

**California Air Resources Board
2013-2014 Solicitation of Draft Research Proposals**

Proposal Title

Understanding Consumer Response and Business Model Potential:
An Innovative Electric Vehicle (EV)-Based Suburban Carsharing and Bikesharing Service in the Dublin-
Pleasanton Region

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This draft proposal was prepared for the Research Division of the Air Resources Board

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January 31, 2013

☒ Human subjects will be used in this research

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1. Abstract

The proposed project will evaluate an innovative approach to increasing consumer awareness and demand for zero emission vehicles in a shared-use vehicle setting in a San Francisco Bay Area suburban location. We will deploy 30 Scion iQEV vehicles in the Dublin-Pleasanton region and provide links to public transit (Bay Area Rapid Transit (BART) District), neighborhoods, and key employment centers (including Hacienda Business Park). This project will also include bikesharing to provide critical linkages among the carsharing access points and key locations. Toyota will provide significant in-kind contributions to the project, including vehicles, insurance, and technology support. City CarShare will manage and operate the shared-use vehicle program, and TSRC will serve as the project evaluator for the three-year effort. Additional partners may include the Bay Area Air Quality Management District and ChargePoint (formerly Coulomb Technologies, Inc.).

Since suburban-based carsharing has only been tested on a limited basis in the past, this real-world project provides a unique opportunity to test several new business models (fractional ownership, station cars, and employer- and neighborhood-based carsharing/business bikesharing in the suburbs). In a fractional ownership model, individuals co-own, sub-lease, or subscribe to a vehicle owned by a third party. Fractional ownership has not yet been evaluated. Station cars are vehicles that individuals access to get to and from public transit stations. Their deployment is highly limited, at present.

For the concept of carsharing to scale in areas that are less dense, such projects are critical for understanding and advancing new ownership models, as well as consumer response to EVs. This project has been under development since Winter early 2012 among the partners and will include several project deployment phases (described below); each will be evaluated as part of the longitudinal user survey.

Phase 1: Classic Carsharing and Business Bikesharing at Hacienda Business Park (July 2013 – November 2013): City CarShare will establish a conventional carsharing system within Hacienda Business Park among businesses and residences on site. Note: business bikesharing will begin during the first phase but after the initial EV carsharing launch; this project element will be deployed by Hacienda Business Park.

Phase 2: BART Station Cars (Roundtrip) (November 2013 – July 2014): Conventional carsharing will be expanded to allow Hacienda Business Park employees to drive the vehicles to and from the Dublin/Pleasanton BART station at the beginning and end of the day.

Phase 3: BART Station Cars (One-Way) (July 2014 – December 2014): The concept of modified one-way carsharing will be introduced. Selected members will be allowed to take cars one-way between BART and Hacienda Business Park.

Phase 4: Fractional Ownership (December 2014 – December 2015): The concept of fractional ownership will be introduced into the carsharing service. Selected members will be allowed to take cars home overnight where they will be re-charged. Members will drive the cars to the Dublin/Pleasanton BART station where they will be available to members arriving on BART. These members will take the vehicles to Hacienda Business Park for use during the day. The process will reverse at the end of the day.

2. Introduction

The proliferation of advanced zero emission vehicles into consumer markets has long been a policy objective for the state of California, as well as the broader nation. Through a series of policies such as the Zero Emission Vehicle (ZEV) mandate, High Occupancy Vehicle (HOV) lane access, and tax incentives, California has offered an array of incentives to help encourage consumer uptake of vehicles that would reduce air emissions and foreign oil dependence. The state has arguably moved the automotive industry product line and the consumer market towards these vehicles, but this pace could be accelerated. Thus, there is a need to explore and develop new mechanisms to expose and proliferate clean fuel, zero emission vehicles to the public in the context of smart land use initiatives, such as SB 375 (Sustainable Communities and Climate Protection Act of 2008) and AB 32 (California's Global Warming Solutions Act).

Carsharing has had a transformative impact on the transportation landscape of urban North America. Carsharing, which provides members with short-term access to vehicles on an as-needed basis, began in Canada in 1994, and by 1998 had been established in the United States. It quickly spread throughout major cities of the country. By 2006, carsharing in North America had over 100,000 members. By the end of 2012, the North American industry led the world with over 900,000 members served by nearly 16,000 vehicles. Carsharing has produced well-documented benefits in the form of reductions in vehicle ownership and emissions from reduced driving (Martin and Shaheen, 2010).

Most of these benefits have been delivered in urban centers, where carsharing has traditionally operated. At the same time, carsharing has had more limited success in establishing viable business models that operate in suburban environments, such as business parks and public transit stations. Furthermore, carsharing systems have been broadly confined to delivering services with internal combustion and hybrid-electric vehicles. Recently, carsharing operators have begun to again experiment with integrating new types of advanced vehicles, mainly plug-in hybrids, but also electric vehicles (EVs), into their fleets. This integration serves to lower the emission impact of carsharing vehicles, while at the same time exposing the membership base to more advanced vehicles. There would be considerable social and public benefits if carsharing could more rapidly develop a viable business model in suburban environments and more readily integrate zero emission vehicles, such as EVs into their operations. These benefits would include: 1) the sustained provision of carsharing in a region with high automotive dependency (and thus high potential for reductions in driving), 2) the increased exposure of people within these markets to original equipment manufacturer EVs, and 3) enhancements to regional mobility that offer new and critical connections to public transit infrastructure.

This proposal seeks to advance these objectives through an innovative project with UC Berkeley, Toyota Motor Company, City Carshare, and the Hacienda Business Park in the Dublin-Pleasanton region of California. Hacienda Business Park is an 875-acre business/residential campus that hosts 475 companies employing 18,000 people, as well as 3,500 residents in housing developments with plans for expansion (Hacienda Business Park, 2012, 2012a). This project would be implemented in four phases. Phase 1 begins with a deployment of a carsharing system that is comprised of 30 iQEV electric vehicles at the Hacienda Business Park to establish a suburban EV-based carsharing system. Please note that the target of 30 vehicles would be placed (and redistributed as needed) during the first 18 months of the proposed

project. In addition, the Phase 1 deployment would include a complementary business bikesharing system that would also be placed at the business park. The system would then proceed through a series of operational expansions.

In Phase 2, the system would be expanded to position vehicles at the Dublin/Pleasanton Bay Area Rapid Transit (BART) station. This would serve to test, evaluate, and improve the station car model of carsharing, in which vehicles serve to facilitate a first-mile and last-mile role with commuters in the region. Vehicles in this phase would operate on a round-trip basis in which users must return vehicles to the location at which they were accessed. Phase 3 would advance this model, by permitting one-way travel by users. Finally, Phase 4 would proceed to test a new business model of fractional ownership with residents. This phase would evaluate how this innovative approach could permit a collective of people to share ownership of advanced vehicles, distributing their cost and use over a wider array of people.

Broadly, this system would serve as a demonstration project that would increase consumer awareness and demand for EVs through direct exposure. The vehicles would serve a dedicated and useful purpose to a large employee and residential base by incorporating them into the transportation infrastructure of a region in great need of new and innovative mobility options. These co-benefits would also bring new exposure of EVs to a large, affluent, and controlled population, serving to provide transportation options that reduce local emissions, as well as facilitate better use of existing public transportation infrastructure.

2.1 Previous Research in EV Carsharing

There has been growing body of literature built on EV carsharing over the past 15 years. Much of this research has emerged from California and Japan, where early carsharing and station-car programs placed an emphasis on incorporating electric vehicles. Also, France has generated notable experience with EVs in carsharing through several long-term operations. EVs were integrated into station car (shared vehicles available at public transit stations) and carsharing programs in the 1990s, demonstrating the ability to balance the mobility needs of many users with a limited driving range. Due to logistical and operational challenges, however, EVs began to disappear from shared-mobility systems in the early-2000s. Recently, they have experienced a resurgence. Building upon lessons learned and notable EV advancements, many carsharing operators anticipate greater potential for EVs in shared-use vehicle systems in the future (Shaheen and Cohen, 2012).

2.1.1 Early Integration of EVs into Shared-Use Vehicle Systems

Station Car Programs

EVs were a major part of station car programs in the mid-1990s, particularly in the U.S. The station cars provided an easy and convenient way to access a user's home or work from the public transit station, thus relieving the first-and-last mile problem. EVs fit well with station car programs since most trips were short distance.

The first large-scale station car program, Praxitèle, was launched as an experimental demonstration in 1997 in a suburb of France's Saint-Quentin. Although the EVs were well received by Praxitèle members, Praxitèle struggled with costs and sustained demand, and it was forced to close in 1999 (Massot et al., 2001; Shaheen et al., 1999). The CarLink field test, which ran from 1999 to 2000, blended the concepts of carsharing and station cars. It was deployed at the Dublin/Pleasanton BART station and included 12 compressed natural gas (CNG) Honda Civics. The program was deemed a success from an operational and user perspective (Shaheen, 1999; Shaheen et al., 2000). CarLink II followed this demonstration. It was deployed from 2001 to 2002 at the Palo Alto Caltrain station in Northern California, with a fleet of 19 ultra low-emission Honda Civics (Shaheen and Novick, 2005). Flexcar took over this program in 2002, but closed it in July 2003 due to financial concerns. Another station car initiative was the BART District-Hertz program, which included two Th!nk city class EVs at the Fremont BART station from 2000 to 2003 (Barth and Shaheen, 2002).

One hybrid station car/carsharing effort is the Zero-Emission Vehicle Network-Enabled Transport (ZEV·NET) program at the University of California (UC) Irvine, which was deployed in 2001 and continues today as a research program. The current fleet is stationed at the Irvine Transportation Center (ITC), a commuter rail terminal (Zev-Net, 2012). "UC Riverside (UCR) Intellishare" was a similar project that implemented a station element into its EV carsharing system in 2006. Station cars were located at the Downtown Riverside Metrolink train station for convenient transport to the UC Riverside campus (Barth, 2006).

Although EVs were noted as a successful part of station car systems, 60% of all programs ceased in the early 2000s (Shaheen et al., 2004). Many closed due to the high cost and low reliability of first-generation EVs, while others cited insurance rates, economic downturn, and decreased customer demand as key operational challenges (Shaheen et al., 1998; Shaheen et al., 2004).

Carsharing Programs

EVs also were integral to many carsharing fleets in the 1990s (Shaheen et al., 1999). Liselec launched in 1993 in La Rochelle, France. Testing EV use in carsharing, the program was successful and still exists today under the name Yelómobile (Urban Community of La Rochelle, 2012). Yelómobile, now the longest operating EV carsharing project, exists as a one-way program and requires trips to stay within La Rochelle. Thus, trips keep within the EV's range of 130 km. Unlike other EV carsharing programs struggling with economic sustainability, Yelómobile continues to receive governmental support (McDonald and Vöge, 2001).

