

# EcoElétrico Curitiba - Smart Mobility

Curitiba, Brazil



## Promoting electric mobility in Curitiba, Brazil

EcoElétrico Curitiba intends to implement, by 2020, a new generation mobility menu for Curitiba based on a connected, integrated and sustainable transportation system, with technology adapted to the mobility needs of its citizens. The goal is to integrate all the mobility services in Curitiba, creating a single “mobility menu”. In the first phase of EcoElétrico, in place since June 2014, a fleet of 12 shared electric vehicles and 10 charging stations, demonstrating a pilot e-mobility concept, are used by the Municipality of Curitiba. The fleet and charging stations are connected and monitored via an online mobility and energy management platform (“mobi.me”) which offers real time management and monitoring for mobility and energy of the city. The “mobi.me” platform continuously monitors all charging stations and vehicle movements and thus allows drawing conclusions on the impact of the new intelligent e-mobility-concept in real time [1].

### Country/ City Profile

Country		City	
	Population (2014)	206,1 [2]	Population (2014) 1,879,355 (city) 3, 400, 000 (metropolitan) [4]
	Land area (km <sup>2</sup> )	8, 515, 770 [2]	Land area (km <sup>2</sup> ) 430.9 (city) 15, 416.9 (metropolitan) [4]
	GDP per capita (2014, current international \$, at purchasing power parity)	16,155 [3]	GDP per capita (2014, US\$, at purchasing power parity) n/a (city) 16,980 (metropolitan) [5]
	Region	Latin America	Region Inland (90 km to sea port)
	City's physical geography	Location	<ul style="list-style-type: none"> <li>✓ 8<sup>th</sup> largest urban area in Brazil, close to the sea</li> <li>✓ 4<sup>th</sup> largest GDP in Brazil, important economic hub in Southern Brazil</li> <li>✓ Average altitude of 935 meters above sea level</li> </ul>
	Climate	<ul style="list-style-type: none"> <li>✓ Subtropical highland climate (average annual temperature: 16,8° C)</li> <li>✓ 1,483 mm/year annual rainfall</li> </ul>	

### Initiating context [1]

The City of Curitiba, in Southern Brazil, is a world-renowned exemplar of urban planning and development. It is recognized as a hub of urban innovative solutions, among which the better known is the Bus Rapid Transit (BRT), which is now used in many cities in South America, and some in North America, Europe and Asia.

The Brazilian Itaipu Binacional (the largest renewable electricity producer in the world) and CEIIA (a Portuguese based Centre for Engineering and Innovation) challenged the Municipality of Curitiba to reinforce its lead in the design and implementation of intelligent mobility solutions, thereby strengthening its position as a worldwide paradigm in mobility planning and management.

As a result the project EcoElétrico Curitiba has been established, intending to implement, by 2020, a new generation mobility system based on a connected, integrated and sustainable transportation system, with technology adapted to the mobility needs of its citizens. The goal is to integrate all the mobility services of Curitiba, creating a single “mobility menu”.

In the first phase of EcoElétrico, in place since June 2014, a fleet of electric shared vehicles is being used by the municipality services. This pilot initiative demonstrates that the use of electric vehicles is viable. But more

importantly, as these vehicles are monitored in real time with “mobi.me”, an online mobility and energy management platform used by the City of Curitiba, this initiative also allows gaining information about the mobility needs of the local authorities. This is resulting in better knowledge about how to optimize fleet use, about the city mobility patterns and the quantification of associated CO<sub>2</sub> emissions, including also an estimation of EcoElétrico driven CO<sub>2</sub> reductions against a reference “business as usual” scenario.

### Project description [1]

Curitiba EcoElétrico is a smart electric mobility pilot initiative developed in the scope of the project “mob.I - Smart Electric Mobility”. It is promoted by the Brazilian utility Itaipu Binacional and CEIIA, in partnership with the Renault-Nissan Alliance and the Municipality of Curitiba.

The Curitiba EcoElétrico initiative favours technological development associated with electric mobility and intelligent systems. The new developed mobility concepts are intended to be tested and showcased by the “mobi.me” system. The aimed new generation mobility system will be built from and oriented to the citizen’s specific needs, starting with an increase in electric mobility and evolving into a customized smart-mobility solution.

The Curitiba EcoElétrico initiative started with a pilot phase for testing the concept and showcasing intelligent mobility solutions. From the 2014 Football World Cup onwards, EcoElétrico is evolving in a scalable logic into the gamut of new generation mobility-solutions thus again positioning Curitiba at the forefront of the urban mobility changing process.

Curitiba EcoElétrico allows the project users to access a dynamic network of vehicles, charging stations and other mobility devices and to monitor the impact of the new intelligent mobility-paradigm in real time, via the “mobi.me” system.

