

2011 Houston-Galveston Region Plug-In Vehicle Assessment

Houston-Galveston Area Clean Cities Coalition

PEV Strategic Planning/Feasibility Study

October 2011

Part 1: ASSESSMENT SUMMARY AND PURPOSE

Briefly describe the scope and purpose of this effort.

A. What is the geographic area served by your coalition?

The Houston-Galveston Clean Cities Coalition (HGCCC) serves the eight county Houston-Galveston-Brazoria (HGB) non-attainment region including: Harris, Liberty, Chambers, Galveston, Brazoria, Fort Bend, Waller, and Montgomery Counties. This region is located on the Gulf Coast in Southeast Texas.

B. What is the focus for this assessment effort? If different than above, describe why and how this area was chosen for this assessment.

This assessment focuses on the eight county region described above.

Although this assessment is specifically focused on the eight counties listed above, future electric vehicle activities may expand beyond this region. The HGCCC is currently participating in the DOE-funded Texas Triangle EV Readiness planning activities which will focus on connecting the large metropolitan areas of Texas. Additionally, the H-GAC is in the beginning stages of a regional sustainable communities planning process which covers a wider thirteen county region. It is possible that electric vehicles may be part of this sustainability plan.

C. Independent of the fact that this is a required deliverable for the 2011 coalition support contracts, why is this assessment necessary?

This assessment is essential for regional PEV planning in the Houston-Galveston region because the HGCCC needs to provide resources and a forum for discussion and information across the entire region. PEVs have gained momentum in the Houston-Galveston region, so coordination among various groups will be necessary for consumer and fleet adoption.

The City of Houston is moving rapidly to become a leader in electric vehicle planning and is attracting multiple electric vehicle supply equipment (EVSE) providers and Original Equipment Manufacturers (OEMs) to the region. The information-gathering process and the final assessment document will provide the region with resources for discussion and sharing among various municipalities and departments.

Also, the assessment will provide essential background information to facilitate Houston-region participation and wider planning efforts across the Texas Triangle.

Part 2: PAST & CURRENT PLUG-IN VEHICLE IMPLEMENTATION

Description of the history and current status of plug-in vehicle implementation in your coalition area.

A. What is your region's past experience with plug-in vehicles, if any?

Municipal governments, other public entities, private companies, and non-profit organizations have demonstrated a commitment to PEVs in the Houston-Galveston region. The City of Houston has been a regional leader in the adoption of expedited permitting processes, the installation of EVSE, and the purchase and conversion of light duty electric vehicles.

Also, the City of Galveston Historical Society was an early adopter of PEV charging equipment. Other suburban communities, county governments, and city planners have expressed interest in learning more about PEV policies, equipment, and vehicles. Additionally, Spring Independent School District purchased a plug-in hybrid diesel-electric school bus in 2009.

Multiple private companies have begun construction and operation of EVSE across the region. NRG Energy EV Services have launched their eVgo Freedom Stations in the Houston-Galveston region. One Freedom Station, which includes one Level 2 and one DC fast charge station, is open for public use at an H-E-B grocery store in Houston. Seven additional Level 2 chargers are currently in operation with DC fast charge capabilities available in the near future. The NRG eVgo program plans to have 50 operational charging stations by early 2012. Furthermore, ECOTality EV Project has committed to installing 200 Level 2 EVSE units in the Houston region by the end of 2012. Of these 200 stations, six charging stations are operational and 38 stations are under construction. GRIDbot and Coulomb, have contracted with the City of Houston and are currently operating more than 30 municipal and publically available EVSE.

Other environmentally-conscious businesses and tech-savvy individuals have contributed to the PEV community. Businesses, including Whole Foods and Element Hotels, have EVSE available today. Additionally, the Houston Electric Auto Association has been supporting education about EV conversions and policy challenges since 1987.

Nissan Leafs and Chevy Volts are currently available to customers in the Houston-Galveston region through local dealerships. Houston Electric Cars sells neighborhood electric vehicles and other highway speed PEVs.

Due to the deregulated energy market in Texas, CenterPoint Energy is the regional electric transmission and distribution provider for the majority of the HGCCC region. CenterPoint has been a regional leader and supporter of PEV adoption. They have funded research to identify possible grid impacts from the implementation of local charging stations. CenterPoint has been proactive in addressing barriers and preparing for the future.

B. What is your state and/or local government's perspective (this can include cities, counties, council of governments, local planning organizations or existing partnerships) on plug-in vehicles (ex. participating in a large-scale deployment project; has its own plan; positive but has not done anything; negative)?

State Legislature: The Texas State Legislature considered multiple pieces of legislation related to PEVs. No major legislation to support or limit PEVs was passed in the 2011 session. However, the following bills were considered:

- HB3310 – EV Tax Rebates/Credits through Texas Emission Reduction Program (TERP)
- SB1742 & HB3308 – HOV lane access for EV
- SB15 – Create TX Energy Policy Council
- HB1669 – Establish road tax on EV owners beginning 2012

- SB385 – Expand TERP funds for EV refueling stations

Houston-Galveston Area Council: As the regional COG and MPO, H-GAC is interested in making the Houston region attractive for new businesses and residents. From the transportation and air quality perspective, electric vehicles are in line with goals to improving air quality and identifying alternatives vehicle technology options. As a result, electric vehicles are viewed as an opportunity to create more attractive communities.

