Lessons Learned – The EV Project

The EV MICRO-CLIMATE® Planning Process

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List of Acronyms

AC	Alternating Current
AHJ	Authorities Having Jurisdiction
ARRA	American Recovery & Reinvestment Act
BEV	Battery Electric Vehicle
CARB	California Air Research Board
DC	Direct Current
DCFC	Direct Current Fast Charger
DOE	Department of Energy
DOT	Department of Transportation
EV	Electric Vehicle
EVSE	Electric Vehicle Supply Equipment
FHWA	Federal Highway Administration
GIS	Geographic Information System
INL	Idaho National Laboratory
kW	kilowatt
NEC	National Electric Code
OEM	Original Equipment Manufacturers
PEV	Plug-in Electric Vehicle
PHEV	Plug-in Hybrid Electric Vehicle
PUC	Public Utility Commissions
SAC	Stakeholder Advisory Committee
SAE	Society of Automotive Engineers
UL	Underwriters Laboratory
U.S.	United States
VAC	Volts Alternating Current
VDC	Volts Direct Current

1 Company Profile

ECOtality, Inc. (NASDAQ: ECTY), headquartered in San Francisco, California, is a leader in clean electric transportation and storage technologies. Its subsidiary, Electric Transportation Engineering Corporation (eTec) dba ECOtality North America (ECOtality), is the leading installer and provider of charging infrastructure for electric vehicles (EVs). ECOtality has been involved in every major EV or plug-in electric vehicle (PEV) initiative to date in North America and is currently working with major automotive manufacturers, utilities, the United States (U.S.) Department of Energy (DOE), state and municipal governments, and international research institutes to implement and expand the presence of this technology for a greener future.

ECOtality designed and currently manages the world's largest EV infrastructure demonstration - The EV Project. With a budget of over $230 million, The EV Project will deploy and study Level 2 alternating current (AC) electric vehicle supply equipment (EVSE) stations for residential use, Level 2 AC EVSE stations for commercial and direct current (DC) fast charge (DCFC) stations. This represents thousands of field assets, utilized in concert with the deployment of Nissan LEAF™ vehicles and Chevrolet Volt vehicles.

The EV Project is a public and private partnership administered by the DOE through a federal stimulus grant, made possible by the American Recovery and Reinvestment Act (ARRA) and by the private investment of ECOtality and its partners.

The EV Project is an infrastructure study. The EV Project will deliver to ECOtality, the Government and the general public a wealth of directly-applicable technical and professional experience for jumpstarting regional EV adoption and replicating business models that lead to sustainable, market-based charge infrastructures.

One purpose of The EV Project is to identify potential barriers to the widespread adoption of EVs and the deployment of EVSE to support them. This process identifies topics of national interest in the early deployment of EV charging stations in order to facilitate discussion and resolution. This paper documents the issues associated with and The EV Project's approach to the EV MICRO-CLIMATE®.

2 Statement of Need

Concerns with global climate change, U.S. reliance on foreign oil, increasing global demand for petroleum- based fuels, and increasing gas prices, along with the rapid rise of more fuel-efficient vehicles, are clear motivators in changing consumer preferences and industry direction toward more fuel-efficient and alternative energy vehicles. Several automotive manufacturers have successfully introduced a new generation of PEVs and more have announced plans to launch PEVs in 2012 and following years. The California Air Resources Board (CARB) mandates that one in seven automobiles sold in California in 2025 will be electric or zero emission vehicles will drive manufacturers to compete to deliver such vehicles. This illustrates that the future of transportation is being propelled by a fundamental shift to cleaner and more efficient electric drive systems. These vehicles draw some or all of their motive power from on-board storage batteries which are recharged from the electric grid. In order for PEVs to be commercialized, electric charging infrastructure must be deployed. Charging infrastructure must be safe, financially viable, and convenient.

Conventional wisdom suggests (and early EV Project data confirms) that the primary location for recharging PEVs will be at the owner's residence. Extending the range of the Battery Electric Vehicle (BEV) and the Plug-in Hybrid Electric Vehicle (PHEV) will be important through publicly available and workplace charging. Charging opportunities away from home increase consumer confidence that they can return home without fully depleting their battery along the way and thus becoming stranded. The counter to this "range anxiety" is the range confidence provided by an abundance of available EVSE in locations where the driver is likely to travel.

The rapid adoption of EVs is likely to depend upon the availability of commercially based accessible charging. However, this statement quickly points out the dilemma that hosts are unlikely to install EVSE at their retail location without a substantial number of PEVs in use and consumers are not likely to invest in EVs without the substantial infrastructure.

There are many proponents of PEVs but few with the financial resources to implement a public infrastructure. Therefore, when such funds are available, it is important that the location of the public EVSE be planned to be in the most effective and visible location so that it will be available and used by the EV driver. Using EVSE utilization as the key metric, the challenge is to optimize the placement of the limited number of EVSE within the geographic boundary. One of the stated objectives of The EV Project is to study business models associated with public EVSE. It is not likely that the rapid adoption of public EVSE can be accomplished by government grants but rather by a business model that makes sense to the retail hosts.

