functionally; the reconfiguration of the city and its activities and the change of travel patterns.
Urban Form

Venezuela, with a 94.9% urban population, has become one of the most urbanized countries in Latin America (United Nations-Habitat, 2007). Caracas’ urbanized area—consisting of 261 km² of 777 km²—has a population density of 12,030 people/km², higher than the largest cities in Europe, and far greater than some of the largest cities in Latin America, with a few exceptions that include Bogotá (14,755 people/km²) and some other Colombian cities ( Corporación Andina de Fomento (CAF), 2010). In comparison to Asian cities, Caracas shares a similar density with Kolkata (12,100 people/km²) and slightly overpasses the densities of Delhi (11,800 people/km²) and Seoul-Incheon (10,600 people/km²). However, mostly Asian cities rank higher than Venezuela (151) as some of the most urbanized areas by population density (DEMOGRAPHIA, 2013) (See also Reducing automobile dependence by Peter Newman, for density indicators of other Asian cities).

Caracas became a center of attraction for rural dwellers and foreign investors in the 1950s due to dictator Marcos Perez Jimenez’s “progressive capitalist mode of production” (Brillembourg, Feireiss, & Klumpner 2005, p.73). Caracas became the most prosperous city in Latin America with some of the most modern infrastructure. The subsequent oil boom of the 60s and 70s that gave Venezuela 15% of the world’s oil market exacerbated the exodus into the capital, resulting in an unorganized and rapid demographic growth (Brillembourg, Feireiss, & Klumpner, 2005).

In “Fragmented Urban Topographies and Their Underlying Interconnections,” Saskia Sassen defines the two extreme modes in the configuration and appropriation of urban space in cities of the South as “the corporate complex” and “informal city” (Sassen 2005, p. 84). Caracas very well exemplifies this divisive, very contrasting urban space. On the one hand, the demographic shift forty years ago was evident by the apparition and expansion of informal settlements or shantytowns that lacked proper public infrastructures (i.e. roads, pedestrian amenities, sewerage, electricity). And on the other hand, formal residences were expanding to the west of Caracas in areas closer to—and in fact within—the urban core with access to public services and infrastructure.

Currently, from the 3.2 million people that live in Metropolitan Caracas, more than 50 percent live in slums or barrios located on the periphery (United Nations-Habitat, 2007). The barrios’ informal architecture, known as arquitectura buhonera\(^\text{16}\) constitutes fifty percent of Caracas' built environment (IRIN and UN-HABITAT, 2007). The division of the urban form referred to by Sassen is exacerbated by the lack of coordination between urban land-use,

\(^{16}\) Arquitectura Buhonera takes its name after imitating the informal commerce that commonly known buhoneros, or street hawkers, practice all over the capital (Eulich, 2010).
traffic, and transport planning. Barrio dwellers endure very rough living conditions due to poorly maintained and missing infrastructure, high crime rates, a lack of public open spaces, and the amateur nature of housing construction.

When it comes to the placement of investments or use of public money, there are increasing concerns about equity issues. Historically in developing countries, transport and urban land use policies tend to benefit the middle and upper classes, while often excluding and isolating the poorest in inadequate places. Although the Chavez’s regime and his successor have made some efforts to provide services for the low-income inside the barrios through the Misión Barrio Adentro and Misión Robinson, these programs offer very low quality services and often lack both material and human resources.

Transportation and Economic Development

The literature suggests that transportation infrastructure investment affects economic growth. A study by John Fernald explains that construction of the interstate highway system in the United States in the late 1950s and early 1960s boosted productivity. The results highlight that the construction boom stimulated by public investment, “contributed about 1 percentage point more to productivity growth before 1973 than after” (Fernald 1999, p. 620). Furthermore, industries that use roads intensively or are vehicle-intensive benefit more and are more productive. The author found causation from public capital to productivity. In another study, Wolassa Kumo found a strong two-way causal relationship between infrastructure investment and public sector employment reflecting on the job creation as a result of construction, maintenance, and the operational activities of infrastructure building (Kumo, 2012).

Another economic benefit from investing in the expansion of infrastructure includes a more efficient transportation of goods and services at a lower cost, which results in lower prices for consumers. This is due to businesses depending on a well-functioning infrastructure system to obtain supplies and deliver goods and services at a profitable price. Similarly, investing in public transit has also shown to promote economic investment in the areas adjacent to public transit routes as they become more accessible to the public. In a study conducted by the U.S. Government Accountability Office on Bus Rapid Transit, showed that local officials believe BRT projects contribute to local economic development and investment (United States Government Accountability Office, 2012). Efficient public transit also increases property values and brings businesses near them.