Similarly, in 1999, Japan began a project called the Second Car System (SCS) in the Tama New Town District, Inagi City. Most of its 300 users reported that the service met their travel needs (Fukuda et al., 2003). SCS included a reservation system that calculated the charge time needed to complete a planned trip and reserved a vehicle accordingly. In this way, the 160-km EV range did not present an obstacle. After the program began implementing fees, however, many users dropped out. After three years of operation, the program closed.

Toyota Motor Company deployed a carsharing experiment in Japan in the late-1990s, called the Crayon System. The program consisted of 50 vehicles, 13 stations, and 700 members (Barth, 2001). Crayon used advanced intelligent transportation systems (ITS) technologies including automated reservations, telematics to communicate between the vehicles and system management, and global positioning system (GPS) technology to track the cars (Barth et al., 2007).

Also in Japan, Nissan entered into EV carsharing in 1997, with the Minato-Mirai 21 (MM21) experiment in Yokohama (Takayama, 2002; Barth et al., 2007). The program's studies began in 1999 and grew to 30 vehicles and seven stations in the Yokohama area. The trials ended in March 2002, and the system transitioned to operators to determine system viability (Takayama, 2002). This program spread to Yokohama, Kawasaki, and Tokyo; it was called the Intelligent Transportation System/Carsharing Electric Vehicle (ITS/CEV) City Car System (Barth et al., 2007). It later became known as Orix Carsharing, comprising roughly 400 vehicles and around 6,000 to 8,000 members. Orix Carsharing discontinued using EVs exclusively and now also uses hybrids and gasoline vehicles (Cohen et al., 2008).

The U.S. also deployed an EV carsharing project called UCR Intellishare, mentioned earlier, which began in 1999 and ended in July 2010 (South Coast Air Quality Management District, 2010). Also a one-way system, Intellishare's fleet was used an average of 100 times/day, each for a relatively short amount of time and distance. With such high use, the EVs had to be well managed so that each had sufficient charge (they had a range of 160 km). If one was depleted, the system would not allow it to be available for use until it finished charging. The limited EV range was not found to be a problem; however, the project was not commercialized since it was created as a test bed (Barth et al., 2010).

Although most of the EV shared-mobility programs proved to be feasible in terms of driving range and user satisfaction, EVs gradually faded out of these systems. Numerous reasons were cataloged for failure: high costs; high insurance rates; low reliability of the first generation EVs; a preference of hybrid vehicles; decreased user demand and public support; operational barriers (e.g., limited vehicle range, few charging stations); logistical challenges (i.e., the need for centralized management and real-time data feedback); and economic downturn (Cohen et al., 2008).

2.1.2 The Resurgence/Evolving Role of EVs in Shared-Use Systems

Shared-mobility systems have experienced a recent EV resurgence. Being almost completely phased out by the mid-2000s in favor of hybrid vehicles, there are new driving forces and interests behind EVs (Shaheen and Cohen, 2012). Due to technological advancements, automakers have launched next generation EVs at lower costs than before with longer-range batteries (e.g., lithium-ion). In addition, the California Zero Emission Vehicle (ZEV) Mandate requires automakers to sell more zero-emission vehicles, and as an incentive they receive ZEV sales credit by placing them in transportation systems that demonstrate technology-enabled vehicle sharing, such as carsharing and station car programs. Monetary rebates are now available to encourage carsharing operators to purchase ZEVs and other low-emission vehicles (California ARB, 2012).

Worldwide carsharing experts believe a key trend over the next five years will be the re-emergence of EVs in shared-use fleets. Hertz on Demand began integrating EVs into its carsharing fleet in New York City in December 2010; they expanded to locations in North America, the United Kingdom, and China. In 2011 Paris began an all-electric program called Autolib', and Nissan launched a pilot test in Yokohama, Japan incorporating Nissan Leaf EVs into its existing fleet with the option of a chauffeur driver.

Additionally, five global automakers (BMW, Ford, General Motors, Mitsubishi, and Toyota) are either providing carsharing services or integrating their EVs into new and existing carsharing operations or both. BMW's DriveNow carsharing program was recently initiated in San Francisco with a fleet of 70 BMW ActiveE electric vehicles (DriveNow, 2012). Similarly, car2go's carsharing program has all electric fleets in San Diego and Amsterdam and has implemented EVs into its existing fleet in Portland, Oregon (car2go, 2011; car2go Nederland 2011; car2go, 2012). Like car2go, other carsharing programs have added EVs to their fleets. City CarShare deployed EVs in the Bay Area, iGo in the Midwest, and Zipcar throughout North America (City CarShare, 2012; iGo Car Sharing, 2011; Zipcar, 2012).

2.2 Previous and Related Work by Proposal Team

The Transportation Sustainability Research (TSRC) team at UC Berkeley, as well as the broader coalition of partners, has a deep and worldwide understanding in research, evaluation, and deployment of carsharing. This experience began with the pioneering development and evaluation of the previously mentioned project called CarLink I. Deployed with 12 CNG vehicles at the Dublin/Pleasanton BART station from January to November 1999, evaluation of this project found that participants tended to be young, highly educated, high income, and working in professional and technical fields (Shaheen and Rodier, 2005). In addition, the project participants expressed that their new commutes were less stressful, despite the longer commute length (Shaheen and Rodier 2005, Shaheen, 1999). CarLink I was followed by CarLink II, deployed at the Palo Alto Caltrain station (Shaheen et al., 2000). Compared to CarLink I, CarLink II had more vehicles, twice as many participants (107), was used by multiple employers each with 100 to 600 employees. Key impacts of the CarLink I and II programs included a 23% increase in rail transit use and a reduction in single-occupancy driving by 44% in CarLink I and 23% in CarLink II. In addition, the programs exhibited an average reduction in vehicle miles traveled (VMT) of 18 miles and 23 miles per participant per day in CarLink I and II, respectively. Finally, these benefits simultaneously

reduced parking demand at participating train stations and among member businesses (Shaheen and Novick, 2005, Barth and Shaheen, 2002).

Following the success of CarLink I and CarLink II, UC Berkeley researchers, led by Dr. Susan Shaheen, have continued to track industry developments in carsharing, as well as produce supporting literature evaluating the impacts of the industry. TSRC explored new and effective practices for carsharing and public parking through a study of policies in implementation across the country (Shaheen et al., 2010). Also in 2010, TSRC researchers completed an evaluation of the greenhouse gas (GHG) emissions impacts of the industry through a comprehensive survey of carsharing organizations in North America (Martin and Shaheen, 2010). That study found that carsharing reduced average VMT by 43%, and reduced household vehicle ownership by an average of 0.23 vehicles per household (Martin et al., 2010). The study has since served as a benchmark for understanding the impacts of carsharing within the United States, Canada, and farther abroad.

The TSRC research team is also continuing research in shared-use modes through several existing projects that focus on the latest evolutions in the carsharing industry. One of these projects is the evaluation of pricing strategies on EV carsharing in San Diego. This project is being completed in partnership with Daimler and the car2go system, which has been deployed in several cities within North America. A unique quality of the system in San Diego is the exclusive use of EV SMART cars, which can be accessed and deposited anywhere within a pre-defined zone within the city. The project will evaluate how different pricing schedules would impact vehicle travel patterns, the spatial distribution of vehicles, as well as the overall distribution of charge. The objective of the project is to determine the types of pricing schemes that improve overall vehicle availability and charge.

A second related project of the TSRC research team is evaluating the deployment of an electric bikesharing system in San Francisco completed in partnership with City CarShare. This project is co-locating electric bicycles with carsharing vehicles to understand how bikesharing placed alongside carsharing can alter the modal split of shared-vehicle use towards lower emission modes. Electric bicycles are especially suited for San Francisco, with its extensive network of hills and side streets. The TSRC team is evaluating the nature of vehicle use, including the distribution of vehicle activity, energy use, and modal split between both pilot and control locations.

The other project partners of the proposal team have substantial, on-the-ground experience with carsharing operations, as well as advanced vehicles. Toyota Motor Company has been a leader in vehicle technology innovation, leading the nation's automotive industry in the development of hybrid-electric drive trains. The Toyota Scion iQEV, which will be deployed in the project, is a new four-seat all-electric vehicle with a driving range of 50 miles, designed for urban commutes or short carsharing trips. The battery can be 80% charged in 15 minutes and fully charged in three hours from a 240V outlet (Toyota Motor Sales, 2012). Toyota would provide significant in-kind contributions to the project, including vehicles, insurance, and technology support. City CarShare has been a pioneering leader in the carsharing industry. Founded in 2001, City CarShare has been delivering carsharing services to the San Francisco Bay Area as a non-profit with a dedicated mission to provide an alternative to automotive ownership. As an operator with over a decade of experience in the carsharing industry, City CarShare would spearhead system operations, bringing their IT-platform and deep implementation knowledge to the project. Other

partners would include: Hacienda Business Park, the BART District, the Bay Area Air Quality Management District (BAAQMD), and ChargePoint (formerly Coulomb Technologies, Inc.).

3. Objectives

The objective of this project is to develop new approaches to generating exposure to advanced clean energy vehicles and to develop new vehicle ownership models. At the same time, the project will establish a system that can demonstrate improved transportation connectivity around the Hacienda Business Park, producing lessons learned for the development of systems in similar environments across the region, nation, and world. The objectives of this project are particularly responsive to several Air Resources Board (ARB) policies including: the ZEV mandate, which provides ZEV credits for vehicles deployed in shared-use settings and linked to public transit; AB 32 (California's Global Warming Solutions Act); and SB 375 (Sustainable Communities and Climate Protection Act of 2008). AB 32 directs ARB to identify and implement a scoping plan to reduce GHG emissions to 1990 levels by 2020 (California Air Resources Board, 2008). SB 375 was enacted to reduce GHG emissions by promoting more sustainable communities and land use practices. It also requires metropolitan planning organizations to anticipate and meet housing needs within the community (Association of Bay Area Governments, 2007). A sustainable transportation program, such as the one proposed here, enhances California's ability to reach the SB 375 and AB 32 goals by "connecting the dots." The ZEV regulation has been included in ARB's scoping plan as a measure to meet the AB 32 target. Carsharing programs, which incorporate ZEVs, have been recognized as "important for air quality and GHG emission reductions" and for their potential to help meet SB 375 mandates (California Air Resources Board, 2008a).