City of Houston: The City has been a regional leader for PEVs. Over the past two years, the City of Houston has actively pursued PEV opportunities for their fleet and for public use.

- In 2009, Reliant Energy sponsored the conversion of ten City of Houston Prius vehicles to PHEV. In June of 2011 the City received its first two all electric Nissan Leafs. In 2011, the City will continue to grow the electric vehicle fleet by adding an additional 23 electric vehicles. This purchase will partially be offset by a grant from the State Energy Conservation Office (SECO). Houston’s electric and plug-in hybrid fleet will reach 40 vehicles by the end of 2011.
- To support electric vehicle infrastructure and accelerate early adopters of the infrastructure, the City has partnered with NRG Energy eVgo, ECotality, GRIDbot and Coulomb Technologies to study, plan, and install electric vehicle charging stations (EVSE). Currently, the City has installed a total of 29 EVSE throughout Houston and has plans to install an additional 30 EVSE for public use at various parks and libraries.
- The City has actively pursued grant opportunities and was able to secure funding from a SECO grant for the creation of an Electric Vehicle Deployment Guidelines document, a Long Range Electric Vehicle plan, and a Micro-Climate EVSE deployment plan with ECotality.

Texas Triangle Plug-In Electric Vehicle Readiness Plan: The major metropolitan areas of Texas have begun planning for PEVs and have identified the need to plan for inter-city travel. The Center for the Commercialization of Electric Technologies is initiating the *Texas Triangle Plug-In Electric Vehicle Readiness Plan*. These planning activities began in September 2011 with funding from the DOE Clean Cities Community Readiness and Planning opportunity. The Plan will identify a package of recommended actions to reduce state and local barriers to PEV market penetration.

Other cities, suburbs, communities: The Woodlands Township, City of Sugar Land, City of Missouri City participated in the HGCC EV Stakeholder meeting in early 2011. These cities and other communities have expressed interest in adopting and/or encouraging PEVs and EVSE.

C. Describe any public/private partnership activities that have occurred or are planned?

- City of Houston and ECotality have developed a local EV Long Range Plan and Microclimate Plan for the City of Houston and areas within commuting distance of the city.
- City of Houston has entered into contracts with multiple EVSE providers to install PEV charging stations for municipal fleet vehicles and for publically available charging.
- GRIDbot, City of Houston, and Houston Advanced Research Center (HARC) is studying charging behavior and activities within the City’s fleet of converted plug-in Prius and Nissan Leaf vehicles. Texas Commission on Environmental Quality (TCEQ) New Technology Research and Development (NTRD) Program funds are supporting the research and study of NOx reduction related to PEV implementation.

- ECOTality is planning to install 200 EVSE within the Houston-Galveston region through the EV Project. A majority of the installation cost will be covered by ECOTality through their DOE-funded EV Project efforts.

(1) List the organizations that are and/or should be involved. Who in the community is leading this effort?

Multiple entities are advancing PEV infrastructure implementation and policy discussions in the Houston region.

- City of Houston led an EV Advisory Committee to support their planning activities with ECOTality. The City is also actively implementing PEVs into their fleet.
- EVSE providers, NRG Energy evGo and ECOTality are the early implementers in our region. These organizations are working cooperatively with municipalities and business across the region to construct and operate EVSE.
- The region's primary electric transmission service provider, CenterPoint, is conducting electricity reliability studies, planning for future PEV deployment, and offering information to consumers.

Other organizations that could be more heavily engaged in future regional PEV planning activities include OEMs, retail electric utility providers, electrical contractors, trade organizations or associations, policy makers and local planners, the Texas Public Utility Commission, Houston Electric Cars and other local car dealerships.

Additionally, HGCC is the main point of contact for the Houston region's participation in the Texas Triangle PEV Readiness planning activities.

(2) What is the role (if any) of your Clean Cities coalition in this (these) partnership(s)?

HGCCC has participated as a member of the City of Houston's EV Advisory Committee. Our Coalition is also working with local electricity providers, CenterPoint, and EVSE providers to gather information and organize future coordination activities.

Houston and other regions of Texas are unique because of the deregulated utility market. Companies, like NRG Energy, view the EV market as a strategic business opportunity and are actively pursuing PEV and EVSE deployment without federal, state, or regional government funding. As a result, the Coalition serves a coordinating role among various stakeholders, including multiple electricity providers, businesses, and local governments. Because HGCCC is housed within the region's council of governments, the Coalition is a natural fit for regional coordination activities, especially in the absence of other regulatory authorities that one would find in other regulated electric utility markets or in areas served by municipally-owned utilities. We are currently working to develop a comprehensive, interactive mapping project for EV charging stations. HGCCC also promotes H-GAC's Clean Vehicles program, which can provide grants for EVs and charging infrastructure.

(3) If not already involved, what is the possible extent of your Clean Cities coalition in this (these) partnership(s)? typical

Although the HGCCC is already involved with the major planning activities and partnerships, the Coalition can take a more visible leadership role for the region to gather and share lessons

learned with other communities and entities. Additional future priorities should include engaging additional organizations that may be missing from the existing PEV activities.