Many underdeveloped countries have used privatization as a way to fix public services. However, some developing countries have relied on governmental intervention to generate efficient and low-cost solutions to public transit. One cost-effective solution that has gained a
lot of support among developing countries is the implementation of Bus Rapid Transit (BRT). Bus Rapid Transit offers the benefits of light rail with the flexibility and efficiency of bus transit. The goal of a BRT system is to enhance ridership while reducing costs. BRT systems combine intelligent transportation systems technology, cleaner and quieter vehicles, convenient and safe fare collection methods, traffic signal priority, and integration with land use.

The Caraqueños: A Divided Society

Transportation Infrastructure

One of the earliest and most important contributions of the oil rent was without a doubt the modernization of the country, in particular that of Caracas. In the late 1940s, renowned New York’s chief planner and master builder, Robert Moses, who spearheaded the program of highways throughout the United States, developed Caracas’ highway system (Brillembourgh, Feireiss, & Klumpner, 2005). The resulting highway plan was directed at improving accessibility for private transport, while public transportation and multi-modal transport options were disregarded. At the time, the United States’ highway system launched during the Eisenhower administration embodied the model and ideal for prosperity and “good government” to the developing world (Brillembourg, Feireiss, & Klumpner 2005, p.75). With Venezuela’s oil boom in the 1950s, Moses network of highways irreversibly and haphazardly fragmented the city, isolating low-income communities in less desirable areas, changing the landscape of the city, and influencing the different living environments.

Currently pedestrian infrastructure is non-existent in some areas and bike infrastructure is non-existent for the most part. Out of 2,758 km of roadways, there is clear pedestrian priority on a total of 2.2 km of roads, and 14 km of bike lane in the whole Metropolitan region (CAF, 2010). Furthermore, as many other businesses in the country, Venezuela’s transportation infrastructure and services have undergone an extensive wave of nationalization largely due to its bad condition. The central government nationalized many roads, ports, airports, as well as the largest ferry company in the country—Conferry—under the pretext that private companies and local governments were not successfully managing and solving their own problems; problems that have resulted from the current economic conditions in Venezuela (The Economist, 2011). Some of the most notorious issues in the transportation sector include engines falling off jet planes; “mega-holes” in the middle of major roads large enough to swallow an entire car; commuter trains colliding; ferry delays and cancellations; as well as traffic congestion in Caracas and main cities due to highways that are over capacity.

Though the fleet of motor vehicles has doubled in the past ten years, the infrastructure to support it has remained largely unchanged and minimally invested in. As a result of
deteriorated roadways and unexpanded infrastructure, traffic congestion has worsened becoming a major headache in the capital and other major cities in Venezuela. The average commute time for private vehicles in Caracas is 43 minutes, which easily doubles for out-of-towners that commute daily into the city for work.

In 2012, the government spent BsF. 5.48 billions ($870 million$^{17}$)—about 1.8% of GDP—in transportation projects (Agencia Venezolana de Noticias, 2011). This is a very small investment to an infrastructure system built over more than fifty years ago. According to the fiscal budget for 2013, the government will spend approximately BsF. 13.362 billions ($2.12 billion$^{18}$) in transportation projects, 3.4% of the projected GDP (Chavez Frias, 2012). Accounting for inflation, this represents an increase of 76.3 % in transportation investment in real terms; a long-time needed step up on infrastructure maintenance, repair, and expansion for sure.

Infrastructure issues affect the country as a whole, but can be most noticeable in Caracas, where over capacity roads, evidenced by the use of the shoulder lane as another traffic lane, contribute to major traffic jams. In 2012 it was reported that Caracas’ road network has remained practically the same since the 1950s. *Caraqueños* (Caracas residents) and those commuting from towns in the vicinity spend an average of one hour and a half in morning traffic, which averages to 720 hours annually (Globovision, Casos de Investigacion, 2011). Yet set in a narrow valley, wedged between mountains, Caracas’ road capacity is very limited which makes expansion an unlikely solution to the congestion problem.

*Public Transit in Caracas*

Experiences show that “major cities in developing countries are important examples of conflicts in the planning process,” due to their failure to efficiently integrate or coordinate urban, transportation and traffic policies and planning (Vasconcellos, 2005). Caracas exemplifies this lack of transportation and land-use integration primarily because of institutional differences and regulatory weaknesses. The number of institutions responsible for urban and transport issues at the local, regional, and federal level presents challenges for major cities in Latin America. Like in Brazil, in Venezuela metropolitan authorities do not have “real” legal power; therefore, it is difficult to reach an agreement over a common transportation project for a metropolitan area that comprises several cities administered by different political parties (Vasconcellos, 2005).

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$^{17}$ Parallel dollar: $181 million.
$^{18}$ Parallel dollar: $441 million.
Institutions and Governing Bodies

The Metropolitan District of Caracas (MDC) has a population of 3,220,540 people and is divided into five municipalities: El Libertador in the Capital District; and Sucre, Coche, El Hatillo, and Baruta in the state of Miranda. Each of the municipalities is governed by its own Mayor. The Metropolitan Mayor of Caracas oversees all the different Municipality Mayors. Recently, due to political differences between the Metropolitan Mayor and the national government, the National Assembly created a new position that assumed power over most functions, funding, and personnel that was previously held by the Metropolitan Mayor.