The readiness of the initial market areas of The EV Project for the placement of public EVSE infrastructure varied considerably. Some locations had devoted little or no resources or efforts in the consideration of public charging, while other locations had significant effort already underway. However, even in the markets where significant effort had been started, the model did not entirely match those of The EV Project; especially in the utilization and business sense.

It therefore became imperative that a detailed planning effort be undertaken in each of the original five market areas that focused on the optimized placement of publicly available EVSE. In so doing, it was important also to enlist the support of the stakeholder groups which existed in each of the market areas or to form new stakeholder groups if none existed, because they had the excellent knowledge of the local conditions upon which this infrastructure would depend. The EV Project timeline was aggressive, and therefore planning the location for the public infrastructure and creating a common unified plan with the local community was determined to be highly desired.

3 Background

3.1 Previous Infrastructure Deployments

EVs made a significant entry into the automotive transportation market in the mid-1990s with the introduction of the General Motors EV1, the Ford Ranger EV, the Toyota RAV4 EV and others. This introduction was relatively short lived for reasons discussed elsewhere and general public adoption did not result. However, the author of this paper was employed by Edison EV, a subsidiary of Edison International at the time. In Arizona, Edison EV installed the EVSE in residential settings and both Edison EV and Electric Transportation Engineering Corporation were in business to install publicly available EVSEs. Edison EV also installed publicly available EVSEs in California and other locations. State incentives and grants were available to commercial hosts to offset some of the installation costs. There was no uniform standard for vehicle charging and automotive manufacturers selected conductive or inductive methods for charging and each type had several variations. Consequently, charging stations typically required at least two types of EVSE. A major improvement for consumers in the present environment is the acceptance of a uniform standard in the conductive connector by the Society of Automotive Engineers (SAE) in standard J1772. All current and planned PEVs in the U.S. will utilize this standard connector.

The typical publicly available EVSE in the 1990s was also the Level 2 AC unit. The challenge then was to find commercial hosts who would participate in the cost of the EVSE and its installation with no revenue capabilities. Consequently, the strategy for locating units was to find willing hosts. Often the locations did not match locations where the PEV would normally drive but the early enthusiasts would accept that inconvenience. It was not a sustainable model for wide spread adoption.

Many of these stations still exist but are not compatible with the J1772 connection standard. Some locations will be selected for replacement with current equipment and others may wait for future funding or local host actions.

3.2 EV MICRO-CLIMATE® Approach

The award of The EV Project demanded a better approach. There would be a specific number of publicly available EVSE to install in a short period of time and there were no standardized plans in the market areas for locating these units. Furthermore, it was desirable to build a local presence and partnership in the selected markets to create synergy in the process. From these points, the EV MICRO-CLIMATE® was created.

The EV MICRO-CLIMATE® was designed as a three step process to identify publicly available charging locations. The three phases included:

- EV Charging Infrastructure Deployment Guidelines
- EV Infrastructure Long-Range Plan
- EV Micro-Climate Plan

3.2.1 EV Charging Infrastructure Deployment Guidelines

In each of the initial market areas, ECOtality established an area office staffed with an area manager, field services manager and office administrator. The area manager was responsible to establish a close working relationship with the various stakeholders in the area and to facilitate the EV MICRO-CLIMATE® process.

Figure 3-1 Stakeholder Advisory Committee (SAC)

In each of the project areas, key stakeholders were identified who were highly motivated to support the wide-spread adoption of EVs in their region. Additional stakeholders were identified to support the formation of a Stakeholder Advisory Committee (SAC). Committee participants included members from the local electrical utility, local city/county agencies, state transportation agencies, universities, EV enthusiasts/advocates, EV manufacturers, Clean Cities Coalitions, Authority Having Jurisdiction (AHJ) members, business development agencies, Chambers of Commerce, EV associations, and Association of Governments.

While each of these organizations promoted the adoption of PEVs, their motivation and interests in accomplishing this varied considerably. The first phase of the Micro-Climate process then was to create synergy and unity in accomplishing the goals of The EV Project. The EV Charging Infrastructure Deployment Guidelines effort was the selected means to accomplish this.

A draft Deployment Guidelines document was prepared by ECOtality for review and comment by the local SACs. This document not only served to provide focus for the stakeholders in the process, but also provides the foundation for future work. It established a common language concerning PEVs and EVSEs, as well as the basics related to EVSE installation processes and considerations. Several local decisions are necessary for the successful deployment of an EVSE, which then encourages further adoption of EVs in the community. The SACs reviewed and provided comments on the draft guidelines to create the local version. It became a public document to which any additional stakeholders and enthusiasts could refer to understand the local deployment of electric vehicles and charging stations. Typical topics addressed in this document are general terms and nomenclature, EVSE descriptions, EV descriptions, charging scenarios, permitting, codes and standards, accessibility, point of sale, EVSE ownership, and utility integration.