This project is critical for understanding the consumer response to EVs and for advancing new ownership models in suburban communities. This unique, real-world project can serve as a test bed for several new business models, such as fractional ownership, station cars, and business bikesharing. In a fractional ownership model, individuals co-own, sub-lease, or subscribe to a vehicle owned by a third party. Fractional owners often pay a flat fee for capital costs, plus additional fees for usage and maintenance (The Telegraph, 2012). It aims to provide access to a product or service at a lower cost than outright ownership. Unlike timeshares, fractional ownership can offer more control over the property (Orsi and Duskow, 2009). Fractional ownership has not been yet substantially tested, constituting a need for critical research. Station cars are a form of commuter-based carsharing. Compared to shuttle services, station cars have more flexible hours, can accommodate the schedule of the user even outside of peak periods, can serve employers of almost any size (by scaling the number of vehicles contracted), and are more personal to the consumer (Shaheen, 2004).

The implementation of the research discussed in the Technical Plan that follows will include 11 tasks that evaluate the four-phase deployment. The evaluation will deliver much needed practical understanding of a suburban carsharing service, which includes classic carsharing, station cars, fractional ownership, and bikesharing, as incorporated with electric vehicles. The carsharing system itself will be evaluated along the dimensions of: 1) consumer response to the shared-use services and EVs, 2) environmental impacts, 3) business model performance, and 4) lessons learned. Each component will contribute to a deeper understanding of the impacts of these new forms of mobility in a suburban setting. The Technical Plan will detail the course of this evaluation using data from stakeholder interviews, focus groups, a broad survey of Hacienda Business Park residents and employees, a longitudinal survey of users of the

carsharing and bikesharing services, activity and energy-use data from the vehicles and charging infrastructure, and finally transaction data for the analysis of business models. These and other resources will be applied to produce analyses of the behavioral shift, travel and emission impacts, economic performance of the system, and business model understanding as detailed in the Technical Plan.

4. Technical Plan

The evaluation of the iQEV shared-use vehicle system would be implemented through eight key initiatives: 1) institutional review board (IRB) approval, 2) literature review, 3) expert interviews, 4) focus groups, 5) study questionnaires (Hacienda Business Park survey and longitudinal user survey), 6) vehicle activity data analysis, 7) environmental impact analysis, and 8) business model analysis. These initiatives would inform several core aspects of the system performance and are described in the following sections. The subsections cover 11 tasks and provide information on data to be collected, expected sample sizes, and planned instruments to be used. All data collected as part of this project will be stored and managed in accordance with IRB established protocols.

4.1 Task One: Institutional Review Board Approval

At the start of the proposed evaluation, researchers would obtain institutional review board (IRB) approval for the project. This would entail developing expert interview survey/protocol materials, the Hacienda Business Park survey, before-and-after user surveys, and focus group protocols. Researchers would develop and submit a detailed description and timeline of the project study instruments including operational data.

Timeline: This step will be completed in advance of the project start date of July 1, 2013

Deliverable: Institutional Review Board approved study protocol

4.2 Task Two: Literature Review

As part of the literature review, researchers would update their existing literature review that documents understanding of EVs in shared-use programs including: user response, impacts, technology assessment, economics, and lessons learned. This step would continue throughout the evaluation period to inform the study of new understanding from the carsharing and EV market literature.

Timeline: July 1, 2013 to December 31, 2015

Deliverable: Literature review would be included as part of the final report

4.3 Task Three: Expert Interviews to Document Study Lessons Learned

Researchers would begin the evaluation by conducting 10 to 15 expert interviews with key project stakeholders (e.g., public transit operators, business park managers, neighborhood associations, governmental officials in Contra Costa and Alameda Counties, City CarShare, ChargePoint (formerly Coulomb Technologies, Inc.), BAAQMD, and Toyota managers/executives involved in the iQEV deployment). The interviews would aid researchers in documenting and understanding the logistical and

institutional challenges faced by the practitioners providing mobility services in the region and equipment to the project. The interviews would also document uncertainties and limitations faced by stakeholders within their respective sector of the project. At the conclusion of the study, exit interviews would be held with the same stakeholders to document changes in their perceptions and key lessons learned. Information obtained from the interviews would be used to synthesize the challenges and opportunities faced by EV carsharing and shared-use mobility (including business bikesharing) in a suburban and business park environment. This understanding could aid other regions and mobility service providers interested in deploying such a model(s) in the future.

Timeline: July 1, 2013 to December 1, 2013

Deliverable: Lessons learned synopsis would be included as part of the final report

4.4 Task Four: Focus Groups to Understand Consumer Response to EVs and Shared-Use Vehicle Services

Researchers would also implement four focus groups (8 to 12 per group) with the Hacienda Business Park employees and residents. Two focus groups (Summer 2013) would be implemented at the beginning of the program with people working and/or living at Hacienda Business Park who are either interested in using an EV carsharing/bikesharing system located at the park or already using it (please note that the iQEV carsharing program will have launched in “beta” form prior to the start of this evaluation—spring 2013—in a classic carsharing application, business and neighborhood carsharing, at Hacienda Business Park). One focus group would be conducted with existing users and a second with potential users. The initial focus groups would provide researchers an opportunity to learn from existing and potential system users. During the focus groups, researchers would probe participants on their existing travel patterns and what deficiencies they see in their current travel situation and environment. They would then explore what kind of features they would like to see in an EV carsharing system at Hacienda Business Park (and their reactions to the existing shared-use vehicle service and the iQEV). Participants would be asked about locations for preferred vehicle placement (both shared EVs and bikes); use of information technology (IT) to reserve/locate vehicles; use of social media to share feedback on the program; how participants might use the vehicles (e.g., trip types and length); vehicle recharging considerations; and what modes they think they would substitute with EV carsharing. In the case of existing users, these individuals would be asked about how they currently use the vehicles and how the service might be improved.

The remaining two focus groups would be conducted to coincide with the launch of the station car (vehicles used to link to public transit to get to and from work or home) and fractional ownership phases of the study. One station car focus group would be conducted in September 2013 to provide input to the project partners on the proposed station car service from the perspective of potential station car users at Hacienda Business Park. The station car service would be explored in two formats: 1) roundtrip (or two-way) services to and from the BART station and 2) one-way service between the BART station and Hacienda Business Park (this includes vehicle redistribution). Researchers would ask questions about the vehicles; recharging at BART; concerns about connectivity (e.g., would the vehicle be available at the BART station when needed); pricing; and carpooling with colleagues.

The final focus group (Fall 2014) would also be targeted at potential fractional ownership users (users that access vehicles on the home end with a partial lease agreement for use just on evenings and weekends) to understand their current transportation patterns, vehicle ownership, and EV attitudes. Input from these focus groups would be used to inform the fractional ownership program design. Researchers would also solicit proposed program feedback regarding the iQEV vehicles; vehicle recharging; concerns about connectivity (e.g., would the vehicle be at BART when needed); pricing; and use of vehicles by others in their household and neighborhood.

A \$50 incentive would compensate participants for their time in the four focus groups (\$2,000 incentive budget for this task). The qualitative data obtained from the focus groups would help to develop and refine service provision, EV use and recharging feedback, IT for reserving/locating vehicles, social media for program communication and feedback, and business model development for the broader population of carsharing and bikesharing users in the Dublin-Pleasanton region in both business and neighborhood settings.

Timeline: July 1, 2013 to December 31, 2014 (Groups would be conducted in the summer of 2013, fall of 2013, and fall of 2014)

Deliverable: A summary of the four focus groups would be included in the final report

4.5 Task Five: Hacienda Business Park Survey

Hacienda Business Park Survey: Researchers would partner with Hacienda Business Park to conduct a broad online survey (using QuestionPro.com) of the entire population of employees and residents to understand the distribution of travel patterns among the population. Researchers would aim to obtain a sample size of (N=3000) for the broader population survey. This survey would serve as a foundation for comparison with the longitudinal user survey and to new users and employers as the vehicles are deployed throughout the business park. (Please note that the target of 30 vehicles would be placed (and redistributed as needed) during the first 18 months of the project.) A raffle would be employed to encourage survey participation. This raffle would include fifty \$25 Amazon.com gift cards (\$1,250 incentive budget for this task).

Timeline: September 1, 2013 to November 1, 2013 (survey deployed)

Deliverable: A summary of the survey results would be included in the final report

4.6 Task Six: Longitudinal User Survey

The user survey would be longitudinal and deployed in several phases online (using QuestionPro.com), which coincide with key project phases (classic carsharing/business bikesharing at Hacienda Business Park, station cars, and fractional ownership). The surveys will develop a quantitative measurement of the behavioral changes resulting from the suburban shared-use vehicle services.

Intake Survey: The first user questionnaire will serve as an “intake” survey in which basic variables describing demographics, vehicle ownership, location of home/work, travel parameters with respect to commuting and non-work travel, including trip length, as well as attitudinal variables, are collected for existing and new users. This survey would also probe the primary reasons and motivations for joining the service. This intake (or “before” survey) would be collected for each participant prior to the start of program use, starting with the “beta” program in Spring 2013. The initial survey would be conducted throughout the study when new users join the service (Spring 2013 – June 2015 (this date marks the final six months of the project deployment covered by the proposed evaluation)).

First Survey: The first survey will evaluate how users respond to the initial carsharing service (neighborhood and business), as well as bikesharing services, at Hacienda Business Park. This survey will probe modal shift, auto ownership, and perception changes due to the service. It will collect data that describe how modal shift influences energy use and emissions as a result of shifts in travel patterns. The survey will also evaluate the participant response to the iQEV and the carsharing system. It will be conducted in Fall 2013 (October – November).

Second and Third Surveys (Deployed in Conjunction with BART Station Car Service): The second user survey would be administered when the system adds station cars at the Dublin/Pleasanton BART station to enable public transit connectivity. This survey would evaluate how the classic carsharing elements (home and business use at Hacienda Business Park) have impacted travel (in contrast to the intake survey), household vehicle ownership, and overall response to the iQEV vehicle and shared-use vehicle service. In addition, this survey would explore response to the station car system that deploys round trip services. This second survey would determine the degree to which users believe that they would use the station car service and how it might alter their current behavior. The third survey would examine the one-way station car service. The second survey would be conducted in Summer 2014 (July – August), and the third survey would follow in Winter 2015 (February – March).

Final Survey (Deployed in Conjunction with Fractional Ownership Service): The final user survey would be administered when the suburban shared-use vehicle service adds the element of fractional ownership to its operation. This survey would evaluate how the classic carsharing and BART station car elements (roundtrip and one-way services) have impacted travel (in contrast to previous surveys), household vehicle ownership, and overall response to the iQEV vehicle and shared-use vehicle services. In addition, this survey would explore response to the fractional ownership model and how it might alter user decisions about vehicle ownership and travel. The final survey would be conducted in Fall 2015 (September – October).