In Venezuela, public transportation is a responsibility of both the national and local governments. *La Ley de Tránsito y Transporte Terrestre* (The Law of Ground Transit and Transport) (2008) assigned the National Government the responsibility of transportation policymaking through *El Ministerio del Poder Popular para Transporte Terrestre* (Ministry of the Popular Power of Ground Transport), and transferred the responsibilities to authorize, regulate, supervise, and control urban public transportation services to each municipality (Asamblea Nacional, 2008). Municipalities grant bus owners or operators the permits to operate on a determined route at a determined schedule and are responsible of regulating that the terms are met. In practice, however, there is no proper regulation; thus, operators frequently do not carry out their routes properly, skipping stops, and disregarding frequency. The por puestos, for instance, run without a set schedule and usually during peak hours, when there is higher demand, which exacerbates congestion (as cited in Lizarraga, 2011).

Due to the complexity of the government power structure and the fragmentation of the regulatory system, coordination of the metropolitan transit system as well as the provision of reliable routes and times information becomes very difficult. Moreover, political differences between a local or municipal government and the central government negatively impact the former, as the latter tends to undermine actions taken by opposition leaders. Therefore, some of the opposition mayors and governors have a harder time implementing their transportation measures. For instance, in 2009, Henrique Capriles Radonsky, governor of the state of
Miranda—which comprises about half of Caracas—launched a traffic calming technique known as Pico y Pala (Peak and Plate) on one of the main arterial routes into the city. The idea behind the scheme, which has had some success in countries like Brazil and Colombia, was to restrict cars with certain license plates from circulating certain days. The plan met resistance from the central government, who ruled the measure to be “unconstitutional” because it restricted people’s right to freedom of movement. Since constitutional rights technically apply to the individual (and not his or her possessions), the decision of the Supreme Court granted automobiles constitutional rights.

**Mobility, Motorization and Transportation Modes**

Caracas has one of the highest rates of motorization in the Latin American region (261 vehicles per 1,000 people), higher than the median in the country (146 vehicles/1,000 people) (CEPAL, 2009). From 1990 to 1998 the fleet of motor vehicles grew by only 4.4%, while from 1998 to 2008, the fleet of motor vehicles grew by 113%, going from 2,441,000 vehicles to 5,218,940 vehicles (Ramirez, 2012). The Society of Venezuelan Civil Engineers has said that 60% of the vehicles sold annually in the country are used in the Caracas Metropolitan District (as cited in Lizarraga, 2011). Gasoline subsidies make it relatively low-cost having a car and encourage motorized vehicle purchases. Although automobiles per capita have often been used as an index to measure both growth and productivity of countries, the measurement alone can be deceiving, as it is the case in Venezuela.

A report by the **Cámara de Fabricantes Venezolanos de Productos Automotores** (FAVENPA)\(^\text{19}\) breaks down Venezuela’s 2011-fleet of motor vehicles into the following: 61.6% passenger vehicles, 18.8% four-wheel drive vehicles or 4x4, 10.1% light commercial vehicles, 6.9% medium commercial vehicles, 1.3% buses and minibuses, and 1.3% heavy commercial vehicles (Ramirez, 2012). Close to twenty-eight percent of the fleet is considered obsolete, dangerous, and highly polluting, being more than 16 years old; and another 16.5% of the fleet is 11-15 years old fast approaching the obsolete category (Ramirez, 2012).

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\(^\text{19}\) Chamber of Venezuelan Auto-parts Manufacturers.
In terms of mobility, a 2010-study by *El Observatorio de Movilidad Urbana* (OMU) shows that most trips in Caracas are done through public transit (54.4%), while private vehicles constitute 27.2% of the total trips (CAF, 2010). More importantly however, is the fact that most trips (46.53%) on public transit are done using the informal transportation system or the privately operated *por puestos*—described in more detail below—which are not integrated to the more efficient and reliable system that exist in the city (Alcaldía Metropolitana de Caracas, 2005). The second most frequent mode of public transit is the Metro system, with 24.39% of the daily trips. Figure 8 shows the trip distribution by public transit type. In addition, pedestrians and bicyclists only account for 18.4% combined, which is 10 points below the median of the fifteen Latin American cities studied by OMU. The low levels of walking and biking are attributable to the lack of pedestrian and bicyclist infrastructure and amenities throughout the city. Aside from the lack of structural infrastructure, most public transportation vehicles (from the private or public sector) are not equipped to hold bicycles for intermodal transfers.