(4) Is the organization leading this effort a Clean Cities coalition member or stakeholder?

Yes, the City of Houston is a Houston-Galveston Clean Cities Coalition member.

(5) Is your local electric utility or supplier a Clean Cities coalition member or stakeholder? Describe their interest and/or interaction with your coalition in regards to plug-in vehicle activities (planning or deployment).

- NRG Energy, a coalition member, is one of many retail electricity suppliers in the region. They are interested in cross-promotion and ensuring the success of their planned “eVgo Network.” The eVgo program is a commercial entity funded completely by NRG Energy. Due to NRG’s ambitious plan for EVSE construction, they are interested in pursuing various permitting issues and EV incentives such as HOV lane access and preferred parking.
- CenterPoint Energy, the natural gas distribution and electric transmission and distribution utility for the Houston area, is not a current Clean Cities coalition member. However, CenterPoint continues to provide information about the growth of EVSE across the region and is actively providing PEV education to regional permitting departments, planners, and the public.

D. What EVSE infrastructure already exists in the assessment area (if applicable)? What is the current degree of use of these existing charging points?

TABLE 1. Existing EVSE Infrastructure in the Houston-Galveston Region

<i>Implementer / Installer</i>	<i>Total Existing</i>	<i>Level of Charging Available?</i>	<i>Publically Available?</i>	<i>Future Plans?</i>
ECotality & City of Houston	1	Level 2	Yes	Additional EVSE planned*
GRIDbot & City of Houston	14	Level 1 & 2 at each station	No	Additional EVSE planned*
Coulomb & City of Houston	10	Level 2	Yes	Additional EVSE planned*
ECotality EV Project	6	Level 2	Yes	200 total with 38 currently under construction
NRG eVgo Freedom Stations	1	DC Fast Charge	Yes	NRG plans to have Level 2 & DC fast charge at each unit
NRG eVgo Freedom Stations	8	Level 2	Yes	
Brookfield Properties	6	Level 2	Yes	
Whole Foods	1	Level 2	Yes	
Nissan Dealerships	14	Level 2	Yes	
Galveston Historical Foundation	1	Level 2	Yes	

Sand Dollar Autoplex	1	Level 2	Yes	
Element Hotels	1	Level 2	Yes	
TOTAL	56			

* See complete list of planned EVSE in Part 3 B

The degree of use is currently being monitored. As of October 2011, most EVSE have been in operation for less than six months and have insufficient data to analyze. HGCCC will continue to work with partners and stakeholders to monitor usage of EVSE across the region. As mentioned previously, HARC is conducting an in-depth review of usage and charging behavior at the City of Houston GRIDbot charging stations.

E. What education, outreach or training activities have been held or are already planned (i.e., first responder, recharger installation, vehicle related)?

Houston-Galveston PEV Activities (2011)

- HGCCC participating in monthly City of Houston EV Advisory Committee meetings from August 2010 to August 2011.
- HGCCC EV Workshop – April 13, 2011 – HGCCC hosted an informational meeting for approximately 40 local government contacts and other regional EV stakeholders. The workshop included four presentations on infrastructure, permitting, recent EV developments, and an overview of EV technologies.
- Houston Drives Electric Press Conference – September 8, 2011 – Houston Mayor Annise Parker announced the Houston Drives Electric initiative and NRG eVgo unveiled the first DC fast charge station in the region.
- Texas Triangle PEV Readiness Kick-Off Meeting – October 3, 2011 – All day meeting in Austin, TX convened all subcontractors and regional participants to discuss current status of PEVs and the planning process’s goals and objectives.
- HGCCC Regional EV Update Conference Call – October 6, 2011 – Meeting to share stakeholder updates, address the regional EV assessment, and discuss next steps for regional PEV activities.
- HGCCC Clean Fleet Technologies Conference – October 19, 2011 – This annual conference highlights multiple alternative fuels with various speakers, panel discussions, and breakout sessions. This year’s event included a speaker from the National Electric Manufacturers Association and three exhibitors who featured EVSE equipment (Coulomb, Hubbell Wiring Systems, GRIDbot).
- Ford Power of Choice Tour and Press Event at University of Houston – October 25, 2011 – H-GAC staff provided brief comments about regional alternative fuel developments to University of Houston students and media representatives.

Planned / Future PEV Activities (2012)

- Inspector & Contractor Training – HGCCC is working with CenterPoint Energy to host training for permitting professionals, inspectors, and electrical contractors. The training is being planned for the first quarter of 2012.

- First Responder Training – HGCCC is also planning to host first responder training in early 2012. The Coalition is currently researching various training courses and opportunities.

Part 3: ASSESSMENT OF PLUG-IN VEHICLE IMPLEMENTATION POTENTIAL

Description of the potential for plug-in vehicle implementation in your region.

A. Which OEMs are offering plug-in vehicles in your region now or in the future? (Nissan Leaf, GM Volt, Ford Focus, etc) When will these vehicles be available?