The sample size of the surveys would be contingent on system recruitment over the project phases. Researchers would work with system operators to maintain a high response rates for system users, including the use of incentives. The evaluation plan includes survey incentives of \$50/members for their longitudinal survey participation for up to 300 participants total throughout the study (\$18,250 incentive budget for this task). (Note this would reflect 10 users per carsharing vehicle.)

Timeline: September 2013 to June 2016 (longitudinal survey deployed and evaluated)

Deliverable: A summary of the longitudinal survey results would be included in the final report

Proposed Survey Schedule (Tasks Five and Six)

Shared-Use Vehicle Project Deployment Phase and Evaluation Task	Survey	Survey Timeline
Pre-Deployment (Task 5)	Hacienda Business Park Survey (N = 3,000)	September 2013 – November 2013
Pre-Deployment (Task 6)	Initial Intake Survey ($N \geq 300$)	Spring 2013 – June 2015
Phase 1: Classic carsharing and business bikesharing at Hacienda Business Park (Task 6)	First Survey	Fall 2013 (October – November)
Phase 2: BART <i>roundtrip</i> station cars (Task 6)	Second Survey	Summer 2014 (July – August)
Phase 3: BART <i>one-way</i> station cars (Task 6)	Third Survey	Winter 2015 (February – March)
Phase 4: Fractional ownership (Task 6)	Final Survey	Fall 2015 (September - October)

4.7 Task Seven: Vehicle Activity Data Analysis

The proposed study would evaluate the characteristics and distribution of travel patterns of the EV carsharing vehicles throughout the four project deployment phases. All vehicles would be equipped with telematics that provide information on parameters of vehicle trips such as:

- Vehicle ID,
- User ID (de-identified),
- Reservation ID,
- Engine start time,
- Engine shut off time,
- Miles driven per trip,
- Energy used per trip (kWh),
- State of battery charge (SOC) at the start of the trip (%), and

- State of battery charge (SOC) at the end of the trip (%).

City CarShare (the carsharing operator) would provide researchers with these data to enable the study team to understand how the vehicles are used. This information would permit researchers to track the distribution of vehicle use by time of day, distance, and energy used. The carsharing operator would also provide information related to all reservation activity including:

- Reservation ID;
- User ID (de-identified);
- Vehicle ID of vehicle reserved;
- Date-time stamp when reservation was made;
- Interface platform of reservation creation (categorical data: Internet, mobile, phone);
- Reservation start date-time stamp; and
- Reservation end date-time stamp.

This information, when combined with the trip-by-trip data, would provide a comprehensive set of information with which to develop a clear understanding of how vehicles are reserved by users, as well as when and how they are used. Results from data analysis would be used to inform the analysis of business models to support shared-use vehicle services in suburban neighborhoods and business park environments.

Timeline: Summer 2013 (including beta test data) to June 2016

Deliverable: Vehicle activity data analysis would be included in the final report

4.8 Task Eight: Environmental Impact Analysis

The vehicle activity data, described above, also provides the foundation for conducting an emission analysis the EV carsharing service. Most of the basic data necessary to evaluate emissions is provided with the trip activity data, but additional information drawn from the charging infrastructure is also needed. To support this analysis, City CarShare would provide the following data on charging activity for all vehicles:

- Reservation ID;
- User ID (de-identified);
- Vehicle ID of vehicle reserved;
- Date-time stamp when reservation was made;
- Interface platform of reservation creation (categorical data: Internet, mobile, phone);
- Reservation start date-time stamp; and
- Reservation end date-time stamp.

These data would provide a comprehensive collection of information on charging activity of the vehicles. This, along with the corresponding vehicle data, would allow researchers to understand when and how the vehicles are charged, and the energy provided to the vehicle by the charging infrastructure. Researchers

would be able to evaluate the grid-side impacts of the EV charging of vehicles and help to determine whether there exist any periods of low vehicle availability as a result of charging. The emission analysis would be developed using marginal grid emission factors—considering emissions from the additional electricity produced as a result of vehicle charging—to generate a more accurate assessment of the emission implications of EV carsharing in the suburban business park environment.

Researchers would also evaluate the reduction in emissions from trips being shifted to bikesharing as part of the shared-use vehicle service at Hacienda Business Park.

Timeline: Summer 2013 (including beta test data) to June 2016

Deliverable: Environmental impact analysis would be included in the final report

4.9 Task Nine: Business Model Analysis

As part of the proposed study, researchers would prepare a business model analysis of the iQEV shared-use vehicle service. To accomplish this, researchers would conduct the following activities, described below.

Determining Willingness to Pay: Results from the iQEV shared-use vehicle program would be used to determine the willingness to pay (e.g., on a monthly and pay-as-you-go basis) for the shared-use vehicle service including: 1) business carsharing, 2) neighborhood carsharing, 3) station car use, and 4) fractional ownership. (Please note that the business bikesharing component of this study would be provided at no cost to users as part of the shared-use vehicle program, but the research team would report on costs and use as part of the study to provide a complete picture of the shared-use vehicle service.) The average willingness-to-pay estimates would be used to calculate whether or not a subsidy would be needed to support the program. If it is found that a subsidy would be necessary, researchers would estimate what the increase in the usage rate and/or advertising/sponsorship support would be needed to make the program “break even” without the need for governmental subsidies.

Estimating System Operating Costs: The annual operating costs of the carsharing service would be calculated, including recharging, and by service component (classic carsharing, station car, and fractional ownership). Three types of costs would be considered: 1) operational costs (e.g., telematics, EV infrastructure, fleet management services); 2) electricity costs; and 3) vehicle costs (e.g., vehicle leasing, maintenance, insurance).

Computing Economic Feasibility: Revenues would be estimated based on the iQEV shared-use vehicle program to determine economic viability.

Timeline: January 2015 to June 2016

Deliverable: Business model analysis would be included in the final report

4.10 Task Ten: Draft Final Report

The draft final report would be submitted to ARB at the end of 2015. ARB would then have six months to review, provide feedback, and allow the research team to respond to comments.

Timeline: January 2015 to December 2015

Deliverable: Draft final report

4.11 Task Eleven: Final Report

The draft final report would be submitted to ARB at the end of 2015. ARB would then have six months to review, provide feedback, and allow the research team to respond to comments. Writing of the final report would begin well before the end of all tasks, and the final report would be submitted at the end of the project term on June 30, 2016. Researchers would also write several journal articles and present results at major conferences as part of the proposed project.

Timeline: January 2016 to June 2016

Deliverable: Final report

4.12 Institutional Review Board Specifications Overview

The proposed research will involve human subjects and thereby require review and approval by UC Berkeley's Institutional Review Board (Office for the Protection of Human Subjects). Subjects will participate in qualitative and quantitative evaluation research methods as follows:

Expert Interviews

Researchers will conduct expert interviews with key project stakeholders (e.g., transit operators, business park managers, neighborhood associations, governmental officials in Contra Costa and Alameda Counties, City CarShare, ChargePoint (formerly Coulomb Technologies, Inc.), BAAQMD, and Toyota managers/executives). Researchers will aim to complete interviews with 10-15 experts. There will be no compensation for participation.

Focus Groups

Four focus groups will be conducted prior to survey implementation. Potential subjects will be recruited from among Hacienda Business Park employees and residents. Subjects will be informed of the time and location of the focus group session shortly after giving consent to participate. Before the date of the focus group, participants will be emailed a reminder.

Sample size

Each focus group session will include 8 to 12 subjects. They will first meet with research staff and have the opportunity to ask any questions about the consent or the study.

Compensation

Focus group participants will receive a \$50 gift card as compensation for their time in the focus groups.

Procedure

The facilitator (a member of the research team) will guide the subjects through a series of discussion questions exploring experiences, perspectives and interest in carsharing, bikesharing within the Hacienda community and as an alternative mode of transit to and from the business park. In addition, questions will

probe users' changes in travel behavior, auto use/ownership, modal shifts, and perceived mobility due to the availability of a carsharing and bikesharing.

Recruitment

Hacienda Business Park will be contacting residents and employees with a promotional email, directing interested participants to contact us directly. We will not be soliciting the program to the public or the Hacienda population in any other manner until we are contacted by Hacienda employees or residents who are interested in being a part of the study.

Community Wide Survey

For the initial survey researchers will conduct a (one-time) broad online survey of the entire population of residents and employees to understand the travel patterns among the population.

Sample size

The target sample size for this survey is 3000, proportionate to the population of employees and residents. Data obtained from this survey will serve as a foundation for comparison with subsequent user surveys.

Compensation

A raffle would be employed to encourage survey participation. This raffle would include fifty \$25 Amazon.com gift cards.

Recruitment

Hacienda Business Park will be contacting residents and employees with a promotional email, directing interested participants to contact us directly. We will not be soliciting the program to the public or the Hacienda population in any other manner until we are contacted by Hacienda employees or residents who are interested in being a part of the study.

Longitudinal User Survey

Over the course of the project, a series of 4 surveys will be conducted with 'users' of the carsharing and bikesharing program. The user survey will be longitudinal and deployed in several phases using online (QuestionPro.com) survey procedures.

Sample size

The sample size of the surveys will be contingent on system recruitment over the project phases. Researchers will work with system operators to maintain a high response rates for system users, including the use of incentives. Researchers hope to maintain a cohort of 300 participants total throughout the longitudinal phase of the study.

Compensation

A one-time \$50 gift card will be offered as incentive to study participants for this phase of the project.

References

Association of Bay Area Governments, (2007). Regional Housing Need Allocation to be Released Fall 2012 Background. <http://www.abag.ca.gov/planning/housingneeds/>

Barth, M., M. Todd, and H. Murakami, (2000). Intelligent Transportation System Technology in a Shared Electric Vehicle Program. In Transportation Research Record: Journal of the Transportation Research Board, No. 1731, Transportation Research Board of the National Academies, Washington, D.C., pp. 88-95.

Barth, M., (2001). Shared-Use Station Car Programs Speech. Shared-Use, Station Car Summit, University of California, Irvine. http://www.zevnet.org/car_summit/UCD%20-%20Barth.pdf.

Barth, M. and S. Shaheen, (2002). Shared-Use Vehicle Systems: A Framework for Classifying Carsharing, Station Cars, and Combined Approaches. In Transportation Research Record: Journal of the Transportation Research Board, No. 1791 Transportation Research Board of the National Academies, Washington, D.C., pp.105-112.

Barth, M., (2006). Shared Use Vehicle System UCOP Presentation: UCR IntelliShare Technology Overview and Transition Methodology.
<http://maillists.uci.edu/mailman/public/ucpark/attachments/20060824/311f4a3c/UCR-IntelliShare-0001.obj>.

