

## A Sustainable Future: BlueLA, a Shared Electric Vehicles Program in Los Angeles

Eve Thullen, Claremont Graduate University & Pomona College

### Introduction

Electric vehicles, do not consume dwindling fossil fuel resources and do not produce local pollutants, have a lower cost that make it possible for individuals and families to move around easily, rapidly, comfortably, which makes them more consumer friendly than public modes of transportation. They are often presented as a green solution to the transport problem. EV adoption is helpful to most regions in achieving air quality standards for ozone and particulate matter, and ultimately for greenhouse gases.

To improve the energy shortage and energy crisis problem in future, to reduce the air pollutions, and to improve the air quality to our cities and neighborhoods, in the year 2015, the city of Los Angeles launched an ambitious sustainability plan called pLAN that in the introduction to the pLAN, Mayor Eric Garcetti wrote: “This is our moment to come together and transform Los Angeles. That’s why I am excited to present to you this Sustainable City pLAN. This pLAN is a comprehensive and actionable directive that will produce meaningful results for today’s Angelenos while setting us on the path to strengthen and transform our city in the decades to come. It is important to emphasize that the pLAN is not just an environmental vision - by addressing the environment, economy, and equity together, we will move toward a truly sustainable future.” [1] In the plan, the Mayor set up a goal for a 45% reduction in greenhouse gas emissions by 2025 and has committed Los Angeles to net zero carbon emissions by 2050. [2]

To achieve this goal, the city developed several plans to reduce the emission vehicles, such as Electric Avenue Plan that the Mayor has been working with electrify LADOT and Metro’s fleets in public transportation systems increasing the procurement of electric trucks and buses. Most important, the city promoted several programs related to EV that make the transition to zero emissions in their Clean Air Action Plan (CAAP), which included [3]:

- **EV RIDERS.** *L.A. became the first city to roll out an electric car share program designed to serve low-income residents. The pilot is proposed to help the city reduce greenhouse gas emissions while providing disadvantaged communities with more convenient and affordable clean transportation options. Altogether, it is expected to recruit a minimum of 7,000 new car sharing users, who are expected to sell or avoid purchasing 1,000 private vehicles — reducing annual greenhouse gas emissions by approximately 2,150 metric tons of carbon dioxide.*
- **CHARGE!** *When the Mayor released pLAN in 2015, he committed to installing 1,000 publicly available EV charging stations by the end of 2017 to help make clean transportation less expensive and more convenient. The City achieved this goal a year*

early — and today over 1,800 chargers have been installed, with a plan for 10,000 more charging stations over the next five years.

- **ONE STOP EV SHOP.** To help cities across the country electrify their fleets, Mayor Garcetti launched the Climate Mayors Electric Vehicle (EV) Purchasing Collaborative — a new online portal that lowers the cost of electric vehicles and charging infrastructure by enabling cities to bid on them together in larger quantities. As a result of the new platform, 20 founding Climate Mayors' cities and two counties committed to purchasing 391 EVs — a figure that is expected to grow as the program continues to engage cities across the country.

## Shared Electric Vehicles Program: BlueLA

Mobile computing technology is quickly changing the landscape of transportation that was enable the rise of car sharing companies such as Uber and Lyft. Car sharing is an alternative mode of transportation that is more flexible than public transportations but less expensive than traditional private vehicles and offers a sustainable transportation alternative that to reduce emissions, congestion, parking demand, and rider cost, while increasing user mobility and convenience.

