**Promoting EVCARD’s Electric Vehicles Rental Service**

**to Users who Own Cars in Shanghai**

For

the Chief Marketing Officer of Global Car Sharing

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# Introduction

## Description of EVCARD’s emission issues

### The energy consumption and emissions of electric vehicles

Electricity is a secondary energy source. Although hydrogen, wind and nuclear power have accounted for an increasing proportion of China's electricity generation in recent years, about 80% of its electricity is still generated by thermal power. Therefore, carbon emissions generated by burning fossil fuels are the main source of carbon emissions generated by electricity (Yan et al., 2015).

Carbon emissions from vehicle usage are the sum of the two emission stages. The first stage is called WTT(well-to-tank), which refers to the energy and emissions consumed between the source of the fuel and the stage in which it is used. For example, the WTT emission of electric energy is the emission during the generation and transmission of electricity. The second stage is called TTW(tank-to-wheel), which refers to the energy and emissions consumed by the vehicle as it travels. The sum of the two is called WTW(well-to-wheel) emissions. Unlike conventional vehicles, electric vehicles have zero TTW emissions (Wang 2002), while all emissions are concentrated in WTT emissions.

Ji (2011) made a comparative study of electric vehicles and traditional cars in 34 major cities in China, and found that traditional cars have a greater impact on the environment and residents' health, because their emissions are closer to population centers. Electric cars, on the other hand, emit no emissions when they are driven, and the emissions are generated by power plants, further away from population centers. In addition, the difference range of CO2 emissions of electric vehicles (135-274g/km) is larger than that of conventional vehicles (150-180g/km).

A study in the Irish context used the current model ratio as a base case to predict the total emissions when electric cars accounted for 100% of the model size. The results show that if trips below 15 km or the first 15 km of longer trips are assumed to be intra-city trips, the use of electric vehicles can significantly reduce the greenhouse gas emissions from intra-city driving, while the reduction is even less significant for inter-city trips (William J. Smith, 2010).

### The impact of car-sharing behavior patterns on emissions

Some car-sharing research has highlighted the impact of car-sharing services on family behavior patterns. For example, the impact on total mileage of private cars, other authors highlight changes in family car ownership patterns and alternatives to local public transport.

In travel behavior, carbon emissions are reduced when more fuel-efficient Shared vehicles replace private vehicles. When car-sharing takes the place of public transport, carbon emissions increase. In addition, car-sharing will have an impact on the convenience and preference of families, making their travel frequency and distance change. The study in South Korea also shows that the increase of fuel car sharing vehicles does not make a significant contribution to carbon emission reduction, while the increase of EV infrastructure such as charging stations can significantly reduce the total carbon emission of future EVs (Jung, 2018).

A North American study, based on online surveys, found that car-sharing among families with cars led to a reduction in carbon emissions, while car-less families led to an increase in emissions. Most of the households that use Shared cars increase their carbon emissions by using them, while the rest of the households reduce their carbon emissions by reducing the number and use of vehicles. However, as car-sharing enables its users to develop a new type of "low-mileage" travel mode, the total emission reduction effect ultimately exceeds the total emission increase effect. And not all car-sharing members are active. Therefore, it is not recommended to apply the same emission factor comprehensively to every member (Elliot W, 2011).

The four factors that affect the carbon emission of Shared cars include the change of transportation mode, the old and new vehicles, the choice of the best model and the integration of travel. The shift in transportation patterns refers to the use of Shared cars instead of other modes of transportation. Old and new vehicles mean that car-sharing services will be updated at a higher rate than family vehicles (about three years), and that the overall newer models will bring higher fuel efficiency. The selection of the best model means that cars can be Shared and different models can be provided so that families can choose the model that best suits their travel needs. Gas-guzzling cars will be used less. Travel integration refers to the fact that due to the characteristics of Shared cars, users are more inclined to integrate shorter multiple trips into longer single trips, in which repeated round trip is avoided and the engine is kept in warm starting state for a longer time, thus saving fuel consumption (Namazu, 2015).

Car sharing helps improve urban transport efficiency and mobility, reducing the number of cars per capita, reducing the need for parking Spaces, reducing fixed costs and supplementing public transport. In addition, car sharing helps reduce negative energy and environmental impacts. Electric or petrol-electric hybrid vehicles are widely used in car-sharing services due to their energy efficiency and compatibility with charging stations and drop-off points. A case study in Lisbon, Portugal, found that introducing hybrid and electric cars to car-sharing services could reduce energy consumption by 35% and electric cars by 47%, respectively, resulting in a 35% and 65% reduction in carbon emissions. (Baptista, 2014).

## Purpose of this report

The purpose of this report is to assess the feasibility of promoting EVCARD services for families with cars and provide a detailed solution, so as to decrease the emission caused by EVCARD’s services. For the urban environment, reducing carbon emissions will slow the greenhouse effect and improve air quality. For EVCARD, increasing users who own vehicles not only offers more profit opportunities but also reduces greenhouse gas emissions. Providing a contribution to reducing emissions is also more likely for EVCARD to receive state funding and social support.

## Brief description of data sources

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