### Implementation process [1]

The first phase of EcoElétrico started during the 2014 Football World Cup. This phase encompassed the creation of a smart network of electric vehicles and charging stations that are used by some city council services, such as the policing of parks, tourist activities support, and traffic education. In June 2015 an electric minibus was added, making up a total of 12 vehicles. All the vehicles and charging stations are monitored in real-time with the “mobi.me” platform which allows for the gathering and production of mobility relevant data and information. With this platform, each service can access customized info in real-time about its mobility behaviour and associated impacts, e.g. about the impact of the vehicle battery charging on the electric grid, ecological footprint, CO<sub>2</sub> emissions, mobility patterns, etc. This knowledge allows: the improved design of public policies related to mobility; the creation of new generation mobility products and services as well as R&D projects; the analysis of users and fleet profiles; etc.

### Project implementation details

<b>Process</b>	One year after the project has been launched (2014), 12 electric vehicles are in use. The subsequent phases will include the enlargement of this fleet but above all the integration of new functions, including the city’s public transportation system.
<b>Financing</b>	Funding is being provided by Itaipu Binacional; the vehicles have been mostly provided by the Renault-Nissan Alliance.
<b>Leadership</b>	Itaipu Binacional and CEIIA are the project lead partners. CEIIA is also responsible for the technical development and management of the “mobi.me” system. The Renault-Nissan Alliance provides most vehicles used in the project. Finally, the Municipality of Curitiba assumes the role as a tester and as a facilitator of the initiative.
<b>Involved stakeholders</b>	<p><b>Project partners</b></p> <ul style="list-style-type: none"> <li>✓ Itaipu Binacional (project co-leader)</li> <li>✓ CEIIA (project co-leader and technical leader)</li> <li>✓ The Renault Nissan Alliance (partner: vehicles)</li> <li>✓ Municipality of Curitiba (partner: tester and facilitator)</li> </ul> <p><b>Users</b></p> <ul style="list-style-type: none"> <li>✓ City services (police, tourist info, education)</li> </ul>

## Results [1]

### Project benefits (July 2014 - June 2015)

CO <sub>2</sub> emission reductions	7 tonnes CO <sub>2</sub> eq	Total distance travelled	55,000 km
Energy consumed on EV charging	12,500 kWh	Money saved	10,500 BRL (~2,400 EUR)
Number of charges	1,200		

The total distance travelled by the 12 cars in the project is equivalent to 1.4 turns around the world (at the equator line) and the energy consumed on EV charging is equivalent to the annual electricity consumption of 6.25 average Brazilian families. To date (June 2015) the pilot initiative saved the equivalent to 22 oil barrels and allowed the reduction of GHG emissions equivalent to the carbon sequestered by 300 trees during a year.

### Lessons learned [1]

Even though the project still in its first phase, it is already possible to identify some positive outcomes. Firstly, it has been proven that electric vehicles are suitable to some services of the municipal council fleet, a fleet with heterogeneous and very specific demands. Secondly, it has been possible to establish a sharing solution for the fleet; a solution that allows for a more efficient use of the vehicles. Thirdly, the monitoring of the vehicles and charging stations in real-time via the "mobi.me" platform provides a volume of data about the mobility patterns of the municipal fleet and associated impacts such as e.g. GHG emissions. This knowledge is very beneficial for the design of public policies in the area of mobility and transportation. The inclusion of new vehicles in this pilot initiative (an electric minibus was recently added to the fleet), encompassing the postal services and the electricity utility to the project and the positive evolution and expansion of Brasília Ecomóvel, a twin project that is being carried out in Brasília, are strong signs that this initiative is well-supported.

### References

- [1] The project website can be accessed in [www.projetomob-i.com.br](http://www.projetomob-i.com.br) (in Portuguese only); English video: <https://vimeo.com/96241012>
- [2] World Bank: Data: <http://databank.worldbank.org/data/reports.aspx?source=2&country=BRA&series=&period=>
- [3] World Bank : GDP per capita, PPP: <http://data.worldbank.org/indicator/NY.GDP.PCAP.PP.CD>
- [4] Curitiba Wikipedia: <https://en.wikipedia.org/wiki/Curitiba>
- [5] 2014 Global Metro Monitor Map, Brookings Institution, Curitiba: <http://www.brookings.edu/research/reports2/2015/01/22-global-metro-monitor>

More information about the "mobi.me" system can be found under e.g.:

<http://smartcitiesitsallaboutpeople.net/ppt/AndreDiasmobimegothamcuritiba.pdf>

[http://www.portugalglobal.pt/PT/Internacionalizar/Multilaterais/Documents/CEIIA\\_Smart\\_Mobility\\_at\\_the\\_Core\\_of\\_Sustainable\\_Cities.pdf](http://www.portugalglobal.pt/PT/Internacionalizar/Multilaterais/Documents/CEIIA_Smart_Mobility_at_the_Core_of_Sustainable_Cities.pdf)

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