To achieve the EV Rider program, the Los Angeles Department of Transportation (LADOT) and the Los Angeles Mayor's Office as part of LA's mobility strategy partner with SALEF launched a 100% electric vehicle (EV) share service for the Pico Union area program called BlueLA. [4]

### What is BlueLA?

*“A revolutionary point-to-point electric car-share service, BlueLA aims to bring affordable access to vehicles for residents of all incomes.” [5]*

-Mission of BlueLA



Fig-1 Bl



Fig-2 BlueLA Cars

BlueLA commenced operations in April 2018, with 40 stations, 200 charging points, and 100 cars in Los Angeles, the service is available to anyone 18 years or older with a valid driver's license and be able to access to a network of shared electric vehicles 24 hours a day, 7 days a week, at self-service stations in their neighborhood. BlueLA members will pick up and drop off vehicles at BlueLA station, which the stations are on street, consisting of one self-service kiosk and 5 parking spots each. The BlueLA members only need pay the fees based on miles. [8]

Till December 2018, total station and charger installed [9]:

- 1,367 – BlueLA members
- 920 - Drivers using the vehicles
- 8,253 - Total trips
- 158,546 - Total VMTs



CARB Grant Funds (C.F. 15-1227)	
Car Share Operations Start-up Support	\$600,000
Parking Conversion	\$106,000
SPRF (Parking Revenue) Credits	\$252,600
Outreach Manager and Street Ambassadors	\$392,000
Advertising	\$100,000
Technical Advisory Services (SUMC)	\$218,743
Sub-Total	\$1,669,343
Additional City Commitments	
BOE Street Damage Restoration Fee Waivers	\$300,000
LADWP Charging Station Rebates	\$800,000
LADWP Customer Fee Waivers	\$80,000
<i>Additional City Commitments Sub-Total</i>	<i>\$1,180,000</i>
Public Investment Total	\$2,849,343
Private Investment Total	\$10,000,000

**Cost and Revenue Structure**

Project funding includes a combination of city and state commitments totaling \$2,849,343, which have been allocated to community engagement, SUMC (Shared- Use Mobility Center) technical services, and parking conversion costs, and \$10,000,000 in private investment from BlueLA to install and operate the service during the five-year pilot, which the cost is largely dedicated to delivering the vehicle fleet, station infrastructure, EV equipment, and related fixtures such as reservation kiosks and meter pedestals, etc. The details can be referred to Table 1: Summary Comparison of Commitments and Funds [10]:

How much does BlueLA cost?

Table 1: Summary Comparison of Commitments and Funds

BlueLA requires a monthly subscription. A standard membership costs \$5 monthly, and vehicle use is metered at 20 cents per minute, in addition to the membership fee. The BlueLA Community Membership is available to qualifying low-income individuals, and benefits and discounts can apply [11]:

MEMBERSHIP RATE: \$1 per month

RENTAL RATE: \$0.15 per minute / \$9 per hour (+9.5% tax)

Rental period begins when you pick up a car, and ends when you plug in at a BlueLA station

Minimum charge is 15 minutes (\$2.25)

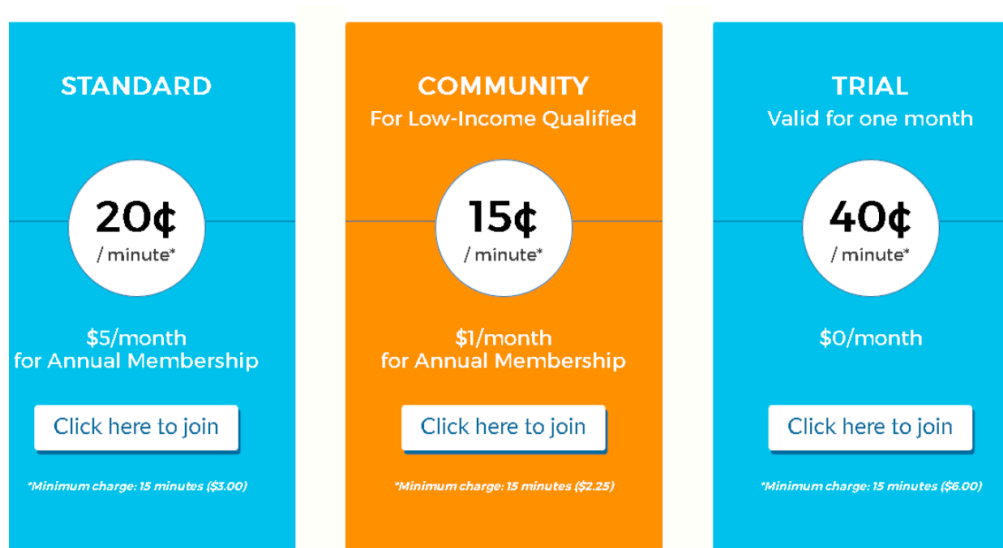


Fig-3 BlueLA Cars Price

### Station and Infrastructures

How to determine the service area and station sites?