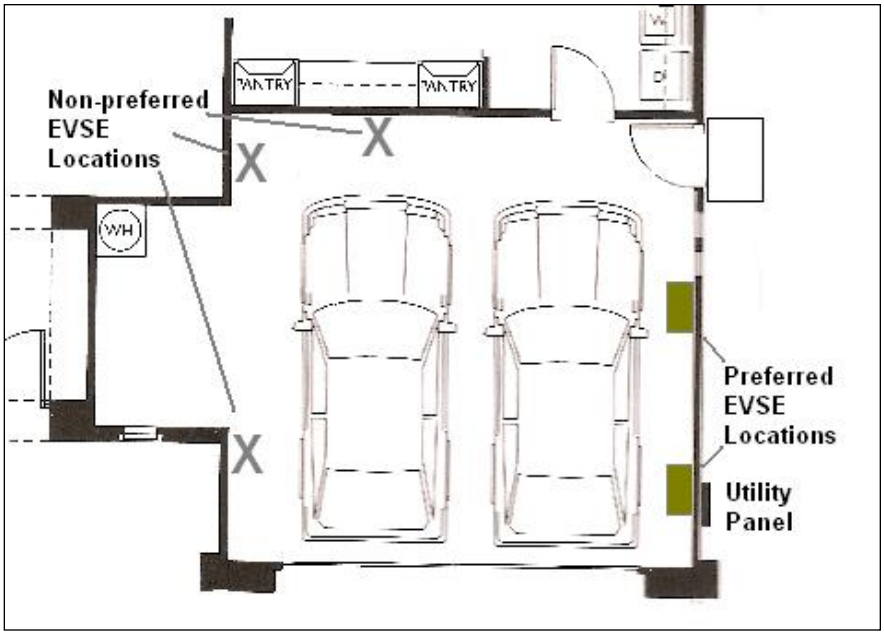

Figure 3-2 Deployment Installation Guidelines

After completion of the guidelines document, the SAC then considered long-range planning.

3.2.2 EV Infrastructure Long-Range Plan

By 2020, there will be a variety of PEVs produced by many Original Equipment Manufacturers (OEMs) and current PEVs will be in their second or third owner so that PEVs will appeal to all demographic groups. In addition, the adoption of PEVs will spread well beyond the major metropolitan areas to be generally available everywhere. The Long-Range plan investigates the quantities of PEVs projected to be introduced into the region and the infrastructure required to support them. These include those EVSEs in metropolitan areas and along the corridors that connect those areas. Some EVSEs will be range extenders to allow drivers, who live some distance from metropolitan areas, to access the local infrastructure grid.

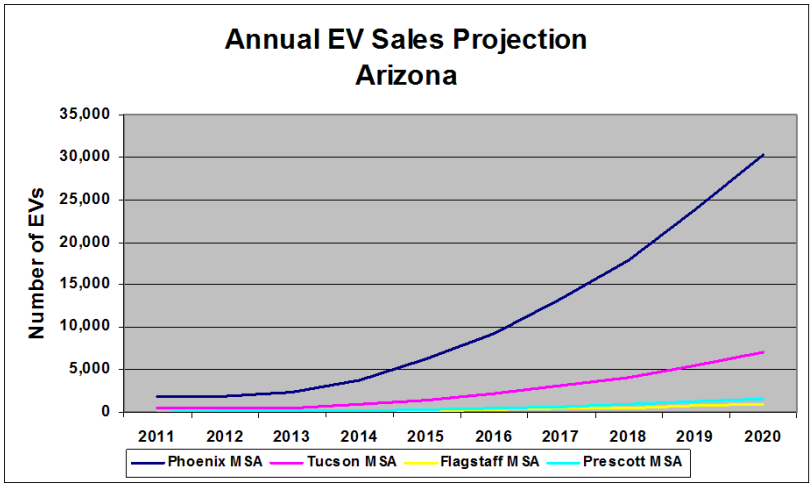

Figure 3-3 Projected Annual PEV Sales in Arizona

ECOtality presented the SAC a draft of the Long-Range Plan for review and comment. It was intended as a starting point to develop the near-term strategy for infrastructure deployment of The EV Project and provide a basis for the direction of future deployment. Many SAC participants were uncomfortable in addressing the deployment plans for the early adopters of EVs since demographically they represented a small segment of the population. The EV Project is an infrastructure study and it would make sense to study how the early adopters use the infrastructure. It would not make sense to install public infrastructure in locations not frequented by these early adopters. The Long-Range Plan could eliminate this specific demographic and view the community as a whole. It also could identify the surrounding community needs which may not be included in the specifics of The EV Project.

The SAC then could evaluate the impact that PEV demand and local requirements play in determining whether a location would truly make sense as part of a complete EV ecosystem. The plan then considered local demographics, traffic patterns, AC Level 2 and DCFC distribution, EV consumer analysis, etc. to provide context for the plan. Resources of the SAC (i.e. geographic information systems (GIS) mapping capabilities, transportation data etc.) were provided in some markets to help execute this portion of the project. In essence, the plan would represent the expected density of EVSE in the metropolitan area in the year 2020. The infrastructure density plan for Portland, Oregon (Figure 3-4) was taken from the Long-Range EV Charging Infrastructure Plan for Western Oregon.