- Nissan Leaf vehicles are currently available to consumers through multiple Nissan dealerships across the region. Based on current estimates, approximately 65 – 80 Leafs are currently on the road in the Houston-Galveston region. The City of Houston has placed an order for 40 Leafs to be delivered by the end of 2011.
- GM Volt vehicles are also available to consumers in the Houston-Galveston region. Approximately 65 – 80 Volts are currently being driven within our region.
- Ford is expected to introduce their Transit Connect Electric and the Ford Focus Electric passenger car in late 2011. An official timeline has not been announced for the Focus Electric but Houston will be one of the initial markets for release.
- Mitsubishi i-MiEV is expected in the Houston region by the end of 2012.
- Toyota PEV delivery is not expected until 2012/2013.
- Tesla Motors opened a sales gallery at the Galleria shopping mall in Houston in October 2011. Vehicles cannot be purchased directly from the showroom but Tesla employees can assist with ordering and demonstrate the technology.
- DeLorean Motor Company, based in Humble, TX, has recently introduced an all-electric DeLorean. The local DeLorean Motor Company is working with electric vehicle start up, Epic EV, to begin production on a new vehicle by 2013.
- Other neighborhood electric vehicles available in Houston: Kandi Coco, ZENN Motor Company, Zap Electric Vehicles, SKY EV

B. What public and/or private infrastructure is currently available or being planned?

Existing EVSE charging stations are described in Part 2 D.

Additional installation of EVSE is planned for the region. By the end of 2012, the Houston-Galveston region may have up to 250 charging stations installed. Planned infrastructure includes the following EVSE which are expected to be fully functional by early 2012.

TABLE 2. Planned EVSE Infrastructure in the Houston-Galveston Region

<i>Implementer / Installer</i>	<i>Total Planned</i>	<i>Level of Charging Available?</i>	<i>Publicly Available?</i>	<i>Location & Access</i>
ECotality & City of Houston	28	Level 2 charger	Yes	Located at City owned libraries & parks
GRIDbot & City of Houston	28	Level 1 & 2 at each station	No	Initially for municipal use only. May open for public use at later date.

Coulomb & City of Houston	10	Level 2 charger	No	Municipal access only
ECotality EV Project	200	Level 2 charger	Yes	To be determined
NRG eVgo Freedom Stations	50	Level 2 & DC fast charger at each station	Yes	To be determined
TOTAL	316			

C. List the local/state incentives (financial & non-financial) available for plug-in vehicles, if any. Assess the real or potential effectiveness of these incentives on developing the market.

- The H-GAC Clean Vehicles Program provides grant funding for the purchase of alternative fuel vehicles, include PEVs. This grant program is a good resource for fleet vehicle funding and offers limited opportunities for PEV infrastructure and charging stations. However, Clean Vehicles funds are not available to individual consumers for PEV purchase.
- ECotality EV Project offers EVSE at low or no cost to eligible entities that agree to allow public access to the charging stations. By the end of the 2012, ECotality is committed to installing 200 Level 2 charging stations across the Houston region. Widespread access to EVSE across the region will provide charging options to PEV owners and potential electric vehicle customers.
- Some locations, like Whole Foods or the Houston Arboretum, may offer free charging to demonstrate their commitment to environmentally-friendly technologies. Other locations, like hotels and parking garages, may offer free charging as an amenity for employees, customers, or residents. Readily available and visible EVSE infrastructure can help educate the public and reduce consumer hesitation towards adopting the new PEV technology. Access to free charging across the region will help to develop the regional EV market by giving PEV drivers more confidence and possibly reducing range anxiety.
- HGCCC has begun preliminary discussions with the H-GAC Cooperative Purchasing department regarding electric vehicles and equipment.

D. List the stakeholders in your area most likely to adopt plug-in vehicles. Based on discussions with these stakeholders, provide estimates for potential vehicle purchases. Commitments to purchases should be clearly detailed with anticipated deployment timelines.

The City of Houston has 15 Prius vehicles converted to PHEVs and five Nissan Leafs in the City’s fleet. The City’s Fleet Management department is working with Nissan to get a total 25 Nissan Leafs delivered to Houston for their fleet. The City has released an RFP for an additional 25 electric vehicles; purchase and delivery of additional PEVs is expected in the first half of 2012.

Spring Independent School District had indicated interest in purchasing additional PHEV school buses should funding become available.

Additionally, many of the EV stakeholders are the first to adopt and purchase PEVs. For example, CenterPoint Energy and NRG Energy have several EVs in their fleet.