#### Service Area

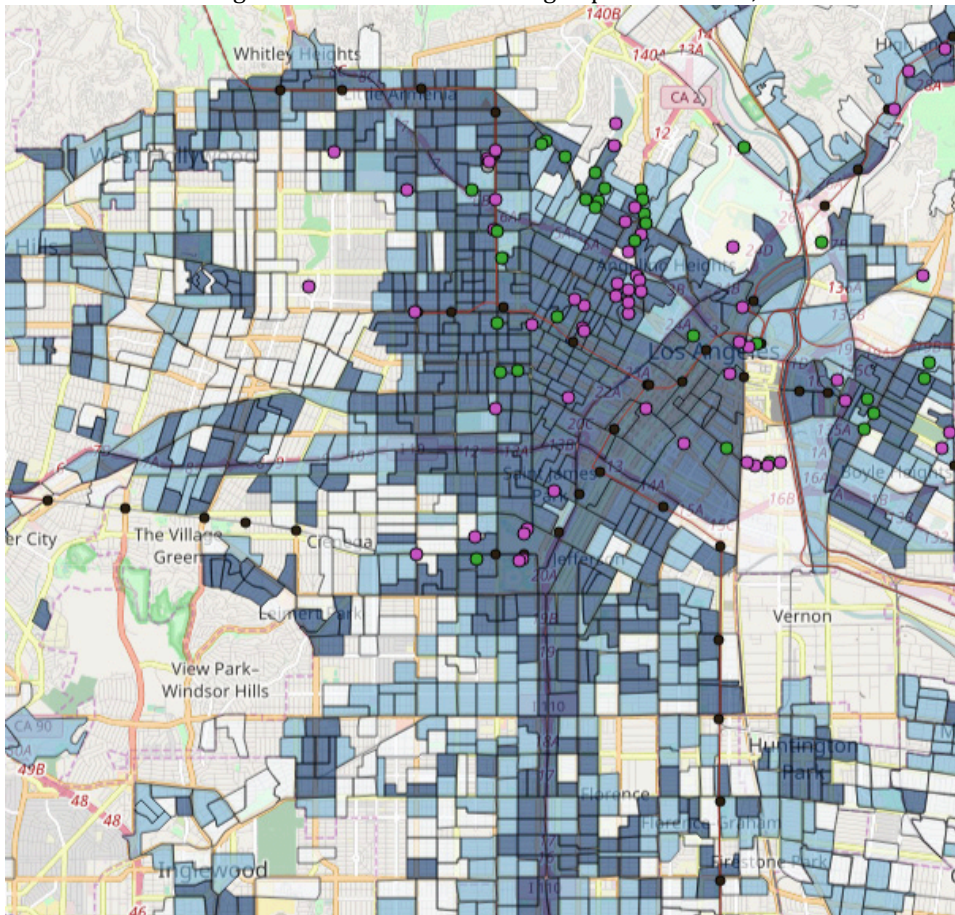
The BlueLA model of electric car sharing is more likely to be successful in a service area with certain spatial and demographic characteristics that satisfied certain standards.

Partnering with SUMC, the city performed data analysis, and refined a national shared mobility opportunity-mapping tool with granular local data for a Car share Expansion Index. The analysis identified attractive car sharing zones, scored on the Car share Expansion Index that based on following measurements:

- *Transit availability and utilization*
- *Population and employment density*
- *Vehicle ownership*
- *Block size and intersection density (as a proxy for walkability)*
- *Longitudinal employer-household dynamics data*

Results of SUMC Expansion Index as mapped in the customized online tool; the area covers Boyle Heights, South LA near USC, and East Hollywood

Figure 4: Result of Car Sharing Expansion Index;



**Station Sites:** With the car sharing expansion index, the city was able to define the service area and to identify specific locations for EV stations, in which each station would consist of five parking spaces and a reservation kiosk. Ideally stations would be placed in a public area

that is easy access and the vehicles more visible to the community.