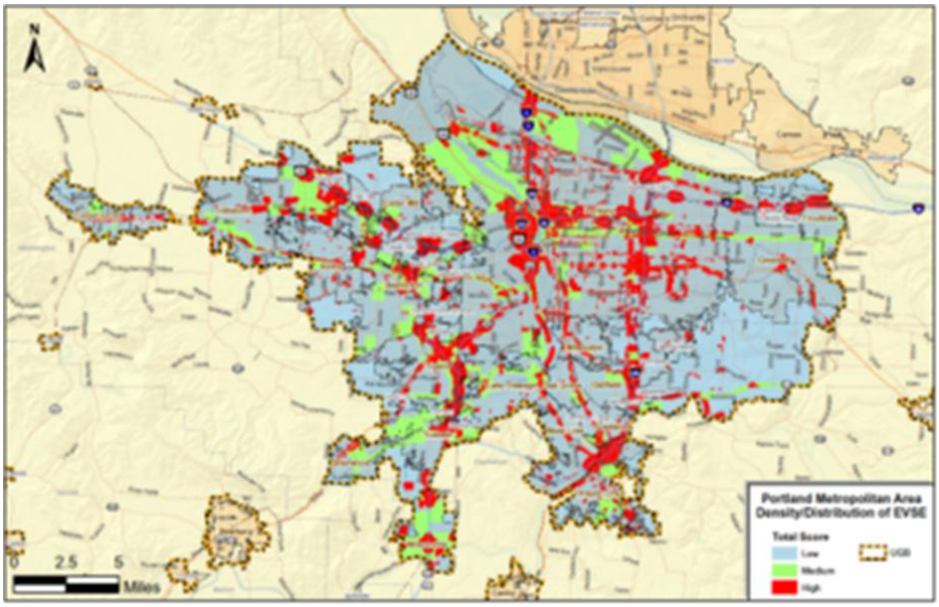

Figure 3-4 Portland Density Distribution of EVSE

3.2.3 EV Micro-Climate Plan

Following the completion of the Long-Range Plan, the EV MICRO-CLIMATE® Plan was established. It was intended to identify a shorter term deployment strategy for the first few years of the Long-Range Plan in addition to immediate local opportunities which will result in a specific location driven approach to PEV infrastructure deployment. Projections from the Long-Range Plan were used to predict the rate of PEV penetration and the charging infrastructure needs to support that penetration in the very near future. Rather than blanket the area with infrastructure by simply finding agreeable hosts, this plan judiciously evaluated the demographics of the likely innovators and early adopters of EVs to establish a near term EV infrastructure. The main objective of this plan was to begin focusing on specific geographic locations that would identify the optimal placement of publicly available DCFCs and Level 2 EVSEs infrastructure in the metropolitan areas and along these corridors. It was generally thought that a PEV driver would walk approximately ¼ mile from an EV parking location to their desired destination. The goal then was to establish target zones surrounding the major destinations and attractions within the specific market area as well as along the transportation corridors.

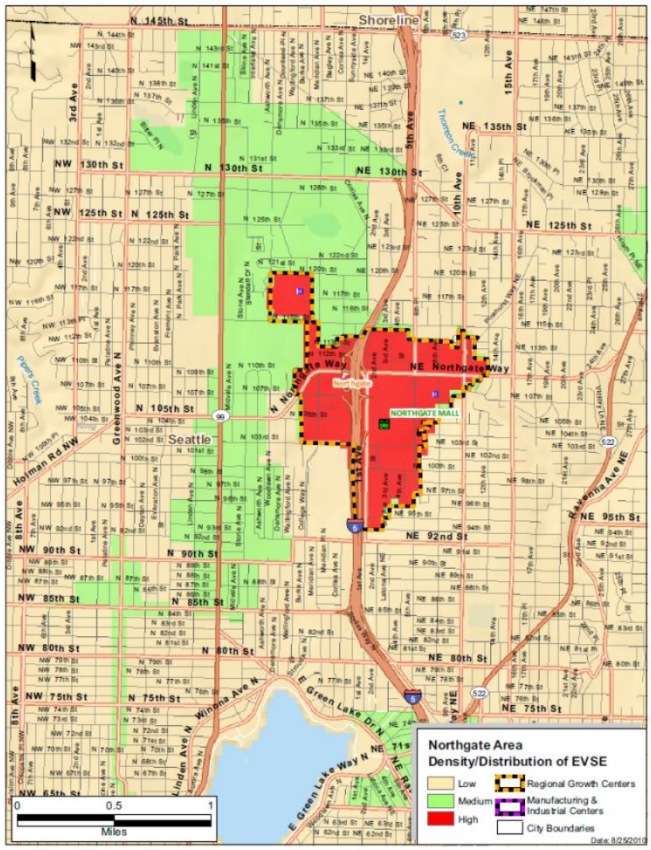

Figure 3-5 Seattle Area Micro-Climate Local Density Map

From this document, the process of soliciting charging site hosts would commence. If successful, the hosts would recognize that their location was at an attractive location for PEV drivers and this would expedite the site selection and EVSE infrastructure deployment.

3.3 Boundaries

Specific boundaries around each metropolitan area were required to identify the locations of qualified participants. Because The EV Project is an infrastructure study, it was determined that the boundary would be a circle of approximately 45 miles from city center which would be sufficient for a Nissan Leaf driver to drive to and from on one battery charge. From this area, the utilization and effectiveness of the installed publicly infrastructure could be measured. Qualification rules were put in place to select participants only from these selected zip codes and aside from a few participants who were incorrectly accepted, participants were located in these areas.