In terms of the supply of public transportation in Caracas, the fleet is very diverse and reaches a great level of informality. The deregulation and privatization of collective transportation in the 1970s led to the emergence of a disorganized and disarticulated on-the-surface collective passenger transport, currently serviced by 269 private operators and 2 public operators (CAF, 2011). The collective passenger transport has a total fleet of 17,000 vehicles and runs 514 different routes (CAF, 2011).

Private operators hold the largest share of the service. Their vehicle fleet is unsafe because these tend to be very old and in very poor conditions. In addition, these vehicles often service without proper regulation and control. The drivers of private operators endure unfair working conditions without a fixed salary, benefits or insurance (Lizarraga, 2011). The city’s

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20 Private operators are cooperatives or civil associations of minibus, microbus, and jeep owners.
private operators include buses, *por puestos* and *rústicos*. *Por puestos* (which literally translates to “by the seat”) can be anything from a 5-seater Ford Ltd 1967 to minibuses/microbuses with a capacity of 18-32 seats. *Rústicos* are 4x4 jeeps that operate in areas that are hard to access due to difficult terrain and poor road infrastructure; primarily used for trips up to the shantytowns in Caracas.

Privately owned collective transportation like the *rústicos* and the *por puestos* present a number of issues. Among the most notable is traffic congestion. There is an excessive number of informal buses in the streets, which exacerbate traffic congestion and pollute the atmosphere; the latter due to the fact that most vehicles are very old and inefficient. The quality of service is low because buses do not belong to specific companies that pride themselves on their unique service and experience.

These vehicles are also the most prone to crime since burglars take advantage of fare collection not being automated or electronic and drivers having to handle the cash while behind the wheel. The disorganization and disarticulation of the transit system aggravates crime. The passengers are also target of these burglaries. In a lot of cases, robbers target larger vehicles and often sweep the entire bus.

The local, regional, and national governments also provide public transportation. Among the different municipalities within the MDC, one can observe differences in the operation and organization of collective transit. For instance, the Municipality of Baruta authorizes municipal and intermunicipal routes, regulates taxi companies, controls the conditions of terminals and stops, and develops bus operator trainings for the municipal bus drivers (Alcaldia de Baruta, 2013). Similarly the Mayoralty of Chacao also prioritizes mobility, providing the municipality a collective passenger transport system, TransChacao since 2008. The Metropolitan Mayoralty also has established a public transit system by the name of TransMetrópoli with a fleet of 80 plus new-technology buses—with bike racks—that service 12 lines.

Aside from municipalities and local governments, there are agencies within the Central Government whose responsibility is to provide public passenger transport services as well as to maintain transportation infrastructure. Agencies of the Ministry of Ground Transport include the Caracas Metro (Cametro), the Instituto de Ferrocariles del Estado (State Railways Institution), and La Fundación Fondo Nacional de Transporte Urbano (FONTUR).

The Metropolitan District of Caracas’ public transportation network comprises three systems: the underground rapid transit, the cable cars, and the collective passenger transport. The underground rapid transit or metro, managed by CAMETRO, was inaugurated in 1983 as an alternative to the car. The metro operates four active lines while two more are under
construction. A network of buses (Metrobús) compliments the subway system since 1987 and has an integrated ticketing system that allows easy transfers between the two public transit options (Lizarraga, 2011). The Metrobús, consisting of 220 large buses, operates 29 urban and suburban routes at a set schedule and frequency (Mundó, 2012). While the Metrobús does not operate throughout the entire MDC, it connects the subway stations with kea areas in the city and the outskirts. Since October 2012, line 7 of the Metro is operated by BusCaracas, a bus rapid transit line with a fleet of 12 buses.

Public transit is an instrument of social inclusion and as such one of its functions is to connect the barrios to the commercial areas where services and job opportunities are concentrated (Lizarraga, 2011). More recently the Metrocable system has been added to the Metro-Metrobús network. The metrocable consists of cable car lines that connect the numerous barrios located along the mountainsides of Caracas to the closest Metrobús stations in the periphery of the city.

Did you say BRT?

Bus Rapid Transit systems in Venezuela are relatively recent. The country currently has two BRT systems in place, one in Caracas (BusCaracas) and the other one in the state of Mérida (TrolMérida). A third BRT system (Transbarca) is currently under construction in Barquisimeto, while two more systems are planned for Ciudad Guayana and San Cristóbal.

The BusCaracas system comprises a 5.5-Km pilot route, 11 stops, and 12 articulated buses. Since it was launched in October 2012, bus drivers in charge of their privately owned bus have complained that the new buses interfere with their own routes. In other words, the BRT system has not been one that integrates with the different bus fleets on the roads, but instead it competes for the same services being provided. The new BRT buses use an electronic pre-pay method for students, which is not a feature that can be easily installed in some of the older buses. Need to absorb the existing private operators. The BusCaracas was suspended for some period of time this year due to the amount of people walking on the dedicated lanes.