Through a collaborative and iterative approach involving BlueLA, city departments, SUMC (Shared-Use Mobility Center), and community residents, the city identified and developed the following criteria for selecting sites:

- *At least one-half mile from other stations*

- Population density above 15,000/sq. mi. within a half mile
- Employment density above 10,000/sq. mi within a half mile
- Three or more POI (Points of Interest) within walking distance
- Allows for comfortable vehicle and charger access (ample street lighting, in or near trafficked area, ample space to enter and exit the vehicle and utilize the chargers comfortably, traffic speeds below 35 mph, etc.)
- Visible from a major street
- Walk and transit score both above 60 (www.walkscore.com)
- Points of power and telecom feed are within +/-80 feet of the proposed station location

The BlueLA Station Map as following updated to February 2019:

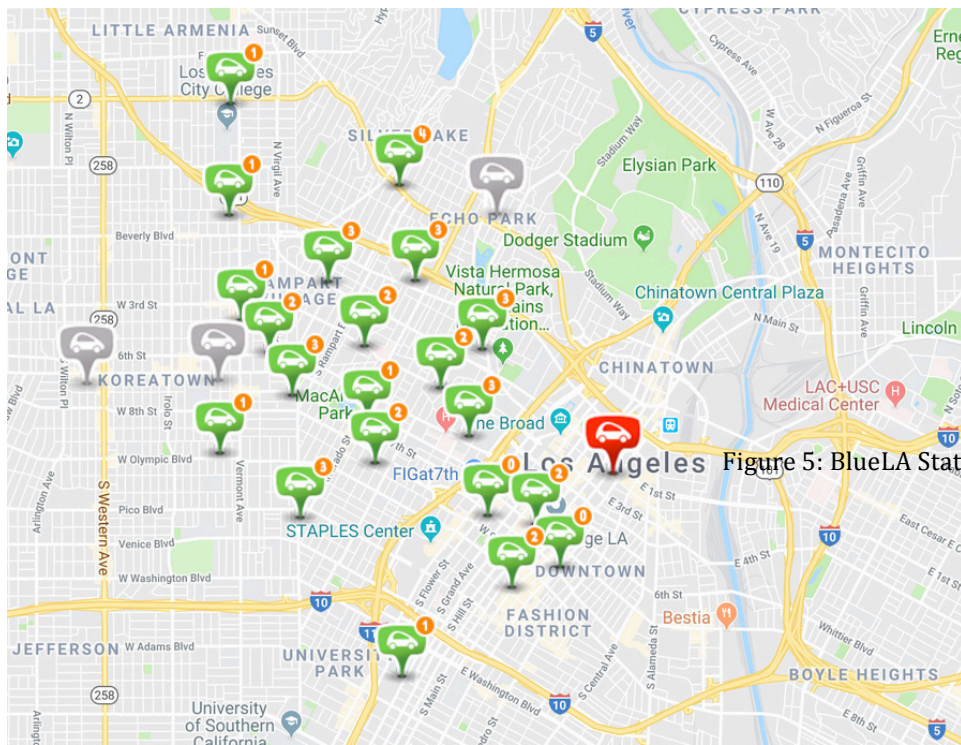


Figure 5: BlueLA Stations Map – February 2019

**Websites  
and Apps**

From the BlueLA website, the user can register as the member; also, it provided a user guider for customers. <https://www.bluela.com/>