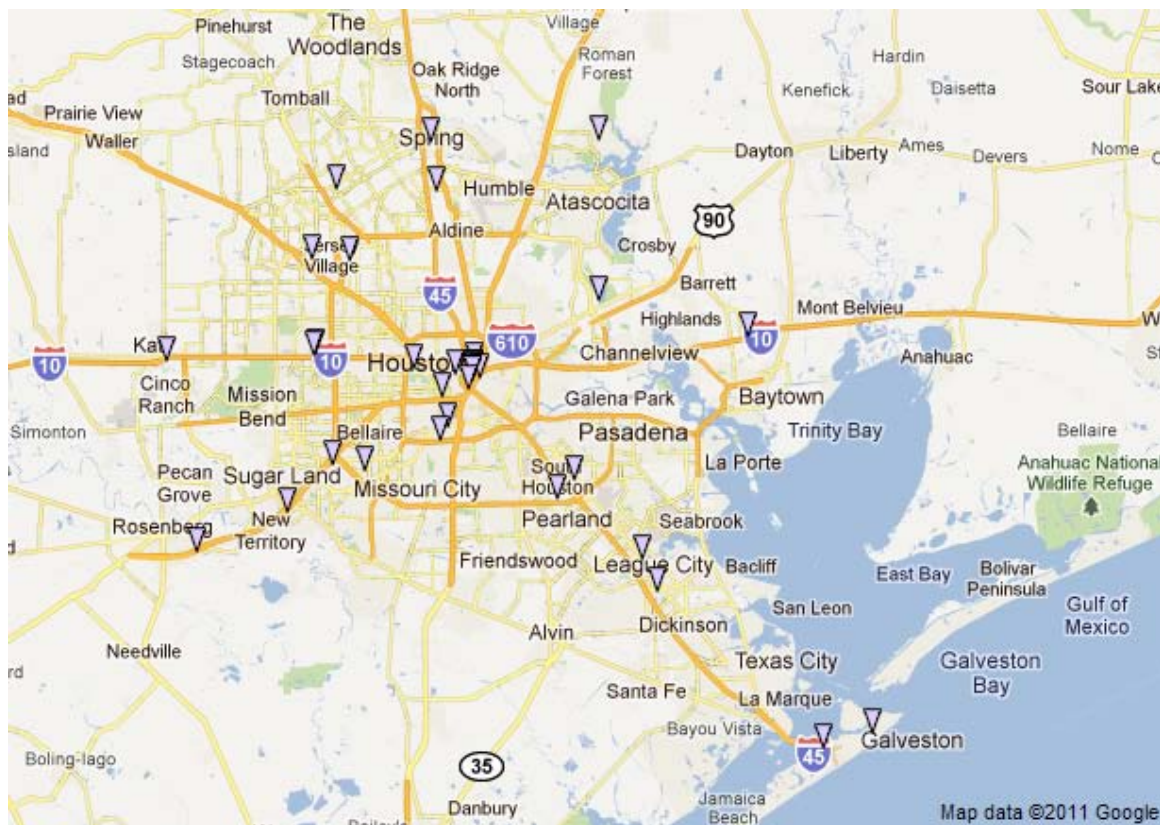
As of October 2011, the HGCCC is not aware of other fleet PEV purchase commitments in the region.

E. List the best locations for future public charging stations and explain why these locations are being recommended. You may need to consult existing traffic studies and other existing

research, as well as conduct discussions with local businesses, business associations and chambers of commerce, to determine these locations. Please create a map or list that shows both what EVSE infrastructure already exists (if applicable), as well as recommended locations.

The best locations for future public charging stations in the City of Houston and surrounding communities is mapped and described in the *Electric Vehicle Charging Micro-Climate Plan for the Greater Houston Area*. The mapping efforts and final document are products of collaboration between the City of Houston, ECotality, and multiple stakeholders. The Micro-Climate Plan is available to the public on the City’s Green Houston website¹. Figure 1 illustrates the locations of existing EVSE infrastructure. Planned and existing infrastructure was also described in Part 2 D and Part 3 B.

FIGURE 1. Existing EVSE Infrastructure



The HGCCC is exploring the idea of developing an interactive GIS mapping platform for all alternative fuel stations, and has submitted a grant proposal to the Federal Highway Administration for funding to support this initiative. In addition to showing existing infrastructure, an interactive map would act as a “match-maker”, allowing individual residents and organizational fleets to suggest locations for future EVSE infrastructure. H-GAC, HGCCC, and participating stakeholders would work to facilitate cooperation between residents, fleets, and EVSE providers that are seeking to support infrastructure development. H-GAC already has a highly skilled GIS department that creates, maintains, and makes publically available extensive regional GIS mapping applications.

¹ <http://www.greenhoustontx.gov/ev/pdf/micorclimateplan.pdf>

CenterPoint, City of Houston, and multiple EVSE providers have expressed support for this mapping tool which will centralize all alternative fuel mapping for the region within H-GAC. because of the agencies' role in regional planning and its existing GIS mapping capabilities.

Part 4: PERMITTING PROCESS ANALYSIS

Description of the current permitting process and efforts underway or planned to expedite permitting.

A. Discussion of the level of awareness the local permitting office(s) has/have regarding EVSE. In particular, what is their level of knowledge of level 2 home charging and are they prepared for the potential for rapid growth in this sector?