SWOT Analysis of the BusCaracas system

Below, I analyze the strengths and weaknesses of the new BusCaracas fleet as well as the possible opportunities that could be expanded upon and threats to be on the lookout for.

Strengths:

- BusCaracas implied lower costs and construction time than the subway alternative.
- Fare prices are very low and reasonable. Fare prices are the same as in the non-BusCaracas public transportation vehicles: a single trip costs 1.5 BsF. (23 US cents); a
two-way trip: 3 BsF. (47 US cents); and a pass for 10 trips cost 13 BsF. (2.06 US dollars) (Ministerio del Poder Popular para Transporte Terrestre, 2012).

- Offers a high quality and efficient service:
  - Pre-board fare collection is safer for the bus drivers because they do not have to manage transaction while behind the wheel. Additionally, pre-paying at the station speeds up the process of entering the bus and shortens waiting time.
  - Free transfers between the two corridors and ticket integration with the Metro-Metrobús system makes transfers between the different modes much easier.
- Restricted operator access.
- BusCaracas’ entire fleet of buses are equipped for and accessible to people that have disabilities.
- Clean Bus technology that uses diesel instead of gasoline, which is more efficient. Also the buses are newer and in better conditions than the old fleet.
- Each bus can hold up to 160 passengers, twenty times more than the largest por puestos, which represent 46.53% of the transit.
- The trip along the corridor takes 35 minutes, half of the current average bus ride (67 minutes) (CAF, 2007).

Weaknesses:

- From the inception of the project, one of the most prominent issues was at the construction level. The project did not have a cohesive team throughout the construction phase. In fact three different companies acquired the project at different times. Therefore, the government’s assignment of responsibility seems to lack proper evaluation of whether the parties involved in the construction are at all capable of fulfilling these.
- Changes in the leading institution without adequate and transparent explanation to the public have affected the credibility of the government and the project. This specifically raises the question of whether the State resources are being correctly allocated and managed.
- Though the system is now in operation, unfinished sections still remain evidenced by many broken sidewalks and unpaved or unpatched roads.
- Due to the narrow nature of the arterial road (Fuerzas-Armana Nueva Granada Avenue), the project and design has had to be modified a number of times, reducing pedestrian and public spaces and greatly hindering both pedestrian and private vehicle mobility.
- Another weakness is the fact that traffic lanes were removed in order to dedicate them to Bus Rapid Transit. This has aggravated the traffic situation in the two main ways parallel to the bus way.
• Pedestrians walk on the dedicated bus way.
• It is not a very large system; therefore its impact is not as great. BusCaracas only travels through two corridors in the city center for a total of 5.2 Km (3 miles).
• 11 stations
• Additionally, the system has not been integrated with the privately operated buses, which represent a majority in the city.
• Lack of Integration between Transportation and Land Use.

Opportunities:

• If it were to be expanded, the BRT system could facilitate mobility along the whole Metropolitan region.
• Integrated Transit Network (RIT)
• Investment in public transportation and the public space that accompanies it will benefit property prices along the corridor.
• Purchase new buses and encourage private operators to apply for credit lines to renew their fleet.

Threats:

• Public Transportation Unions fear of replacement and displacement by the new buses. Historically, transportation unions—mostly representative of private operators—have been very eloquent about the unsustainable and subsidized fare prices of the metro system, as well as about more public transit competitiveness. It is essential that the government work with them to make the system more robust.

Summary

Overall, the bus rapid transit in Caracas has not reached its full potential as a successful transportation oriented development project. The system is not very large since it only travels through two corridors for approximately 3 miles. In addition, the system has not been integrated with the fleet of privately operated buses, which holds almost 50% of the daily trips. Due to the disorganized manner in which the project was handled, the system—now in operation—still has unfinished sections, evidenced by many broken sidewalks and unpaved or unpatched roads. The project and design has had to be modified a number of times at several locations, reducing pedestrian and public spaces and greatly hindering both pedestrian and private vehicle mobility.
It is worth mentioning however, that although the system has presented some issues, there are some advantages to investing in bus rapid transit. The BRT network implied lower costs and construction time than the expansion of the subway alternative. Additionally, fare prices are the same as the non-BusCaracas public transportation option, which entail the provision of a higher quality and more efficient service for the same price. The service’s pre-board fare collection speeds up the process of entering the bus, which shortens waiting time at stops and transfer locations. Free transfers between the two corridors and ticket integration with the Metro-Metrobús system makes transfers between the different modes much easier. BusCaracas’ entire fleet of buses are equipped for and accessible to people that have disabilities. The fleet’s technology is much more efficient and each BRT bus can hold up to twenty times more passengers than the largest *por puestos*. Finally, the trip along the corridor has shortened commuting times to 35 minutes, half of the current average bus ride (67 minutes) (CAF, 2007).