Barth, M., S. Shaheen, T. Fukuda, and A. Fukuda, (2007). Carsharing and Station Cars in Asia: An Overview of Japan and Singapore. In Transportation Research Record: Journal of the Transportation Research Board, No. 1986, Transportation Research Board of the National Academies, Washington, D.C., pp. 106-115.

California Air Resources Board, (2008). Assembly Bill 32: Global Warming Solutions Act.
<http://www.arb.ca.gov/cc/ab32/ab32.htm>

California Air Resources Board, (2008a). Sustainable Communities.
<http://www.arb.ca.gov/cc/sb375/sb375.htm>

California Environmental Protection Agency Air Resources Board, (2012). Advanced Clean Cars: 2012 Proposed Amendments to the California Zero Emission Vehicle Program Regulations.

car2go N.A., LLC., (2011). Everywhere You Want to Be: The car2go Network.
<http://www.car2go.com/sandiego/en/concept/fleet/>.

car2go N.A., LLC., (2012). car2go Is Good for the Environment. <https://www.car2go.com/en/portland/>.

car2go Nederland B.V., (2011). Enjoyment of a Smart Fortwo Electric Drive.
<http://www.car2go.com/amsterdam/en/how-it-works/electric-smart-fortwo/>.

City CarShare, (2012). Cars and Locations. <https://www.citycarshare.org/why-city-car-share/programs/greener-rid/electric-rides>.

Cohen, A., S. Shaheen, D. Brook, and E. Martin, (2008). Light Electric Vehicles (LEV) Project: Consulting Final Report. Industrial Technology Research Institute.

DriveNow, (2012). FAQ. https://www.drive-now.com/usa/faq/?language=en_US&L=2&redirect_flag=1.

Fukuda, T., S. Kashima, and M. Barth, (2003). Evaluating Second Car System, an Electric Vehicle Sharing Experiment in Tama New Town District, Inagi City, Tokyo. TRB 2003 Annual Meeting.

Hacienda Business Park Owners Association, (2012). Overview Introduction.
http://www.hacienda.org/introduction/introduction_overview.html

Hacienda Business Park Owners Association, (2012a). Property Profiles.
<http://www.hacienda.org/profiles/home.html>

I-GO Car Sharing, (2011). I-GO Launches Solar-Powered Electric Vehicle Project.
<http://www.igocars.org/2011/11/30/solar-canopies>.

Martin, E. and S. Shaheen, (2010), “Greenhouse Gas Emissions Impacts From Carsharing in North America.” Final report. Mineta Transportation Institute of San Jose State University.

McDonald, M. and T. Vöge, (2001). Analysis of Potentials and Limitations of Cybernetic Transport Systems - Combined Deliverable for D1.1 - System Operating Scenarios and D1.3 - Barriers to Deployment, Technical report, Cybermove. Cybernetic Transportation Systems for the Cities of Tomorrow.

Massot, M., J. Blosseville, and M. Praxitele, (2001). A Transportation Concept, *Transportation Quarterly* 55, pp. 17 - 25

Orsi, J. and E. Doskow, (2009). *The Sharing Solution: How to Save Money, Simplify Your Life & Build Community*. Nolo. pp. 168-. ISBN 978-1-4133-1021-4.
http://books.google.com/books?id=6utl5IWTv6QC&pg=PA168&redir_esc=y#v=onepage&q&f=false

Shaheen, S., D. Sperling, and C. Wagner, (1998). Carsharing in Europe and North America: Past Present and Future. *Transportation Quarterly*, Vol. 52, No. 3, pp. 35-52.

Shaheen, S., (1999). Dynamics in Behavioral Adaptation to a Transportation Innovation: A Case Study of CarLink—A Smart Carsharing System. Publication UCD-ITS-RR-99-16. Institute of Transportation Studies, University of California, Davis, pp. 232.

Shaheen, S., D. Sperling, and C. Wagner, (1999). A Short History of Carsharing in the 90's. *Journal of World Transport Policy and Practice* 5 (3), pp. 18-40.

Shaheen, S., (2000). Carlink, A Smart Carsharing System: A Study Of Behavioral Adaptation. Presented at the 79th annual meeting of the Transportation Research Board, Washington, D.C.

Shaheen, S., J. Wright, D. Dick, and L. Novick, (2000). CarLink—A Smart Carsharing System Field Test Report. Publication UCD-ITS-RR-00-4. Institute of Transportation Studies, University of California, Davis, pp. 182.

Shaheen, S., (2004). Carlink II: A Commuter Carsharing Pilot Program Final Report. Paper UCD-ITS-RR-04-30. Institute of Transportation Studies, Davis, California.

Shaheen, S, A. Schwartz, and K. Wipiewski, (2004). Policy Considerations for Carsharing and Station Cars: Monitoring Growth, Trends, and Overall Impacts. In Transportation Research Record: Journal of the Transportation Research Board, No. 1887, Transportation Research Board of the National Academies, Washington, D.C., pp. 128-136.

Shaheen, S., and C. Rodier, (2005). Travel Effects of a Suburban Commuter-Carsharing Service: Carlink Case Study. In Transportation Research Record, Journal of the Transportation Research Board, No. 1927, Transportation Research Board of the National Academies, Washington, D.C., pp. 182–188.

Shaheen, S. and L. Novick, (2005). Framework for Testing Innovative Transportation Solutions: Case Study of CarLink, A Commuter Carsharing Program. Transportation Research Record, No. 1927, pp. 149-157.

Shaheen, S., C. Rodier, G. Murray, A. Cohen, and E. Martin, (2010). Carsharing and Public Parking Policies: Assessing Benefits, Costs, and Best Practices in North America. Mineta Transportation Institute.

Shaheen, S. and A. Cohen, (2012) Carsharing and Personal Vehicle Services: Worldwide Market Developments and Emerging Trends. International Journal of Sustainable Transportation.

South Coast Air Quality Management District, (2010). AQMD to Honor Clean Air Heroes at 22nd Annual Clean Air Awards.

Takayama, M., (2002). Transportation and Safety in Japan: Introduction of the ITS/EV City Car System. Journal of the IATSS Research, Vol.26 No.2, pp. 118-121.

Toyota Motor Sales, (2012). Scion iQ EV Arrives for Campus and Urban Car-Sharing Programs. <http://pressroom.toyota.com/releases/scion+iq+electric+vehicle+denver+oct17.htm>

Urban Community of La Rochelle, (ND). En électrique. http://www.agglo-larochelle.fr/services/depl_electrique.php Accessed July 26, 2012.

ZEV-NET, (2010). FAQ. <http://zevnet.fastfleet.net/how/faqs/#vehicles>.

Zipcar, Inc., (2012). Zipcar San Francisco Fleet Now Includes New Honda Fit EV. <http://ir.zipcar.com/releasedetail.cfm?releaseid=706763>.

iQEV Project Timeline													
Task #	Task Name	FY 2013-2014				FY 2014-2015				FY 2015-2016			
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
		Jul-Sep	Oct-Dec	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec	Jan-Mar	Apr-Jun	Jul-Sep	Oct-Dec	Jan-Mar	Apr-Jun
1	IRB Approval and Draft Protocol Development	(pre project)											
2	Literature Review												
3	Expert Interviews												
4	Focus Groups (four in total)												
5	Hacienda Business Park Survey												
6	Longitudinal Survey (Participants surveyed each phase)												
7	Data Analysis: Vehicle Data												
8	Environmental Impact Analysis												
9	Business Model Analysis												
10	Draft Final Report												
11	ARB Review and Final Report												
n/a	Project meetings with ARB												
n/a	Team project meetings and site visits	Project team meetings will be quarterly (minimum). Site visits will be as needed											
n/a	Present project findings	Date(s) not yet determined											

iQEV Project Estimated Cost per Task												
Task #	Task Name	Labor percent time	Labor	Benefits	Equip	Travel	Copy/Print	Computer	Supplies & Room Rental	Incentives	Overhead	Total
1	IRB Approval and Draft Protocol Development	0%	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$0
2	Literature Review	8%	\$30,623	\$10,948	\$0	\$0	\$0	\$400	\$0	\$0	\$3,962	\$45,933
3	Expert Interviews	10%	\$38,279	\$13,685	\$0	\$0	\$0	\$400	\$0	\$0	\$4,952	\$57,316
4	Focus Groups (four in total)	10%	\$38,279	\$13,685	\$0	\$800	\$0	\$400	\$1,087	\$2,000	\$4,952	\$61,203
5	Hacienda Business Park Survey	8%	\$30,623	\$10,948	\$0	\$0	\$0	\$400	\$0	\$1,250	\$3,962	\$47,183
6	Longitudinal Survey (Participants surveyed each phase)	10%	\$38,279	\$13,685	\$0	\$0	\$0	\$1,000	\$0	\$15,000	\$4,952	\$72,916
7	Data Analysis: Vehicle Data	10%	\$38,279	\$13,685	\$0	\$0	\$0	\$1,000	\$0	\$0	\$4,952	\$57,916
8	Environmental Impact Analysis	10%	\$38,279	\$13,685	\$0	\$0	\$0	\$1,000	\$0	\$0	\$4,952	\$57,916
9	Business Model Analysis	10%	\$38,279	\$13,685	\$0	\$0	\$0	\$500	\$0	\$0	\$4,952	\$57,416
10	Draft Final Report	10%	\$38,279	\$13,685	\$0	\$0	\$0	\$500	\$0	\$0	\$4,952	\$57,416
11	ARB Review and Final Report	5%	\$19,140	\$6,843	\$0	\$0	\$0	\$400	\$0	\$0	\$2,476	\$28,858
n/a	Project meetings with ARB	2%	\$7,656	\$2,737	\$0	\$700	\$0	\$0	\$0	\$0	\$990	\$12,083
n/a	Team project meetings and site visits	5%	\$19,140	\$6,843	\$0	\$2,000	\$0	\$0	\$0	\$0	\$2,476	\$30,458
n/a	Present project findings	2%	\$7,656	\$2,737	\$0	\$2,000	\$0	\$0	\$0	\$0	\$990	\$13,383
	Total	100%	\$382,792	\$136,850	\$0	\$5,500	\$0	\$6,000	\$1,087	\$18,250	\$49,521	\$600,000

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SELECTED BOOKS, PAPERS, AND REPORTS

Shaheen, Susan (2013). "Introduction to Shared-Use Vehicle Services for Sustainable Transportation: Carsharing, Bikesharing, and Personal Vehicle Sharing Across the Globe." *International Journal of Sustainable Transportation*, 7:1,1-4.

Shaheen, Susan and Adam Cohen (2013). "Carsharing and Personal Vehicle Services: Worldwide Market Developments and Emerging Trends." *International Journal of Sustainable Transportation*, 7:1, 5-34.