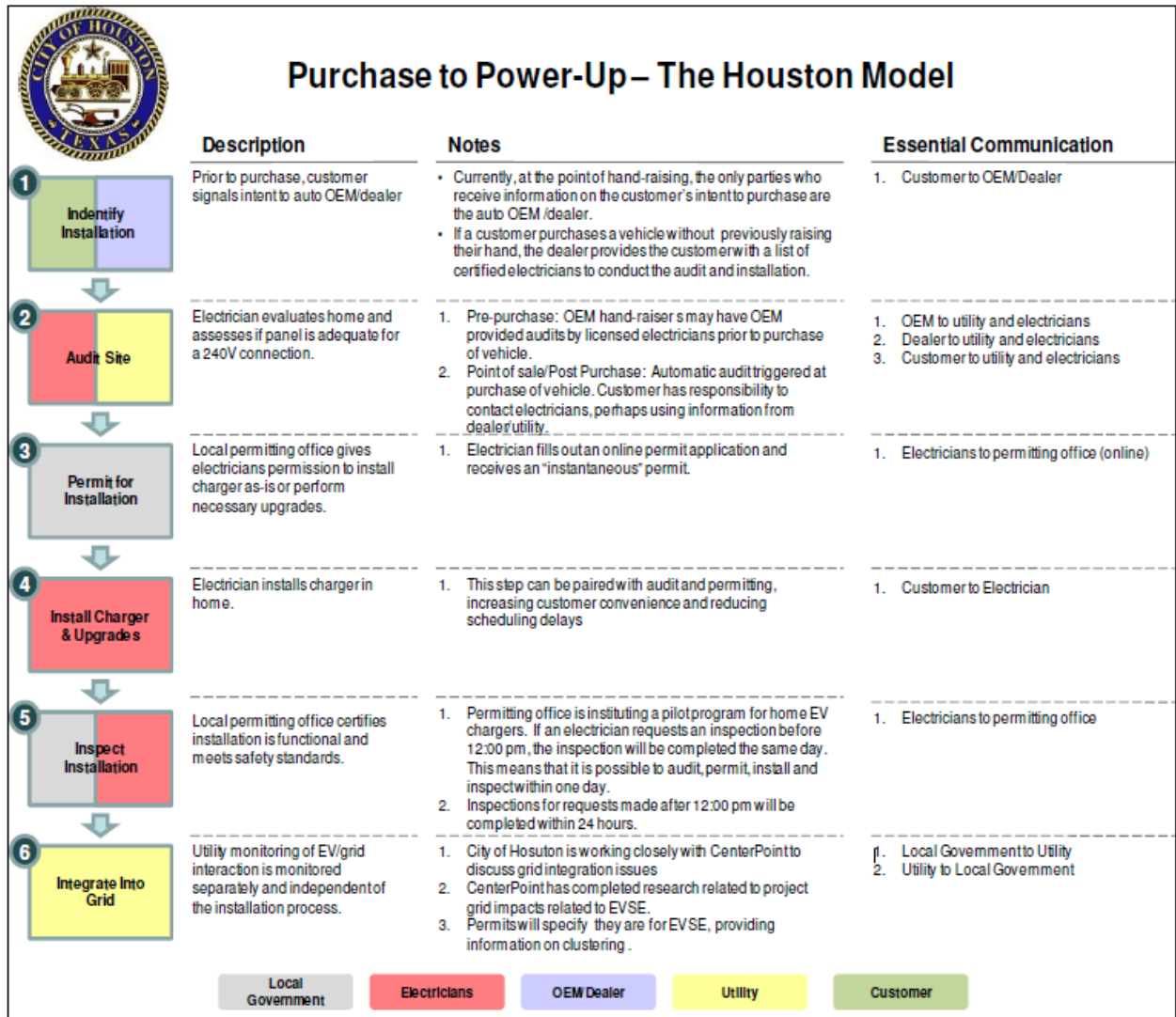
The City of Houston permitting office has worked diligently to plan and communicate across multiple City departments. The Mayor's Office of Sustainability, the Fleet Management Department, Code Enforcement, and Permitting Center are working together to share information and address barriers. HGCCC stakeholders and partners have indicated that the residential permitting process for Level 2 home charging is working very well. The City is continuing to work with the commercial building codes and permitting processes.

Other large suburban communities, including the cities of Pearland, Sugar Land, Katy, and Webster, have worked with EVSE providers to permit and facilitate construction of EVSE stations. The HGCCC has received feedback from these communities and EVSE companies which suggests that the process worked efficiently. As the PEV sector grows, the HGCCC will need to gather best practices and develop educational materials for county planners and smaller communities throughout our region.

B. Discussion of current permitting process for EVSE installation, including a time line from initiation to approval.

The City of Houston has developed the most sophisticated permitting process for EVSE installation in the region. Other communities have successfully worked with EVSE providers to construct and permit charging stations using existing permitting processes. Smaller cities may have less available staff time and fewer resources to devote electric vehicle planning. Figure 2 outlines the City of Houston's model timeline and permitting process for EVSE installation.

FIGURE 2. City of Houston EVSE Permitting Process and Timeline



From “Recommended Electric Vehicle Charging Infrastructure Deployment Guidelines for the Greater Houston Area”

C. Description of any efforts undertaken or planned to expedite the permitting process to allow for expedited installation of charging infrastructure for purchasers of plug-in vehicles

The City of Houston has been gradually adopting an online permitting system for most City-issued permits since 2008; the electrical permits were transferred to the online system in 2011. Challenges and concerns related to PEVs were incorporated into the City’s new, streamlined online permitting process. During this transition period, staff members from the City of Houston permitting department participated in the City’s EV Advisory Committee meetings. Currently, residential permits for installation of EVSE at home should take 24 hours or less. Furthermore, the City of Houston is working to implement “day-of” permitting inspections if inspection request is made before noon.

HGCCC is not aware of any other communities that have adopted expedited permitting for PEV charging infrastructure.