If the BRT system were to be expanded, it could facilitate mobility along the whole metropolitan region. Additionally, investment in public transportation and the public space that surrounds it would benefit property prices along the corridor and close to public transportation lines. Something to keep in mind, however, is the fact that public transportation unions represent a big threat—and historically have been vocally opposed—to BusCaracas because private operators fear being replaced and displaced by the new publicly owned buses. Historically, transportation unions have been very eloquent about the unsustainable and subsidized fare prices of the metro system, as well as about better-quality public transit competition. Therefore, it is essential that the Venezuelan government works with them to make the whole system more robust and of a better quality.
VI. Recommendations

Fossil fuel subsidies to consumers affect how people travel. In particular, they influence the choice of transport mode. Due to the subsidies, a person can travel 300-400 miles in a private automobile for approximately 1 USD in fuel costs. Or, the same person can take a single bus trip for 23 US cents. Even ten bus trips at a discounted bus pass rate of USD 2.06 will not cover the same distance that a car will be able to cover with just a single US dollar. The increase in fuel prices caused by a phase-out reform of subsidies would certainly shock existing transportation patterns. Transportation planners can and should therefore play a big role in how cities deal with or react to the phase-out.

In this section I discuss several recommendations that relate to the transportation system in Venezuela. While some of my recommendations are intended to address specific issues arising due to the subsidy phase-out, it is also useful to point out more general opportunities for improvement in the public transportation sector. Therefore, some of my recommendations are not specific to a fossil fuel subsidy phase-out, but rather propose improvements to the transportation system that may serve to ensure sustainable public transportation in Venezuela in general. The case studies discussed above illustrate that in addition to treating the specific symptoms caused by a fossil fuel phase-out, planners can help reduce tensions and stress in individuals who find themselves forced to adapt to higher fuel costs by ensuring a well-organized and well-planned public transportation system. Moreover, the specific actions that address problems stemming from the subsidy phase-out require that certain prerequisites are met. For example, education programs about public transportation options are only useful if different transportation options are actually available in the first place, and if it is possible to obtain information about these options in an organized fashion.

As a first step to make transportation options (and information about them) readily available, it is necessary to integrate services. Service integration would support public transportation and encourage multi-modal transportation instead of stimulating only motorized transport. According to Vasconcellos (2005), service integration—which involves a citywide route reorganization—can be offered in physical or financial forms. Physical integration refers to the organization of space in which travelers or commuters may change between different modes and services. Physical integration refers to the humanization of space through the creation of more open spaces by expanding pedestrian priority ways and infrastructure as well as bicycle infrastructure. Reclaim land along the BRT line to create more open spaces and accessibility to pedestrians. Financial integration refers to combined ticketing (Vasconcellos, 2005).
In Caracas, service integration would require the coordination of the publicly and privately operated public transportation options through new transit technology like pre-board payment and ticketing integration in all buses. Ongoing coordination and integration of transit services can improve transportation system connectivity and reliability and help make transit a more attractive mode alternative to the car. Service integration policies and practices that directly impact commuters include infrastructure, fare payment and schedules. Infrastructure integration in Caracas for instance would require changes to the route structure of transit operators and the establishment of transfer centers that will facilitate the exchange between different modes or within the same mode. Currently different operators compete for the same routes at the same time, which increases congestion in the city. Increasing public transportation availability without at the same time coordinating and integrating the different services (offered by both public and private operators) would only increase the congestion problem. Finally, schedule integration or the coordination of arrival and departure times would facilitate the movement of transit customers.

Service integration would undoubtedly require the replacement of the old bus fleet with new technology buses that run on electricity, diesel, natural gas, or bi-fuel. Today, most buses in Caracas run on gasoline, which are less efficient, and more polluting than its bi-fuel, electric or natural gas counterparts. The new fleet should have high occupancy to keep operational costs as low as possible.

Education and Promotion Programs

Ignoring the cost of the car itself, driving in Venezuela is currently cheaper than riding public transit. Fossil fuel subsidies have existed for a long time and the population is used to facing a very low cost of driving. A phase-out reform of fuel subsidies would generate confusion and discomfort among commuters because people do not trust or know any other options. Commuters are not aware of efficient alternatives to their car. It is the planners’ job therefore to educate the public and advocate for multi-modal transportation while in the process of fully integrating the transportation network. As a ways to incentivize public transit ridership and multi-modal transportation it is necessary that planners establish programs that emphasize road safety and security for all type of commuters. Some of these programs include pedestrian and bicyclist initiatives or workshops to promote walking and biking in the city.