Shaheen, Susan, Stacey Guzman, and Hua Zhang (2012). "Chapter 9: Bikesharing Across the Globe." In *City Cycling*. John Pucher and Ralph Buehler, eds. Boston: MIT Press.

Chan, Nelson D. and Susan A. Shaheen (2012). "Ridesharing in North America: Past, Present, and Future." *Transport Reviews*, 32(1), pp. 93-112.

Martin, Elliot and Susan Shaheen (2011). "Greenhouse Gas Emission Impacts of Carsharing in North America." *IEEE Transactions on Intelligent Transportation Systems*, Volume 12, Issue 4: 1074-1086.

Martin, Elliot and Susan Shaheen (2011). "The Impact of Carsharing on Public Transit and Non-Motorized Travel: An Exploration of North American Carsharing Survey Data," *Energies* 2011, 4, 2094-2114; doi:10.3390/en4112094.

Shaheen, Susan, Madonna Camel, and Meera Velu (2011). *California Department of Transportation, District 4 Employee Bikesharing Pilot Program Evaluation*. Transportation Sustainability Research Center (TSRC). Berkeley, California. February, pp. 44.

Shaheen, Susan, Adam Cohen, and Elliot Martin (2010). "Carsharing Parking Policy: A Review of North American Practices and San Francisco, California Bay Area Case Study," 2010 *Transportation Research Record*, No. 2187, pp. 146 to 156.

Martin, Elliot, Susan Shaheen, and Jeffrey Lidicker (2010). "Impact of Carsharing on Household Vehicle Holdings: Results from North American Shared-Use Vehicle Survey," 2010 *Transportation Research Record*, No. 2143, pp. 150-158.

Lidicker, Jeffrey, Timothy Lipman, and Susan Shaheen (2010). "Economic Assessment of Electric-Drive Vehicle Operation in California and the United States," 2010 *Transportation Research Record*, No. 2191, pp. 50-58.

Shaheen, Susan, Adam Cohen, and Melissa Chung (2009). "North American Carsharing: A Ten-Year Retrospective," *Transportation Research Record*, No. 2110, pp. 35-44.

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Associate	

Academic Publications

McDonald, B., Dallmann, T., Martin, E., Harley, R. (2012) “Long-Term Trends in Nitrogen Oxide Emissions from Motor Vehicles at National, State, and Air Basin Scales.” *Journal of Geophysical Research*. Vol. 117.

Martin, E., Chan, N. Shaheen, S. (2012) ‘Understanding How Ecodriving Public Education Can Result in Reduced Fuel Use and Greenhouse Gas Emissions’ *Accepted for Publication in the Transportation Research Record*.

Wang, M., Martin, E., Shaheen, S. (2012) ‘Carsharing in Shanghai, China: Analysis of Behavioral Response to a Local Survey and Potential Competition’ *Accepted for Publication in the Transportation Research Record*.

Martin, E., Shaheen, S. (2011) 'Greenhouse Gas Emission Impacts of Carsharing in North America', *IEEE Transactions on Intelligent Transportation Systems*. 12(4) December 2011.

Martin, E., Shaheen, S. (2011) "The Impact of Carsharing on Public Transit and Non-Motorized Travel: An Exploration of Carsharing Survey Data" *Energies*, 4(11), November 2011.

Shaheen, S.; Zhang, H., Martin, E., & Guzman, S. (2011) 'Hangzhou Public Bicycle: Understanding early adoption and behavioral response to bikesharing in Hangzhou, China.' *Transportation Research Record: Journal of the Transportation Research Board*, No. 2247. Washington, D.C., 2011 pp. 33-41.

Williams, B., Martin, E., Lipman, T. & Kammen, D. (2011) 'Plug-in-hybrid vehicle use, energy consumption, and greenhouse emissions: an analysis of California Clean Mobility Partnership household vehicle placements in northern California' *Energies* 4(3), 435-457.

Martin, E., Shaheen, S., Lidicker, J. (2010) 'The Impact of Carsharing on Household Vehicle Holdings: Results from a North American Shared-use Vehicle Survey', *Transportation Research Record: Journal of the Transportation Research Board*, No. 2143. Washington, D.C., 2010 pp. 150-158.

Shaheen, S.; Cohen, A. & Martin, E. (2010), 'Carsharing Parking Policy: A Review of North American Practices and San Francisco Bay Area Case Study', *Transportation Research Record: Journal of the Transportation Research Board*, No. 2187. Washington, D.C., 2010 pp. 146-156.

Shaheen, S. & Martin, E. (2010), 'Demand for Carsharing Systems in Beijing, China: An Exploratory Study', *International Journal for Sustainable Transportation*, V.4, pp. 41-55

Martin, E., Shaheen, S.; Lipman, T. & Lidicker, J. (2009), 'Behavioral Response to Hydrogen Fuel Cell Vehicles and Refueling: A Comparative Analysis of Short- and Long-Term Exposure', *International Journal of Hydrogen Energy* V.34, pp. 8670-8680

Chester, M. & Martin, E. (2009), 'Cellulosic Ethanol from Municipal Solid Waste: A Case Study of the Economic, Energy, and Greenhouse Gas Impacts in California', *Environmental Science & Technology*, V.43 (14), pp 5183–5189.

Chester, M., Martin, E. & Sathaye, N. (2008), 'Energy, Greenhouse Gas, and Cost Reductions for Municipal Recycling Systems', *Environmental Science and Technology* V.42, 2142-2149.

Shaheen, S., Martin, E. & Lipman, T. (2008), 'Dynamics in Behavioral Response to Fuel Cell Vehicle Fleet and Hydrogen Fueling Infrastructure: Exploratory Study', *Transportation Research Record: Journal of the Transportation Research Board*, No 2058. Washington D.C., pp 155-162.

Rachel S. Finson

Transportation Sustainability Research Center, University of California, Berkeley;
1301 S. 46th Street; Richmond Field Station, Building 190; Richmond, CA 94804-4648
510-725.7609 (C) and 510-665-2183 (F)
rfinson@tsrc.berkeley.edu

QUALIFICATIONS

- ➔ Experienced managing public-private partnerships, including government agencies, start-up companies, established businesses, and university researchers.
- ➔ Excellent interpersonal skills with a strong ability to synthesize diverse perspectives and facilitate collaborative outcomes.
- ➔ Enjoy the creative challenge of strategic planning and developing new projects and programs.

SKILLS AND EXPERIENCE

Program & Strategic Development:

- Initiated a grant-making strategy to promote advanced (clean) technology vehicles with a focus on supporting zero emission vehicle regulations in California and the Northeast.
- Collaborative dialogue with a network of advocates, grant-makers, government representatives, the academic community, and the private sector.
- Skilled at convening and moderating meetings, consulting with experts among the advocacy community and with government and business representatives and creating consensus based on diverse goals.
- Develop new research concepts, proposals, and partnerships.

Project Management:

Expert in all phases of grants management, including soliciting and reviewing proposals, budgeting, collaborating with foundations, developing grant recommendations, and evaluating the success of past grants.

Evaluate and implement field demonstrations and research projects involving new technologies and social, safety, and environmental goals.

Experienced with competitive bidding, awarding contracts, developing and maintaining work plans, timelines and achieving goals.

Manage multi-year public-private partnerships between the California Department of Transportation, entrepreneurial start-up companies and established businesses to implement projects demonstrating advanced information technology for transportation systems.

Skilled at creating a team atmosphere to bring a variety of interests and backgrounds together to accomplish the broader goals of the partnership.

Research:

Familiar with all aspects of human subjects research, including legal requirements pertaining to protection of identity and rights of research participants.

Implemented field demonstrations with plug-in hybrid electric and fuel cell vehicles in conjunction with major automobile manufacturers.

Completed studies evaluating the carbon dioxide emissions from the cities of San Francisco and San Jose.

Design, moderate, and implement focus groups.

EMPLOYMENT HISTORY

2006-current	Sr. Project Manager	Transportation Sustainability Research Center University of California, Berkeley
2002-2005	Research Associate	Partners for Advanced Transit & Highways University of California, Berkeley
1998-2001	Consultant	Rocky Mountain Institute Social and Environment Research Institute W. Alton Jones Foundation The Energy Foundation
1993-1998	Program Officer	The Energy Foundation
1993	CO ₂ Study Coordinator	Environmental Services Dept., City of San Jose, CA
1992	Energy Intern	Natural Resources Defense Council
1990-1991	Research Assistant	Center for Technology, Environment, and Development, Clark University

EDUCATION

Master of Arts:

Clark University, Massachusetts

Hazards Management & Risk Assessment. 1991.

Environment, Technology, and Society Program. Awarded full scholarship.

Thesis: *Cities and Climate Change: A San Francisco Case Study.*

Bachelor of Arts:

California Polytechnic State University, San Luis Obispo.

Political Science. Cum Laude.

Concentration: International Relations.

Madonna L. Camel

Transportation Sustainability Research Center, University of California, Berkeley;
1301 S. 46th Street; Richmond Field Station, Building 190; Richmond, CA 94804-4648
510-665-3467
madonna@tsrc.berkeley.edu

Professional Experience

Assistant Director/Project Manager 4/2012- present
Survey Researcher/Project Manager 3/2009-3/2012
Transportation Sustainability Research Center
University of California, Berkeley

Manager of Data Collection 10/1987-2/2009
Survey Research Center
University of California, Berkeley

Overview of Responsibilities

Assistant Director

- Assist TSRC Directors on day-to-day research activities and business development
- Recruit and train all junior level staff including graduate student researchers and undergraduate interns
- Assist TSRC Directors with branding and marketing of TSRC research- including website development, brochures, special events and management of the TSRC Advisory Board
- Project Management

Project Management

- Design and supervision of data collection, data preparation, and quality control
- Implementation of rigorous survey research methodological standards and practices
- Monitor and analyze study progress and budgets
- Management of instrument design and development
- Budget preparation
- Hiring and recruitment of staff
- Development of staff training procedures and materials
- Monitor status of project schedule, costs, and production

Methodological Expertise

- Focus Group Facilitation and Moderation
- Cognitive Interviewing
- Survey and Questionnaire Design
- Interviewer training
- Scenario Planning (GBN Methodology)

Selected Projects

- Project Manager: Public Perception of a Feebate Policy in California- 2009 Statewide Telephone Survey and Focus Groups

- Project Manager: Feasibility Study of Electric Vehicle Carsharing in the Rossmoor Community of Walnut Creek California- Personal interviews and focus groups (2009-2012)
- Project Manager: California Department of Transportation, District 4 Employee Bikesharing Pilot Program Evaluation (2010)
- Consultant/Panel Participant: Ridesharing as a Complement to Transit- TCRP Synthesis J-07/Topic SB-19 – Transportation Research Board National Research Council, Washington, D.C. (2010)
- Project Manager: Integrated Active Transportation System Operational Vision and Implementation Research Plan (2010-2012)

Professional Affiliations

- Voting Member of University of California at Berkeley Institutional Review Board (IRB)- Committee for the Protection of Human Subjects, 2004-present- Currently serving on CPHS I (Biomedical research)
- Pacific Chapter of the American Association for Public Opinion Research affiliate, 2001-present.
- American Association for Public Opinion Research affiliate, 1999-present.