For example, the initial markets for The EV Project included Chattanooga, Knoxville and Nashville in Tennessee. Later, Memphis was added along with the remaining cities in the State. Consequently, the boundary became the State of Tennessee. The planning efforts centered on the larger metropolitan areas and five (5) mile circles around the smaller towns.

The boundary of the Long-Range Plan was specifically selected to be a much larger geographic area since that planning envisioned a much higher population of EVs and a widely spread ownership distribution. It also included the corridors for DCFC planning.

The boundary of the EV Micro-Climate public infrastructure, on the other hand, was again brought close to the zip code boundaries, but EVSE were not required to be within the specific boundary. If it could be shown that the proposed location was a highly desirable destination location, it was approved for inclusion in the infrastructure. This applied to both the Level 2 AC and DCFCs.

3.4 Schedule

The EV Project was officially launched in October, 2009. It was planned that infrastructure planning would commence early in 2010 in parallel with the EVSE design and Underwriter Laboratories (UL) certification testing. The preparation of the Blink Network would also commence in 2010. The installation of residential EVSE would coincide with the delivery of the OEM EVs with commercial EVSE installations to follow once there were a baseline number of residential EVSE in the local community.

Selection of the area managers commenced immediately and the last site was initiated in February 2010. All sites established the local area office and commenced the search for the appropriate SAC members. All locations commenced the EV Charging Infrastructure Deployment Guideline phase by March 2010 and the final EV MICRO-CLIMATE® Plan was essentially completed in November 2010. The overall planning process was planned and expected to take approximately eight (8) months.

4 Lessons Learned

4.1 Overview of Process

The EV MICRO-CLIMATE® Plan process was set prior to the first market area implementation. Several alternatives were reviewed, including the elimination of the Long-Range Plan effort. However, for reasons stated in Section 3, it was retained in the overall plan. It was also discovered early on that a competitor also providing EVSE infrastructure had no detailed plan for installation and was soliciting hosts directly. It was thought that a comparison of the deployed charging stations with the planning efforts versus no plan would provide valuable insight and a relevant final report lesson learned.

The EV MICRO-CLIMATE® Plan was discussed during the first quarterly review with DOE and ECOtality received encouragement to continue the process.

The planning process was rather strictly followed in the initial steps to provide a baseline of information for later lessons learned. While all areas followed the guideline process fairly directly, some conflicts were generated early on that led to specific issues.

4.2 Stakeholder Advisory Committee (SAC)

In general, the formation of the SAC was fairly straight-forward. Members were eager to participate and were enthusiastic about The EV Project. Most of the key stakeholders knew others who could properly represent other important views and they were successfully enlisted. All the area SACs were enthusiastic and supportive through the guidelines phase.

One area had a particularly difficult time in unifying the SAC. Several key stakeholders in the area had commenced their own planning efforts prior to the arrival of The EV Project and while supportive of the infrastructure planning effort, did not seem to desire the leadership or direction provided by ECOtality. Part of this issue is addressed in Section 4.7 and part was based upon personality conflicts. The issues were later resolved and a good working relationship was formed.

As expected, the various SAC members had their own motivations and focus for the deployment of EVSEs. In some locations, no progress had been accomplished on any EVSE infrastructure planning. Many SAC members contributed significant effort and the efforts of their organizations to assist in the planning efforts. Some contributed GIS planning efforts while at other sites, GIS was not used or paid separately by The EV Project.

As the planning progressed into the Long-Range Plan effort, many stakeholders felt they had little or no expertise to contribute but retained interest and enthusiasm through its completion. By the time the EV MICRO-CLIMATE® Plan was in progress, many SAC members were weary of the meetings. One market area decided to essentially skip the Long-Range Plan to focus directly on the local placement of EVSE as provided in The EV MICRO-CLIMATE® Plan.

Some SAC members objected to the long-range planning efforts following the Deployment Guideline phase and desired to immediately start enlisting EVSE hosts. Again, refer to the motivations section below for additional information.

Most SACs dis-banded following the completion of the EV Micro-Climate plan. In one location, the group was reformed under a different lead facilitator in a new assignment related to EVs. Another region met on an ad hoc basis for status updates while a third region continued to meet on a regular basis.

Overall, the SAC was an appropriate planning approach. Extremely valuable information and support was provided by the local members. Their involvement was also valuable in soliciting charging site hosts and promoting public education and information.

4.3 Draft Documentation

Providing the SAC with draft documents to review and comment was a valid approach. It would have been extremely difficult to complete the three distinct phases in the short period of time if a focused document were not available. Most SAC members appreciated the effort and information provided by the draft documents and supported the general approach and unified approach between the various EV Project markets. The EV market projections through 2020 as presented by ECOtality were generally validated by the local SACs, although one market area decided not to publish the information as being too speculative.

4.4 Widespread Issues

The Deployment Guidelines document addressed signage as an issue that required a unified response. ECOtality determined early on that it did not want to direct or suggest a unified symbol for signage. It became apparent early on that there was going to be wide disagreement on any selected signage. Every symbol that was presented was disliked by several of the SAC members in several market areas. In one area, a symbol that was copyrighted was suggested which would have led to royalties paid to the owner. The Department of Transportation (DOT) for the States of Washington and Oregon submitted a request for the Federal Highway Administration (FHWA) to consider an EV Charging General Service symbol which existed in the 2009 Edition of the Manual of Uniform Traffic Control Devices. The FWHA responded with interim approval of the symbol shown below. More information is provided on this issue in the Signage lessons learned paper.