Additionally, another way of promoting transit ridership would be through what David Levinson from the Department of Civil Engineering at the University of Minnesota calls “transit system memberships”. This encourages those willing to pay for ‘unlimited services,’ instead of
paying each time they use a service (Levinson, The case for (and against) public subsidy for public transport, 2013). Levinson explains that reducing pass prices and raising individual fares "At a relatively lower price, more people would get a Metropass. Possessing a Metropass would induce me to make more trips by transit (since the marginal cost of use would now be zero)... People pay for the option of not having to think about price" (Levinson, Club Transit, 2013). Yet, the most important feature of this membership is the psychology behind it: the customer becomes an owner of the transportation system and therefore as a member or owner, the passenger now advocates for the service and maintains it. Similarly to museums and zoos, membership should have perks in order to increase the perceived ownership that passengers have for the service. For instance, joining the Caracas Transit System would get the passenger a discount on the high-speed train (under construction) or ride for free in another city’s transportation system for a week. This is especially important in the context of gasoline subsidy phase-outs because at the moment consumers are psychologically most invested in their cars; taking “ownership” of another mode of transportation will help change this mentality and therefore make it easier to adapt to higher consumer fuel prices.

Transportation Policies during the Phase-Out

Although the decision making power regarding some aspects of a fossil fuel subsidies reform is not in the hands of transportation planners, there are a number of policies that directly affect transportation planning. Therefore transportation planners may play an important role in educating decision makers, and planners may actively advocate those policies. The following policies would play an important role in promoting public transportation infrastructure investment and planning, as well as transit use:

I. Implementation of a multi-tier pricing system for gasoline and diesel fuels by adopting quotas for subsidized, semi-subsidized and free-market gasoline and diesel prices.

II. Implementation of subsidized and semi-subsidized diesel prices for vehicles in the agricultural and industrial sector and for public transportation.

III. Restriction of old public transportation fleet.

IV. Implementation of government-sponsored programs that promote the switch to better and cleaner technology (NGVs).

V. Implementation of the gasoline-rationing card across all states in the country, beyond borderline states.

VI. Gradual approach to phase-out is recommended. GIZ suggests that price increases should be no more than 10%.
A multi-tier pricing system in gasoline and diesel fuels would allow people that drive to work to be more conscious about their consumption and be less wasteful. The idea is to reduce private consumption and promote multi-modal trips. A policy like this will of course be more efficient when paired with a strongly developed transportation network because people would have more options on how to get to places.

Subsidized and semi-subsidized diesel prices for vehicles in the agricultural and industrial sector would be ideal because that would keep prices of other goods and services from going up. This scheme for the public transportation sector would mean that fare prices could be maintained at low levels, encouraging the use of transit use. As demand for the service rises, operational costs become lower.

Government-sponsored programs that promote the switch to better, newer, and cleaner technologies (such as NGVs) would benefit the environment and allow for a decrease in dependency on the more polluting fuels: gasoline and diesel. Given that Venezuela has the eighth largest natural gas reserves in the world and that the natural resource is comparatively cheaper to produce than the other two fuels, it is certainly worth considering—if not a complete switch—encouraging bi-fuel or hybrid vehicles (Central Intelligence Agency, 2012).

Since funding often conditions project scope, it is essential that both the central and local governments set new mechanisms to provide funding and grants for project implementation. As cited by Vasconcellos in Urban Transport, Environment and Equity “the alternative to poor subsidy policies is not a ‘no-subsidy policy’ but rather a more efficient one” (Vasconcellos 2005, p.237). The idea is not to end fossil fuel subsidies, but to relocate them in an equitable manner. Investing in an improved public transportation system will result in a more equitable redistribution of nation resources, because – unlike highways—the poor are also likely to benefit from improved public transportation.
VII. Summary and Conclusion

Some individuals have long recognized the importance of investing oil rents into projects that provide opportunities for long-run growth. The renowned Venezuelan intellectual and journalist Arturo Uslar Pietri published an article in 1936 that explored the destructive character of an economy completely dependent on a non-renewable natural resource (Uslar Pietri, 1936). In his critique, Uslar Pietri coined the phrase “to sow the oil,” because he favored investing oil rent into strengthening the agricultural sector and encouraging the use of modern technology to industrialize farming. In his opinion it was most important to protect the environment by repopulating the forests, building canals, and building dams that would regulate irrigation. Uslar Pietri considered it imperative that the riches generated from the non-renewable resource would be used to invest in a solid and progressive economy.

My suggestions attempt to capture the spirit of Uslar Pietri’s comments. Instead of consuming the natural resource at an accelerated rate due to cheap prices, it is possible to invest in an infrastructure to support public transit and multimodal transportation without the need for extensive fossil-fuel price subsidies. Not only would investing in transportation infrastructure help alleviate traffic congestion and reduce emissions, but it would also humanize cities—in particular Caracas—becoming less vehicle-centric and more people-centric.