Coordinator, International Field Directors and Technologies Conference -2006, Montreal, Quebec Canada

Coordinator, International Field Directors and Technologies Conference -2007, Santa Monica, California

Technical Reports, Papers, Selected Presentations and other relevant activities

Public Perception of Feebate Policy in California: 2009 Statewide Telephone Survey and Focus Group Results (August, 2010)

- Final Report California Department of Transportation, District 4 Employee Bikesharing Pilot Program Evaluation (February, 2011)
- Rossmoor Carsharing Study Final Report (July, 2011)
- ITS World Congress Presentation Paper: Integrated Active Transportation Systems- A Roadmap for Developing Intelligent Transportation Systems in the 21st Century (August, 2011)
- Electric Vehicle Carsharing in a Senior Adult Community in the San Francisco Bay Area (August, 2012)
- Camel, Madonna, et.al. Exploring the Future of Integrated Transportation Systems in the United States from 2030 to 2050: Application of a Scenario Planning Tool (August, 2012)

TOYOTA

Toyota Motor Sales, U.S.A. Inc.
19001 South Western Avenue
Torrance, CA 90501
310-468-4000
310-468-7800

January 17, 2013

Annalisa Schilla, Ph.D.
California Air Resources Board
Research Division
1001 I Street
Sacramento, CA 95812

Dear Dr. Schilla,

I am writing in support of Dr. Susan Shaheen of the Transportation Sustainability Research Center (TSRC) at the University of California, Berkeley (UC Berkeley) draft research proposal: "Understanding Consumer Response and Business Model Potential for An Innovative Electric Vehicle (EV)-Based Suburban Carsharing and Bikesharing Service in the Dublin-Pleasanton Region."

This proposed project is a rare, multifaceted "win-win" that connects the dots between many policy and regulatory initiatives and progressive efforts to link zero emission vehicles with reducing vehicle miles traveled; encouraging shared-use vehicle growth; and improving public transit access, particularly in suburban locations.

The proposal involves several key partners: Toyota Motor Corporation; City CarShare; and TSRC, UC Berkeley. It will evaluate an innovative approach to increasing consumer awareness and demand for zero emission vehicles in a shared-use vehicle setting in a San Francisco Bay Area suburban location. As part of this project, the project team will deploy 30 Scion iQEV vehicles in the Dublin-Pleasanton region and provide links to public transit (Bay Area Rapid Transit (BART) District), neighborhoods, and key employment centers (including Hacienda Business Park). This project will also include bikesharing to provide critical linkages among the carsharing access points and key locations. Toyota is providing significant in-kind contributions to the project, including vehicles, insurance, and technology support. City CarShare will manage and operate the shared-use vehicle program, and TSRC will serve as the project evaluator for the three-year effort.

This real-world project provides a unique opportunity to test several new business models (fractional ownership, station cars, and employer- and neighborhood-based carsharing/bikesharing in the suburbs). For the concept of carsharing to scale in areas that are less dense, such projects are critical for understanding and advancing new ownership models, as well as consumer response to EVs. This project is particularly responsive to several ARB policies including: the Zero Emission Vehicle (ZEV) mandate, which provides ZEV credits for vehicles deployed in shared-use settings and linked to public transit; AB 32 (California's Global Warming Solutions Act); and SB 375 (Sustainable Communities and Climate Protection Act of 2008).

We strongly encourage you to advance this to a funded research project.

Sincerely,



Bill Reinert
National Manager



SAN FRANCISCO BAY AREA RAPID TRANSIT DISTRICT

300 Lakeside Drive, P.O. Box 12688
Oakland, CA 94604-2688
(510) 464-6000

January 29, 2013

2013

Annalisa Schilla, Ph.D.
California Air Resources Board, Research Division
1001 I Street
Sacramento, CA 95812

Tom Radulovich
PRESIDENT

Joel Keller
VICE PRESIDENT

Grace Crunican
GENERAL MANAGER

Dear Dr. Schilla:

I am writing in support of Dr. Susan Shaheen of the Transportation Sustainability Research Center (TSRC) at the University of California, Berkeley (UC Berkeley) draft research proposal: "Understanding Consumer Response and Business Model Potential for An Innovative Electric Vehicle (EV)-Based Suburban Carsharing and Bikesharing Service in the Dublin-Pleasanton Region."

DIRECTORS

Gail Murray
1ST DISTRICT

Joel Keller
2ND DISTRICT

Rebecca Saltzman
3RD DISTRICT

Robert Raburn
4TH DISTRICT

John McPartland
5TH DISTRICT

Thomas M. Blalock, P.E.
6TH DISTRICT

Zakhary Mallett
7TH DISTRICT

James Fang
8TH DISTRICT

Tom Radulovich
9TH DISTRICT

This proposed project represents an opportunity to connect the dots between many policy and regulatory initiatives and progressive efforts to link zero emission vehicles with reducing vehicle miles traveled; encouraging shared-use vehicle growth; and improving public transit access, particularly in suburban locations.

The proposal involves several key partners: Toyota Motor Company; City CarShare; and TSRC, UC Berkeley. It will evaluate an innovative approach to increasing consumer awareness and demand for zero emission vehicles in a shared-use vehicle setting in a San Francisco Bay Area suburban location. As part of this project, the project team will deploy 30 Scion iQEV vehicles in the Dublin-Pleasanton region and provide links to public transit (Bay Area Rapid Transit (BART) District), neighborhoods, and key employment centers (including Hacienda Business Park). This project will also include bikesharing to provide critical linkages among the carsharing access points and key locations. Toyota will provide significant in-kind contributions to the project, including vehicles, insurance, and technology support. City CarShare will manage and operate the shared-use vehicle program (EVs), and TSRC will serve as the project evaluator for the three-year effort. 'ChargePoint' (formerly known as Coulomb Technologies) will provide in-kind support and EV infrastructure.

This real-world project also provides an opportunity to test several new business models (fractional ownership, station cars, and employer- and neighborhood-based carsharing/bikesharing in the suburbs). For the concept of carsharing to scale in areas that are less dense, such projects are critical for understanding and advancing new ownership models, as well as consumer response to EVs. This project is particularly responsive to several ARB policies including: the Zero Emission Vehicle (ZEV) mandate, which provides ZEV credits for vehicles deployed in shared-use settings and linked to public transit; AB 32 (California's Global Warming Solutions Act); and SB 375 (Sustainable Communities and Climate Protection Act of 2008).

I strongly encourage you to advance this to a funded research project.

Sincerely,

Carter Mau
Executive Manager, Office of Planning and Budget
San Francisco Bay Area Rapid Transit District (BART)





A Bay Area Nonprofit

Annalisa Schilla, Ph.D.
California Air Resources Board
Research Division
1001 I Street
Sacramento, CA 95812

January 17, 2013

Dear Dr. Schilla,

I am writing in support of Dr. Susan Shaheen of the Transportation Sustainability Research Center (TSRC) at the University of California, Berkeley (UC Berkeley) draft research proposal: "Understanding Consumer Response and Business Model Potential for An Innovative Electric Vehicle (EV)-Based Suburban Carsharing and Bikesharing Service in the Dublin-Pleasanton Region."

This proposed project is a rare, multifaceted "win-win" that connects the dots between many policy and regulatory initiatives and progressive efforts to link zero emission vehicles with reducing vehicle miles traveled; encouraging shared-use vehicle growth; and improving public transit access, particularly in suburban locations.

The proposal involves several key partners: Toyota Motor Company; City CarShare; and TSRC, UC Berkeley. It will evaluate an innovative approach to increasing consumer awareness and demand for zero emission vehicles in a shared-use vehicle setting in a San Francisco Bay Area suburban location. As part of this project, the project team will deploy 30 Scion iQEV vehicles in the Dublin-Pleasanton region and provide links to public transit (Bay Area Rapid Transit (BART) District), neighborhoods, and key employment centers (including Hacienda Business Park). This project will also include bikesharing to provide critical linkages among the carsharing access points and key locations. Toyota will provide significant in-kind contributions to the project, including vehicles, insurance, and technology support. Coulomb Technologies will provide in-kind support and EV infrastructure for the project. City CarShare will manage and operate the shared-use vehicle program (EVs), Hacienda will provide in-kind support and infrastructure for the bikesharing component and TSRC will serve as the project evaluator for the three-year effort.

This real-world project provides a unique opportunity to test several new business models (fractional ownership, station cars, and employer- and neighborhood-based carsharing/bikesharing in the suburbs). For the concept of carsharing to scale in areas that are less dense, such projects are critical for understanding and advancing new ownership models, as well as consumer response to EVs. This project is particularly responsive to several ARB policies including: the Zero Emission Vehicle (ZEV) mandate, which provides ZEV credits for vehicles deployed in shared-use settings and linked to public transit; AB 32 (California's Global Warming Solutions Act); and SB 375 (Sustainable Communities and Climate Protection Act of 2008).

City Carshare strongly encourages you to advance this to a funded research project.

Sincerely,

Brent O'Brien
Director of Member Experience



January 14, 2013

Annalisa Schilla, Ph.D.
California Air Resources Board
Research Division
1001 I Street
Sacramento, California 95812

Re: Support for Dublin-Pleasanton Carshare and Bikeshare Project

Dear Dr. Schilla:

We write in support of Dr. Susan Shaheen of the Transportation Sustainability Research Center (TSRC) at the University of California, Berkeley (UC Berkeley) and the draft research proposal: "Understanding Consumer Response and Business Model Potential for An Innovative Electric Vehicle (EV)-Based Suburban Carsharing and Bikesharing Service in the Dublin-Pleasanton Region." This proposed project is a rare, multifaceted "win-win" that connects the dots between many policy and regulatory initiatives and progressive efforts to link zero emission vehicles with reducing vehicle miles traveled; encouraging shared-use vehicle growth; and improving public transit access, particularly in suburban locations.


Hacienda is located in Pleasanton near the geographic center of the San Francisco Bay Area and, at 875 acres, is the largest development of its kind in Northern California. Over 10 million square feet of existing, mixed-use space is occupied by some 475 companies that locally employ over 17,500 people. In addition, Hacienda also features homes to some 4,000 residents and is in the active planning phase for as many more. Our facilities thrive because of the state-of-the-art working and living environments that have been developed which include critical components such as an ongoing commitment to providing comprehensive approaches to commute alternatives.