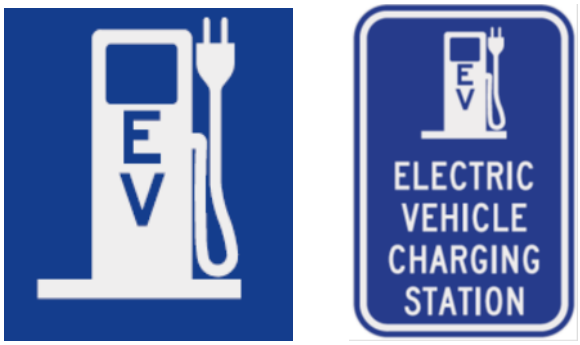

Figure 4-1 FHWA Interim Approved Symbol

Another issue identified in the Deployment Guidelines document was public charging accessibility by persons with disabilities. The position that was suggested in the guidelines draft was found to be incompatible with local thinking and the Washington area promoted a deeper development of the issue and solution. More information on this topic is included in the Accessibility at Public EV Charging Locations lessons learned paper.

Following the publications of the Deployment Guidelines in the market areas, SAE and National Electric Code (NEC) revised the charging nomenclature for the various charging levels. The current designations are shown in the J1172-Electic Vehicle and Plug-in Hybrid Electric Vehicle Conductive Charge Coupler standard by SAE,

Table 4- 1 EVSE Circuit Ratings

AC Charging	Level	DC Charging
Circuit Rating: 120 VAC, Up to 16 Amps Power: <1.92 kW	1	Circuit Rating: 200 - 450 VDC, Up to 80 Amps Power: < 36 kW
Circuit Rating: 240 VAC, Up to 80 Amps Power: < 19.2 kW	2	Circuit Rating: 200 - 450 VDC, Up to 200 Amps Power: < 90 kW
To be determined	3	To be determined

The electric utilities became interested in several topics first introduced in the Deployment Guidelines. Among these was the possibility of clustering. It was thought that if once an EV owner displayed and discussed with neighbors the desirability of the EV and promoted The EV Project benefits, several other people in that neighborhood would buy an EV and thus create a higher demand on the local distribution transformer. Methods were put in place for ECOtality to inform the electric utility when participants were selected for the Project. In addition, utilities requested the OEMs provide this information as possible. Questions of customer privacy were raised and for The EV Project, permissions from the participants were obtained before providing this information.

4.5 Locally Determined Topics

Mapping programs can provide significant insight into infrastructure deployment plans. The role of the GIS capabilities was left to the local SACs to discuss and utilize as desired. Two of the areas used relatively simple laptop mapping programs while others developed very sophisticated GIS mapping layer strategies. In two of these three areas, the GIS support was donated by members of the SAC while The EV Project paid for the service in the third market area. Those resulting GIS maps provided excellent visibility and a highly professional look to the Long-Range Plan and EV MICRO-CLIMATE® Plan. The maps generated by the laptop program were also very effective in communicating the plans but lacked the visual clarity the others provided.

Encouraging the SAC to assist in the promotion of the adoption of EVs and The EV Project was left to the individual markets. In some areas, the SAC was very active in promoting public education and outreach; conducting Hosting Partner Forums and displays and other public events. In other areas, no action was taken by the SAC as a whole but left to individual members.

4.6 Site Selection Guidance

The EV Project provided significant resources in the market areas for EV infrastructure. There may be competing interests in the location of these resources between local interests and the requirements of The EV Project. The following was provided as a guide for site selection to fulfill the requirements of The EV Project.

The EV Project provides the resources to develop an infrastructure and study the infrastructure deployment and driver behavior in order to learn lessons from this study and refine the deployment methodology. The installed infrastructure must support the Project objectives. To do that, the following areas must be considered:

Data Collection:

1. Matching Data: Data collection is vital to the success of The EV Project. Data from The EV Project EVSE is matched to the participant's vehicle data by Idaho National Laboratories (INL) to be considered valid and used by The EV Project. Data from The EV Project EVSE that does not match a participant vehicle is not used and likewise, data from a participant's vehicle that does not match an EV Project EVSE is not used. This means: EV Project EVSE should be placed where it is likely used by the participant's vehicle. Participant demographics must be considered in this placement. These demographics include where the likely buyer will live, work or frequent as a destination. It is expected that the participants (early adopters) will be of higher than average income, college and above educated, slightly older than the average driver (i.e. 45 years and above). It is also expected that the demographics will closely match hybrid vehicle owners. They will own their own home or condo and will own two or more vehicles.
2. High Use: Site selection should favor those areas where the use of the EVSE will be frequent throughout the day and evening; weekday and weekend.
3. Special Project: Some of the EVSE will be placed specifically to support special projects and data collection of The EV Project. Those will be identified specifically. Workplace or employer EVSE (fleet) and condo EVSE are examples and will be evaluated individually.