The long-term goal for the transportation network in Caracas is a citywide route reorganization with full integration, which means the integration of the publicly and privately operated public transportation options. The first step would be the replacement of the old fleet with new technology buses and vehicles that run on electricity, diesel, or compressed gas. The new fleet should have high occupancy to keep operational costs as low as possible. These systems would be integrated through new transit technology like pre-board payment and ticketing integration. In this process of reorganization, existing operators must be included in the planning of new bus routes and feeder lines to mitigate opposition and conflicts.

The Brazil case study revealed that gradual implementation of a fossil-fuel phase-out reform works best because the process is more controlled and each sector or group of stakeholders that could be in opposition is dealt with carefully and separately. In contrast, the Bolivian government, who adopted and implemented the reform in a very short period of time without much regard or care of public opinion, faced very strong opposition and finally was unsuccessful. Both the Bolivia and the Iran cases hint to the importance of informing the masses in a transparent manner. The Iran case demonstrated that dealing with the public in an informative and educational way from the planning stage to its implementation phase helps ease the public into a phase-out reform. Iran’s success can also be attributed to how well the
government advertised the phase-out scheme and compensation package as necessary measures to promote higher standards of living and minimize income inequalities.

In addition to the economic measures, Iran also focused on strengthening the country’s public transportation infrastructure at least a decade before the implementation of the reform. This was done in an effort to increase public-transit use, which is more inexpensive and uses less energy per person than an automobile. We see that in the Bolivia case, the focus on improving public transportation comes after the failure of the reform, as a way to also reduce gasoline consumption. In Brazil, their experience shows that not all major cities had a cohesive transportation system when the reform started to be implemented. However, we can assume that if fossil fuels were still subsidized, Sao Paulo’s traffic would be much worse than it is now. And as in the case of Bolivia, many Brazilian cities are now rushing to finish transportation projects for the 2014 and 2016 international games.

Therefore, in order to be able to liberalize gasoline and diesel prices in the near future, it is important that Venezuela invests in strengthening its public transportation network. More importantly, the planning of urban spaces must be comprehensive; therefore, requiring the integration of Land Use Planning, Transportation planning, and Traffic Planning. By humanizing the urban landscape, cities would be less vehicle-centric and more people-oriented.

In addition to the above general recommendations that will improve the usability, availability, and reliability of the public transportation system, there are also specific tasks that planners face in facilitating the subsidy phase-out. In particular, municipalities should establish campaigns and programs that emphasize road safety for all type of commuters through bicyclist initiatives, bus drivers’ trainings, and workshops to educate and encourage public transit users. This is necessary and particularly needed in Venezuela because the decades of very low fuel prices have made consumers unaware of efficient alternatives to driving. It is important that as changes to the shape of the city start occurring, individuals are knowledgeable about their options and that they have all of the necessary information needed to change their mode of transportation away from only personal automobiles.

Planners should also be vocal advocates of policies within the reform that will most directly impact public transportation. For example, maintaining semi-subsidized fuel prices for public transportation will be vital in order to maintain a low cost for public transit. Maintaining multi-tier pricing system for some period of time at the beginning of the reform will also help individuals familiarize themselves with alternatives to driving their own cars.

Since higher income individuals are less likely to change transportation modes in response to the increased fuel prices, a scheme such as Levinson’s transit-system membership
with perks may be implemented by transportation agencies. This creates a sense of ownership in the public system and replaces the strong sense of ownership that Venezuelan’s have of their cars (and the country’s oil resources). Transportation planners can help with the necessary change in mentality about cars that is needed to make a subsidy phase-out successful. By effectively planning a public transportation system that takes into account the needs and characteristics of all different users, transportation planners can play an essential role in the transformation of Venezuela into a more sustainable place.

**Areas for Future Research**

Due to geographical limitations, I was unable to gather any primary data that would have added a social perspective to this investigation. Therefore, future research into this matter should include interviews with three groups of people: professionals (i.e. economists, planners, architects, and transportation union leaders), officials, and a sample of the populations. Having these primary sources affords the researcher a more detailed look at the problems faced by transportation planners during successful and unsuccessful fossil fuel phase-out reforms in other countries. Furthermore, learning the specific processes of how planners overcame these problems would provide valuable lessons for Venezuela, as well as other countries that may attempt to phase out fossil fuel subsidies in the future.
Appendix A
Regional Comparison of Diesel Fuel Consumption, GDP per Capita and Fossil-Fuel Consumption Subsidies

Legend
- GDP per Capita, PPP
  - 3,322 - 5,200
  - 9,231 - 12,200
  - 12,231 - 15,200
  - 15,231 - 18,200
  - 18,231 - 21,200
  - 21,231 - 25,200

- Diesel Subsidies
- Gasoline Fuel Subsidies
- Fossil-Fuel Consumption Subsidies

Subsidy by Fuel in 2011 (billion dollars)
- Oil: 21.57
- Natural Gas: 1.89
- Coal: 0.00
- Electricity: 3.22
- Subsidy per person ($): 195
- Total subsidy as share of GDP: 8.6%
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Vita

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