Part 5: ANALYSIS OF PUBLIC INFORMATION AND EDUCATION NEEDS

Description of the types of educational outreach which needs to be conducted in order to better facilitate implementation of plug-in vehicles and infrastructure.

A. Discussion of education needs for potential buyers of plug-in vehicles

(1) Process for installing Level 2 home charging, including the process for locating certified electricians to install Level 2 home charging

The vehicle manufacturers and auto dealers in the Houston region have been responsible for educating consumers and buyers about the process for installing Level 2 home charging. Also, NRG Energy offers a home charging dock and equipment for consumers who purchase electricity through the eVgo charging plans.

As PEVs become more common, certified electricians may be the first point of contact for consumers. HGCCC may need to maintain a publically-available list of certified electricians with PEV and EVSE experience and/or training. Also, the Coalition may need to educate individual consumers through H-GAC's air quality and transportation programs.

(2) Safe operation of EVSE

Training for code enforcement officers, permitting professionals, inspectors, and electricians should include information about the safe operation of EVSE. Enforcement of codes and permitting processes should ensure that residential EVSE units function properly. Educational outreach materials and train-the-trainer educational programs may be needed to inform the proper authorities.

Consumers and PEV owners should be educated by dealers when purchasing a vehicle. However, HGCC may need to work with the region's electricity transmission service provider to create public information websites, FAQ sheets, and/or an information hotline.

Furthermore, the Houston region should consider safe operation of EVSE during natural disasters and other emergency situations. It will be necessary to plan for possible effects of hurricanes and tropical storms. For example, how can PEV owners ensure safe evacuation and how will EVSE providers repair infrastructure after storm damage. Also, heat waves may affect electricity generation during peak times. HGCC may need to work with other Texas cities to ensure that the Electric Reliability Council of Texas (ERCOT) has considered the impact of demand response programs on PEV charging during high demand times. Drivers and potential PEV buyers would need to provide feedback to the planning process. Also, HGCCC may need to insert PEV information into future preparedness information campaigns.

B. Discussion of education needs for public charging infrastructure installations

The challenges and education needs for public charging infrastructure are changing as the Houston region is moving from planning mode to actual implementation and construction of EVSE. Our needs will continue to evolve as stakeholders learn from emerging challenges which include:

- EVSE Permitting on Commercial Property – Residential permitting for EVSE has not been a problem for most communities in the region. However, stakeholders have indicated that there is a need to work with local permitting departments to facilitate construction of EVSE on commercial property and to address permitting challenges related to construction of overhead structures. EVSE providers will need to learn more about existing permitting restrictions and

permitting offices may need share best practices and may need more information about the various levels of EVSE equipment.

- Interoperability – The public will need education and information about access to charging infrastructure. There is no standard for access to public EVSE; each EVSE provider has a different RFID card or access protocol. The consumer will need information about how to access different charging stations. Also, EVSE providers will need to remain informed about development of wireless communications standards for equipment.
- Signage – Regional efforts to develop uniform signage for EVSE infrastructure may enhance recognition of PEVs and EVSE across the regional and/or state.
- Workplace Benefits – Employers are considering workplace EVSE as a potential benefit for their employees. Public workplace charging is a challenge in the Houston region. Companies, building owners, and corporate leadership are asking questions about fairness to employees and about the potential tax implications of offering charging stations to employees. These individuals will require additional information about various options for offering EVSE as a workplace benefit.

C. Discussion of education needs for fleet implementations of plug-in vehicles and infrastructure

Successful education for fleet implementation will require engagement with regional fleet managers from local governments, school districts, and other private fleets. Education and information regarding funding opportunities, fuel savings, and possible financial benefits will also be required. Due to the current economic climate, many fleet managers may be hesitant to adopt a new technology. Ongoing communication and information about funding opportunities will be required to demonstrate the potential benefits of PEVs.

Fleet managers may also require training or a professional discussion forum to address concerns related to safety, maintenance, and reliability.

HGCCC recognizes that the fleet managers in our region often conduct extensive cost-benefit comparisons when deciding to implement alternative fuel vehicles. Fleet managers may need to see cost and fuel saving comparisons between PEVs and other vehicles.

D. Discussion of education needs for first responders, public safety officers, construction permitting officials and others.

HGCCC is currently planning training for first responders, permitting officials, and electrical contractors. However, Coalition staff does not have the expertise to conduct this training. CenterPoint Energy is working with the Coalition to schedule training and identify appropriate trainers. HGCCC will also consult with Dallas-Fort Worth Clean Cities Electric Vehicles North Texas stakeholder group to identify appropriate training opportunities.

Other groups and individuals that may need training include emergency response and evacuation planners, mechanics, and maintenance personnel. The Coalition will determine interest from these groups and identify potential training opportunities. We are also searching for partners, like local community colleges, who may be able to offer regular training courses and incorporate PEV training into existing professional training courses.

Part 6: ANALYSIS OF OTHER BARRIERS

Discuss and analyze various other barriers (real or perceived) that could prevent successful deployment of plug-in vehicles and infrastructure.