Long-Range Plan

1. Local Stakeholders should provide input into the Long-Range Plan. Some areas have done significant work already on this subject. Where possible, that input should be considered.
2. The placement of The EV Project EVSE should support locations identified in the area's Long-Range Plan.
3. The placement of The EV Project EVSE should consider the leveraging of these free units for additional units by the retailer. That is, two units provided by The EV Project yields additional units purchased for use. For local companies, these new locations should be supportive of the Long-Range Plan.
4. Demographic data analyzed in the Long-Range Plan (i.e. traffic patterns) should also support the location of The EV Project EVSE.

Utility Concerns

1. Placement of the publicly available EVSE will be of interest to the electric utility – especially in the case of DC Fast Charging. Electric utilities should be given an opportunity to review the placement with respect to their local grid capabilities.
2. Clustering of residential EVSE is another concern to the electric utility. While there is no control over who will obtain an EV, The EV Project should provide as much information about residential EVSE installations as soon as possible within the privacy guidelines.

Budget

1. The cost of each Level 2 AC and DCFC are fairly rigid in The EV Project budget. There is little room for adding more equipment in each area. There is little room for substituting more expensive EVSE in the budget.
2. The cost for installation of the Level 2 and DCFC are fairly rigid in The EV Project budget. Simple installations for residential and commercial EVSE will be the norm. Additional costs for service upgrades, etc. cannot be borne by The EV Project.
3. Special projects are budgeted items and there is little room for additional projects. However, savings in some areas might allow projects of significance to be undertaken.
4. Expenditures in the placement and installation of the EVSE must be directly tied to The EV Project objectives.
5. Vendors and sub-recipients must abide by the DOE contract requirements.

Schedule

1. The schedule of The EV Project is fixed. Placement of EVSE must support this schedule. Locations where future EV penetration might occur do not support this schedule or the data collection requirements.
2. The EV Project partners providing locations for EVSE placement can assist in meeting the schedule. Such locations need to meet the guidance provided above.

Visibility

1. A strong effort should be made to locate the EVSE in a highly visible location. While perhaps not the prized location with respect to the business entrance, the EVSE should be in a location easily noticed by others entering the business.
2. Signage should be included at each location to assist those not familiar with EVs to recognize the purpose of the station.

4.7 Motivations

In the early planning stages, it was assumed that all the SAC members would be in agreement with the siting philosophy of The EV Project. Recall that one of the stated objectives of The EV Project is to study business models associated with public EVSE. As noted before, it is not likely that the rapid adoption of public EVSE can be accomplished by government grants, but rather by a business model that makes sense to the retail hosts. Consequently, the guidelines identified in Section 4.6 for The EV Project in site selection were provided to the area managers. Some SAC members had different motivations for site selection.

This is not intended to point out that other motivations are wrong or incorrect but only that some motivations can be in conflict. A lesson learned is to ensure that the motivations are clearly identified at the initiation of the planning process. In most cased noted below, exceptions were made to The EV Project placement guidelines to accommodate the motivations of the SAC members. These locations will be studied along with the other sites selected for utilization and lessons learned prepared accordingly.

4.7.1 Utility Ownership Models

In some market areas, the electric utility had plans to own and operate the public infrastructure. It was planned that the cost would be rate-based, i.e. the costs would be borne by all the rate payers in the service territory to provide the service in the public good. In this way, the access to the EVSE could be provided to all and the fee for service could be at no cost or as determined by the rate case. With EVSE ownership, the utility would also be responsible for placing the units and a long-range and micro-climate plan would be unnecessary. By the terms of The EV Project, the Project needs to retain ownership of the publicly available EVSE for the duration of the Project to ensure data collection and transmittal. In addition, this utility plan has obvious motivational conflicts with the goals of The EV Project where business models are required.

While this subject has been raised to some Public Utility Commissions (PUCs), no PUC has yet agreed with the electric utility ownership model.

4.7.2 Public Messaging

In some market areas, great emphasis is placed on alternative transportation methods. Some SAC members saw the placement of public EVSE could support these promotions and lobbied for specific locations that are transition points for public transit. Such places could include park and ride locations or long term parking at airports. While the location can emphasize and promote the public transit modes, the location is not suitable for business models in that it would be likely that one vehicle would park at the EVSE all day and while only a short time might be required to recharge the battery, the EVSE would receive no other use.

4.7.3 Projects Showcasing

In one market area, it was desired to showcase EV charging in a public venue and several EVSE suppliers were requested to provide EVSE for this location. A significant concentration of EVSE then occurred which provided a great visual message but it would be many years before utilization would approach the business models desired by The EV Project.

4.7.4 Political Motivation

Some municipal government members of the SAC had a strong desire to place public EVSE at government facilities such as City Hall or public libraries. Many of the early adopters of EVs are politically active and the reasons for this placement seemed more political than concerned with high utilization.

4.7.5 Public Image

Some organizations and universities appeared interested in hosting publicly available EVSE at their facilities because of the image it would convey to others. However, placing EVSE in a student parking area at a university may not be a good place, if utilization is the desired goal. Some businesses also seemed to desire EV Project EVSEs for their location to promote a public image. However, the location was truly limited to employees and access to the public was difficult or not available.

4.7.6 Workplace

At the initial scoping discussions for The EV Project, it was determined that public charging would require general access by the public for most of the day. Some locations were rejected because they did not provide this access. It was later determined that the placement of a limited number of EVSE in the workplace environment could have some value in the overall evaluation of the infrastructure and specific project areas were established for study.