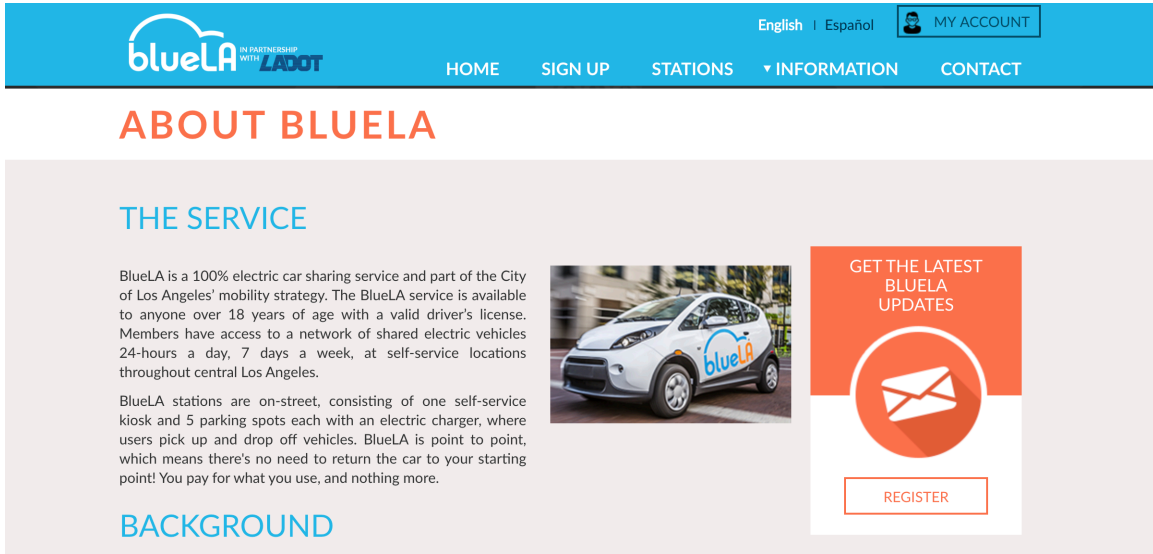
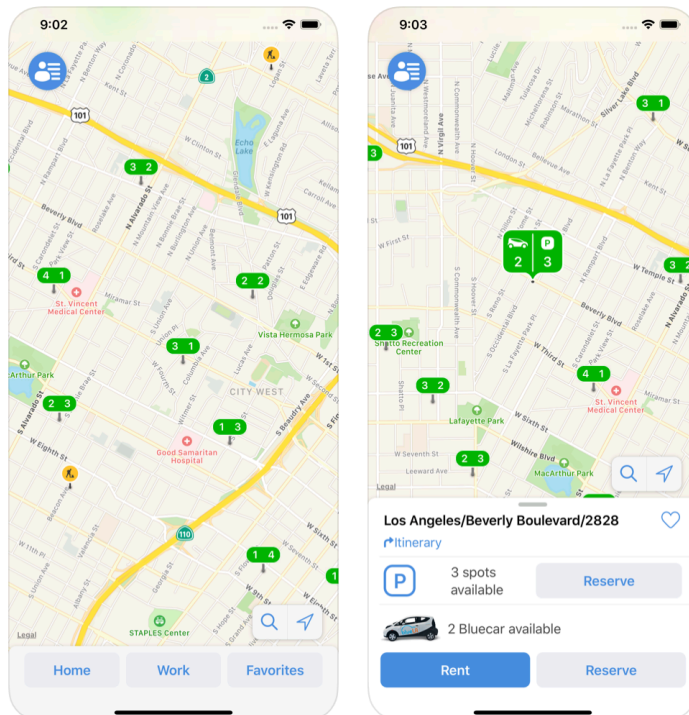


Figure 6: BlueLA Website

Also, the city developed phone apps that help the customers to use BlueLA more conveniently. From the App, the user can check the available station sites and electric vehicles.



Figure 7: BlueLA Apps



### Construction and Partners

In 2017, the city started Construction of BlueLA stations and a demonstration site was



completed in June 2017, in which three engineering teams were involved: LADWP, Blue LA's contractor CES, and Charter's contractor IES. The electric service was provided by LADWP with 100A, 120/240V, 1PH, and 3W Service; and the telecom service provided by Spectrum Business and Charter Communications.

In April 2018, the service launched with seven sites, and in an effort to further expedite the construction process, BlueLA hired a second construction firm called Motive Energy with Vantage Company to finish the rest of sites in the end of year 2018.