The proposal involves several key partners: Toyota Motor Company; City CarShare; and TSRC, UC Berkeley. It will evaluate an innovative approach to increasing consumer awareness and demand for zero emission vehicles in a shared-use vehicle setting in a San Francisco Bay Area suburban location. As part of this project, the project team will deploy 30 Scion iQEV vehicles in the Dublin-Pleasanton region and provide links to public transit (Bay Area Rapid Transit (BART) District), neighborhoods (including six directly within Hacienda), and key employment centers (including Hacienda). This project will also include bikesharing to provide critical linkages among the carsharing access points and key locations. Toyota will provide significant in-kind contributions to the project, including vehicles, insurance, and technology support. City CarShare will manage and operate the shared-use vehicle program (EVs and bikes), and TSRC will serve as the project evaluator for the three-year effort. Hacienda will provide in-kind support (including marketing and personnel to help manage the system) and contribute toward the bikesharing infrastructure for the project.

This real-world project provides a unique opportunity to test several new business models (fractional ownership, station cars, and employer- and neighborhood-based carsharing/bikesharing in the suburbs). For the concept of carsharing to scale in areas that are less dense, such projects are critical for understanding and advancing new ownership models, as well as consumer response to EVs. This project is particularly responsive to several ARB policies including: the Zero Emission Vehicle (ZEV) mandate, which provides ZEV credits for vehicles deployed in shared-use settings and linked to public transit; AB 32 (California's Global Warming Solutions Act); and SB 375 (Sustainable Communities and Climate Protection Act of 2008).

Hacienda whole heartedly supports this proposal and urges your favorable consideration. We strongly encourage you to advance this to a funded research project.

Sincerely,



James Paxson
General Manager, Hacienda

fc: Letter_Dublin-Pleasanton Carshare and Bikeshare Support_011413.let
dc: BUS\UCB



ChargePoint
1692 Dell Avenue | Campbell, CA 95008 USA
+1.408.841.4500 or US toll-free +1.877.370.3802

January 24, 2013

Annalisa Schilla, Ph.D.
California Air Resources Board
Research Division
1001 I Street
Sacramento, CA 95812

Dear Dr. Schilla,

ChargePoint is pleased to offer this letter of support for Dr. Susan Shaheen of the Transportation Sustainability Research Center (TSRC) at the University of California, Berkeley (UC Berkeley) draft research proposal: "Understanding Consumer Response and Business Model Potential for An Innovative Electric Vehicle (EV)-Based Suburban car sharing and bike sharing service in the Dublin-Pleasanton Region."

This proposed project is a rare, multifaceted "win-win" that connects the dots between many policy and regulatory initiatives and progressive efforts to link zero emission vehicles with reducing vehicle miles traveled; encouraging shared-use vehicle growth; and improving public transit access, particularly in suburban locations.

The proposal will evaluate an innovative approach to increasing consumer awareness and demand for zero emission vehicles in a shared-use vehicle setting in a San Francisco Bay Area suburban location. This project will also include bike sharing to provide critical linkages among the carsharing access points and key locations.

ChargePoint is the largest network of independently owned charging stations in the world, over 1500 organizations with 10,000 charging spots providing charging via our network. ChargePoint stations currently dispensing more than 812 Megawatt hours (MWh) of electric fuel each month; the annual equivalent of 2,000,000 gallons of gas avoided and 30 million lbs. of Co2 emissions prevented. ChargePoint (formerly known as Coulomb Technologies) may provide in-kind support and EV infrastructure for the project.

www.chargepoint.com



ChargePoint

1692 Dell Avenue | Campbell, CA 95008 USA
+1.408.841.4500 or US toll-free +1.877.370.3802

This proposal shares some of the goals of ChargePoint and we are proud to support the research work. If you have any questions please free to contact Kumar Gogineni at 408-841-4530

We strongly encourage you to advance this to a funded research project.

Sincerely,

A handwritten signature in black ink, consisting of a stylized first name followed by a long horizontal line and a vertical stroke at the end.

Kumar Gogineni
Executive Director
ChargePoint, Inc



**BAY AREA
AIR QUALITY
MANAGEMENT
DISTRICT**

ALAMEDA COUNTY

Tom Bates
Scott Haggerty
Nate Miley
(Vice-Chair)

CONTRA COSTA COUNTY

John Gioia
David Hudson
Mary Piepho
Mark Ross

MARIN COUNTY

Susan Adams

NAPA COUNTY

Brad Wagenknecht

SAN FRANCISCO COUNTY

John Avalos
Edwin M. Lee
Eric Mar

SAN MATEO COUNTY

Carole Groom
(Secretary)
Carol Klatt

SANTA CLARA COUNTY

Ash Kalra
(Chair)
Liz Kniss
Ken Yeager

SOLANO COUNTY

James Spering

SONOMA COUNTY

Susan Gorin
Shirlee Zane

Jack P. Broadbent
EXECUTIVE OFFICER/APCO

January 18, 2013

Annalisa Schilla, Ph.D.

California Air Resources Board

Research Division

1001 I Street

Sacramento, CA 95812

Dear Dr. Schilla,

I am writing in support of Dr. Susan Shaheen's (Transportation Sustainability Research Center (TSRC) at the University of California, Berkeley (UC Berkeley)) draft research proposal: "Understanding Consumer Response and Business Model Potential for An Innovative Electric Vehicle (EV)-Based Suburban Carsharing and Bikesharing Service in the Dublin-Pleasanton Region."

This proposed project is a multifaceted initiative that connects policy, regulatory and progressive efforts to reduce vehicle miles traveled emissions by encouraging shared-use vehicle growth (bicycle sharing and zero emissions vehicles); and improving public transit access, particularly in suburban locations.

The proposal involves several key partners: Toyota Motor Company (Toyota); City CarShare; and TSRC-UC Berkeley and will evaluate an innovative approach to increasing consumer awareness and demand for zero emission vehicles via the deployment of a shared-use vehicle platform in a Bay Area suburban location. As part of this project, the project team will deploy 30 Scion iQEV vehicles in the Dublin-Pleasanton region which will provide links to public transit (Bay Area Rapid Transit (BART) District), neighborhoods, and key employment centers (including Hacienda Business Park). This project will also include bikesharing to provide critical linkages among the carsharing access points and key locations. Toyota will provide significant in-kind contributions to the project, including vehicles, insurance and technology support. City CarShare will manage and operate the shared-use vehicle program (EVs and bikes), and TSRC will serve as the project evaluator for the three-year effort. The Bay Area Air Quality Management District (Air District) will also provide in-kind support for the project and will have a competitive solicitation available later this year which will make grants available to support the EV infrastructure for this deployment.

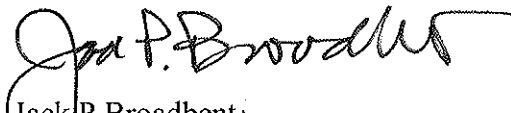
This project provides a unique opportunity to test several new business models (fractional ownership, station cars, and employer- and neighborhood-based carsharing/bikesharing) for the suburban California environment. Additionally, the concept of carsharing in areas that are less dense is critical for understanding and advancing new vehicle ownership models, consumer response to EVs and reducing greenhouse gases and criteria pollutants. This project is particularly responsive to ARB policies such as the advanced clean cars initiative, which provides ZEV

January 18, 2013

credits for vehicles deployed in shared-use settings and linked to public transit; AB 32 (California's Global Warming Solutions Act); SB 375 (Sustainable Communities and Climate Protection Act of 2008) and supports criteria pollutant reduction by eliminating vehicle miles traveled emissions.

The Air District has funded over \$400 million in similar transportation, vehicle, fueling and infrastructure projects in the Bay Area over the past 20 years. This experience leads the Air District to believe that Dr. Shaheen's proposal has a high likelihood of success. I appreciate your consideration of Dr. Shaheen's application and if you have any questions regarding this letter please contact Damian Breen, Director of Strategic Incentives at (415) 749-5041 or dbreen@baaqmd.gov.

Sincerely,



Jack P Broadbent
Executive Officer/APCO

THE CITY OF



PLEASANTON.

January 18, 2013

Annalisa Schilla, Ph.D.

California Air Resources Board - Research Division

1001 I Street

Sacramento, CA 95812

Dear Dr. Schilla,

On behalf of the City of Pleasanton, I am writing in support of the draft research proposal *Understanding Consumer Response and Business Model Potential for An Innovative Electric Vehicle (EV)-Based Suburban Carsharing and Bikesharing Service in the Dublin-Pleasanton Region* by Dr. Susan Shaheen of the Transportation Sustainability Research Center (TSRC) at the University of California, Berkeley (UC Berkeley).

This proposed project aligns with and supports the City's comprehensive Climate Action Plan, pulling together many policy and regulatory initiatives and progressive efforts to expand the use of zero emission vehicles, reduce vehicle miles traveled, encourage shared-use vehicle growth, and to improve public transit access, particularly in suburban locations such as Pleasanton and Dublin.

Credible partners involved in this proposal, such as the Toyota Motor Company, City CarShare, TSRC, and UC Berkeley – make this a very plausible endeavor. The project will evaluate an innovative approach to increasing consumer awareness and demand for zero emission vehicles in a shared-use suburban environment. As part of this project, the project team will deploy 30 Scion iQEV vehicles in the Dublin-Pleasanton region and provide links to public transit (Bay Area Rapid Transit District), neighborhoods, and key employment centers, including Hacienda Business Park – the largest business park of its kind. This project will also include bikesharing to provide critical linkages among the carsharing access points and key locations. Toyota will provide significant in-kind contributions to the project, including vehicles, insurance, and technology support. City CarShare will manage and operate the shared-use vehicle program (EVs and bikes), and TSRC will serve as the project evaluator for the three-year effort.

This project provides a unique opportunity to test new business models, including fractional ownership, station cars, and employer- and neighborhood-based car and bike sharing in the suburbs. Such projects are critical for raising consumer awareness and advancing new ownership models related to EVs. Moreover, this project is fully aligned with several ARB policies including: the Zero Emission Vehicle (ZEV) mandate, which provides ZEV credits for vehicles deployed in shared-use settings and linked to public transit; AB 32 (California's Global Warming Solutions Act); and SB 375 (Sustainable Communities and Climate Protection Act of 2008).

The City of Pleasanton strongly encourages you to advance this to a funded research project.

Sincerely,

Daniel Smith, Director – Operations Services
City of Pleasanton

OPERATIONS SERVICES DEPARTMENT

3333 Busch Road
(925) 931-5500
(925) 931-5595 Fax

P.O. Box 520, Pleasanton, CA 94566-0802

Administration
Streets
Sewer/Storm

Support Services
Utility Planning
Water