4.8 Roles and Responsibilities Documentation for the SAC

The SAC was organized without specific guidance on their roles and responsibilities, including any support actions that may be required from their respective home offices. In many cases, the members volunteered the support that was desired, but at other times, the members attended or called into meetings without providing support or ideas. A clearer “job description” could have been provided that outlined the expectations of their participation including the length of the project, the number of meetings and other support required and the specific stages of the project. A clear understanding of the SACs function, if any, following completion of the project would have been desirable.

4.9 Market Additions

When The EV Project was expanded to include the Chevrolet Volt and the cities of Los Angeles, San Francisco, Dallas/Ft Worth, Houston, Memphis, and Washington DC, there was insufficient time to conduct the detailed planning activities, but rather these areas needed to move immediately into the charging site host selection. At first, it was thought these areas would not receive public infrastructure as an additional source of study. The question arose if participants behavior would be different between areas where a substantial infrastructure existed and those where it did not. Certain areas were allowed to proceed with some infrastructure, mostly in support of workplace or fleet charging while still retaining some areas with no public infrastructure.

4.10 Effectiveness of the Planning Effort

One of the key elements of the EV MICRO-CLIMATE® planning process is the actual plan for seeking public charging hosts. It was originally thought that The EV Project offer to charging site hosts would be attractive enough that significant effort would not be required to enlist sites. This was not the case, as it was not always possible to follow the EV MICRO-CLIMATE® Plan for the placement of The EV Project assets. Site host market acceptance for offering EV charging was a significant factor for final charger placement. Therefore, most of the market areas will complete the installation phase of The EV Project with public EVSE installed in locations which may not coincide with the plan. Part of the final evaluation of the effectiveness of the overall planning effort then will be to evaluate the utilization and performance of all the EVSE to determine if the planning effort contributed to the successful placement of EVSE. This will be the subject of a separate lessons learned paper.

5 Recommendation / Conclusion

5.1 Overall Conclusion

As noted in Section 3, there were several objectives identified for the EV MICRO-CLIMATE® Planning Process:

- Create a local ECOtality presence in the market area
- Establish ECOtality leadership in the market area
- Establish relationships with the key stakeholders in the community
- Create a synergistic focus for the stakeholders already interested/involved in EV promotion
- Establish a common ground for nomenclature and discussion
- Identify specific areas which require local action in the deployment of EVSE
- Create a plan for the placement of EVSE
- Communicate regularly with stakeholders, area government, and potential hosts
- Message to potential hosts the benefits that might accrue to them with the placement of an EVSE

The plan was effective in accomplishing all these objectives. The area manager very quickly was recognized in the community as the ECOtality spokesperson and focusing the SAC on the EV Charging Infrastructure Deployment Guidelines created the synergy to gain momentum in the planning process. The area manager, as facilitator and as provider of the draft documents, was the recognized leader who was required to keep the overall planning process to the eight to nine month time frame.

5.2 Documentation

This process was approached in three specific phases and it was intended that the documents approved in the process would signal the completion of that phase. The following documents were generated:

EV Charging Infrastructure Deployment Guidelines

This document was approved locally by the SAC and made a public document. Copies of this document for Phoenix, Arizona; Tucson, Arizona; Central Puget Sound Area (Seattle, Washington); Portland, Salem, Corvallis and Eugene Oregon; State of Tennessee; and San Diego, California are posted on The EV Project website. Credits to the support of the SACs are included in the documents.

Long-Range EV Charging Infrastructure Plans

This document was approved locally by the SAC and made a public document. Copies of this document for Arizona, Western Oregon, Tennessee, and San Diego, California are posted on The EV Project website. Some of the information used in the creation of these documents was considered proprietary to ECOtality so the unclassified versions were posted. Again, credits to the support of the SACs are included in the documents.

EV Micro-Climate Plans

This document was approved locally by the SAC and made a public document. The documents for Arizona, Oregon, Tennessee, Central Puget Sound & Olympia Areas of Washington State, and San Diego, California are in final tech review and the unclassified versions will be posted on The EV Project website.

5.3 Time and Schedule Impact

The overall planning process was found to be an eight to nine month process. This did not add time or cost to The EV Project because it was conducted in parallel with the equipment design and build functions of the Project. The final EV MICRO-CLIMATE® planning phase was completed coincident with the availability of residential Blink EVSE and the delivery of the first Nissan LEAF vehicles. This also preceded the delivery and installation of the first publicly available EVSE by approximately six months.

5.4 Future Work

Following the work completed in the initial five market areas, ECOtality has proposed the same or similar planning process in several other areas. Work is in progress, or has been completed in many areas at this writing with very favorable reviews. This is seen as an endorsement of this overall planning process. Improvements to the process are proprietary and not identified here but the lessons learned identified in Section 4 are included.

Micro-Climate reviews are not limited to The EV Project or even solely to government. There are a number of examples of private application of Micro-Climate reviews that could be successfully applied. Some community organizations have already shown interest and discussions have begun with large industrial facilities. It is anticipated that as the housing market picks up, developers of large planned communities will begin applying Micro-Climate within their site plans.