Another important partner called SUMC (Shared-Use Mobility Center), that SUMC is a public-interest organization focuses on universal, affordable, and sustainable mobility in urban and metropolitan regions of the US through the efficient sharing of transportation assets. In this BlueLA project, SUMC provided several services such as conducting new research, and providing policy and technical expertise to cities and regions.

### User Experiences and Sustainability Outcomes

Thanks to the program, with 80 electric vehicles, 130 charge points, 26 charging stations, nearly 2,000 BlueLA members, and over 12,000 trips, in 2018, 260 metric tons of CO2 have been avoided in the city of Los Angeles. [12]

Also, to better understand if the program is meeting expectations and the needs of its members, BlueLA conducted member surveys when individuals enter the program and when they leave the program, [13] for example, in terms of affordability that BlueLA should not be more expensive than other ride sharing service such as taxis or Uber, or in terms of accessibility, that BlueLA should have reasonable waiting times for appointments. What's more, to determine if the program was a success by signing up and maintaining members from targeted low-income communities in addition to keeping users safe and happy, BlueLA also conducted further analyses which included some key performance indicators such as the number and length of rides, the number and zip code of members, the number of accidents and general behavior of drivers, etc.

To get feedback from customers, we captured some reviews from website.

Reviews from Google Play: Overall score is 3.8, and 16 total reviews which 6 of them under 3 stars and 9 of them above 4 stars from [https://play.google.com/store/apps/details?id=com.bluela.androidapp&hl=en\\_US&showAllReviews=true](https://play.google.com/store/apps/details?id=com.bluela.androidapp&hl=en_US&showAllReviews=true)

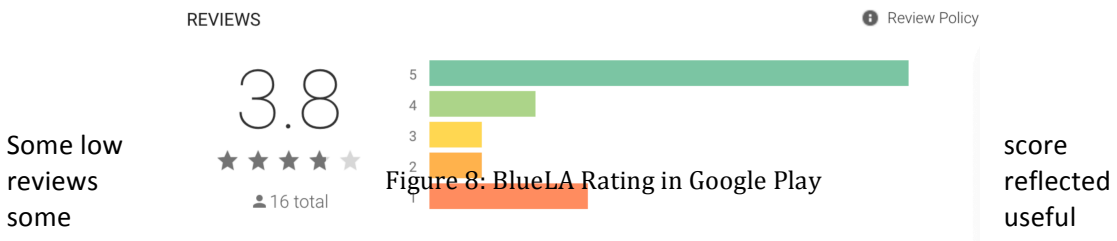


Figure 8: BlueLA Rating in Google Play

information about the deficiencies in the program. For example, one user mentioned that the rental process was slow. Another critical issue is customer service and maintenance. One user indicated that the maintenance is a big problem for the project, “The cars themselves need to be better maintained. My car hadn't been washed or vacuumed in forever. Also, there are issues with a window closing on my vehicle.”

The other user stated that: “Has to return the car due to battery malfunction”

However, from Apple Store, BlueLA received well reviews that overall score is 4.8 out of 5, in which total 224 ratings from <https://apps.apple.com/us/app/bluela/id1348330645>

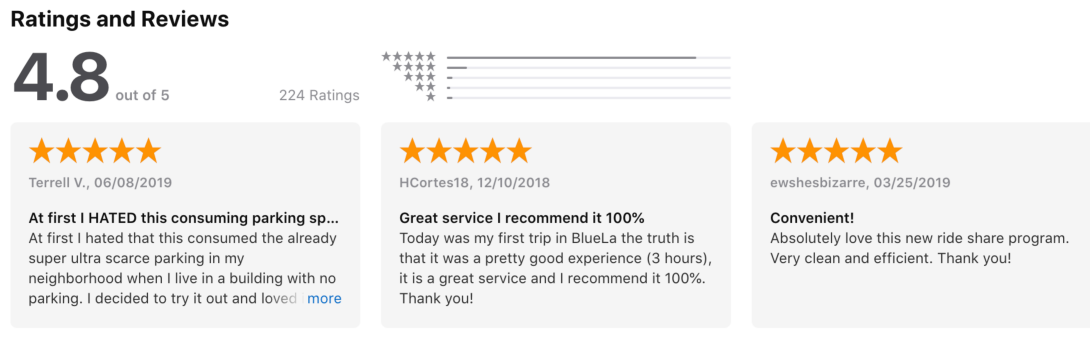


Figure 9: BlueLA Rating in Apple Store

Some users giving rating of 5 stars stated that they love this program because it was clean energy and efficient, also a money-saving,

“I realize that if there were more of these all around the city I could ditch my car for good, saving 700 a month on car payments, gas and car insurance. I’m going to use these cars on the weekend before these really take off and become scarce.”

Overall, the popularity of the BlueLA system among community members is growing and the result is encouraging, the program is so far successful.

### Future: Self-Driving Electric Vehicles

To promote clean energy and the EV market, governments are making related policies that encourage EV consuming, for example, policies for incentives for consumers such as purchase bonuses, reduced taxes, and electricity cost discounts, etc. Also, governments are building infrastructure such as charging station development, and putting investments in new technologies on EV batteries and self-driving vehicles. [14]

Motivated by rapid development of technology and the growing burden of congested urban driving, automated driving vehicles are becoming popular. Self-driving cars are sparking a revolution in the transportation system over the next several decades; for example, General Motors is cooperating with a ridesharing service company for an autonomous driving taxi service. [15] Electric vehicle ride sharing can integrate with self-driving technologies to be more sustainable, feasible and profitable than traditional car service!

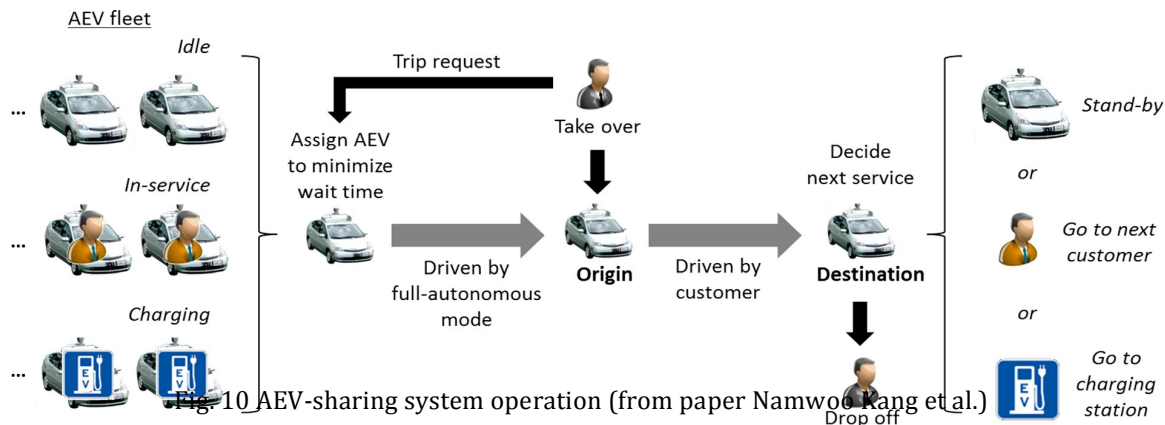


Fig. 10 AEV-sharing system operation (from paper Namwook Kang et al.)

Here is an autonomous electric driving framework as Fig.10. The framework was developed and designed by Namoo Kang and his colleagues from Smart Design Lab.

The framework was defined as five parts: a customer becomes a member; a smart phone app that displaying location and showing a wait time for a car; the car arriving in a full-autonomous driving mode; then the users drives car with no autonomous driving mode; and the user can leave the car at the destination or the car can self-driving to car station, or the car can travel to the next customer (in full autonomous driving mode).

The goal of City of Los Angeles is to make diverse transportation options accessible to all segments of the population. We believe the new technology – self-driving cars will bring in new opportunities for the project, which will make BlueLA more successful and make a more sustainable future for the city.

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