A. Identify the potential barriers to deployment of plug-in vehicles and recharging infrastructure in your area.

- Permitting & Building Codes – Local communities will need to address issues with electrical codes but also need to consider building permits for structures (i.e. overhead structures for charge stations).
- Lack of Education – Businesses or entities who can support EVSE infrastructure will require additional information about the expected deployment of vehicles and will need information to facilitate permitting and construction.
- Price – The price of EVSE infrastructure may prevent some businesses or communities from adopting EVSE and the price of vehicles may prevent initial deployment of PEVs.
- Range Anxiety – May be a bigger issue in the Houston-Galveston region due to the area’s dependency on highway travel and traffic congestion challenges. Very hot summer weather could cause additional concern due to extensive dependence on A/C.
- Availability of Plug-In Vehicles – HGCCC partners have indicated that consumers in the Houston region are willing to purchase electric vehicles but delivery delays have slowed the adoption of PEVs across the region.
- Interoperability of EVSE – EVSE providers are developing their own business models for charging fees and providing access to charging equipment. Currently, each charging unit requires a different RFID card for access to equipment. If interoperability issues are not addressed, then some consumers may be stranded without access to charging equipment.
- Multiple Electricity Providers – Deregulation of electricity providers may provide some unique challenges for our area due to the number of companies serving the region.

B. List any incentives that aren’t currently in place that should be adopted and explain why.

H-GAC and HGCCC partners and stakeholders have identified the following incentives as potentially useful tools to encourage adoption of PEVs.

- HOV / HOT Lane Access – HOV lanes in Houston are operated by Houston METRO. These lanes were originally developed to serve METRO’s transit needs. Due to regulatory restrictions on the funds used to implement the HOV lanes, opening up preferential treatment to single occupancy EV owners may not be possible. However, METRO has recently begun discussions about HOT lanes. HGCCC will initiate conversations with METRO to determine whether HOT lanes may be eligible for alternative fuel incentives or discounts.
- Grant money for “EV Ready” Workplaces and Multi-family Locations – Funding and advanced planning can enable workplaces and multi-family residential units to have charging “wiring” installed so that EV drivers can have chargers installed (at their own expense) when needed.
- Preferential parking – Government or privately-owned parking facilities can offer preferential parking for EVs and/or install EVSE at convenient locations. Safe and accessible EV charging locations may encourage consumers to consider PEVs as an option.

- Recognition for “EV Friendly Workplaces and Partners” – H-GAC recognizes employers, companies, and organizations that support commuting alternative programs and the Clean Vehicles programs. Recognition for PEV supporters would allow businesses to distinguish themselves among their peers and would promote the PEVs among employees and the public.

C. Analyze and discuss the steps necessary to reduce or eliminate the identified barriers. Key parties necessary for the reduction or elimination of barriers should also be discussed.

- Permitting & Building Codes – Local government planning and permitting departments may benefit from training and informational materials. HGCCC has identified some training needs but other best practices may be helpful. City of Houston and the Clean Cities Coalitions may be resources that can provide guidance to smaller communities.
- Lack of Education – Businesses or entities that can support EVSE infrastructure will require additional information about the expected deployment of vehicles and will need information to facilitate permitting and construction. Fleet managers and consumers who are considering PEV purchase may require information about EVSE access and other incentives. Regional EV supporters and stakeholders will need to communicate with the public. HGCCC can also support coordinated messaging across the region.
- Price – Potential PEV buyers who identify cost as a barrier may need additional information about the possible fuel savings and federal tax credits. HGCCC, OEMs, and auto dealerships could provide more information about savings and provide comparisons to comparable vehicles.
- Range Anxiety – Auto dealers and OEMs can address customer concerns. Also, effective communications with the media will be essential. Research institutions can collect and analyze data about range and charging times under various conditions. Information gathering and sharing, among Clean Cities coalition and other PEV associations, can identify existing issues and challenge misinformation.
- Availability of Plug-In Vehicles – Future planning and outreach for deployment PEVs can be supported by communication with OEMs. OEMs can alleviate this concern and perceived barriers by providing clear messaging to the public and providing tentative timelines to Clean Cities and other stakeholders.
- Interoperability of EVSE – EVSE providers will need to be aware of physical and wireless communication standards for access to charging stations. HGCCC and EVSE providers will need to maintain up-to-date information on the *Alternative Fueling Station Locator* and other mapping applications so consumers are not stranded.
- Multiple Electricity Providers – The HGCCC must work with multiple retail electricity providers. This communication process may be facilitated by creating a regional PEV stakeholder group for these organizations and/or a communication forum that can reach multiple entities. If multiple electricity providers offer EV time of use rates, consumer outreach and education may help PEV driver understand their options.

Part 7: ROLE OF COALITION TO FACILITATE PLUG-IN VEHICLE IMPLEMENTATION

Describe the current and future role of your coalition in plug-in vehicle implementation.

A. What actions will your coalition take to follow up on this assessment? If there is an effort already ongoing, how will your coalition participate?

The HGCCC will continue to work with staff at the City of Houston to work cooperatively on regional PEV efforts. The City has published their PEV plans and is no longer hosting EV Advisory Committee meetings. The HGCCC hopes to expand PEV discussions to a wider, regional audience by potentially creating a Regional EV Advisory Committee.

Future Coalition stakeholder meetings will follow up on the topics outlined in this assessment. Additionally, the Coalition is planning to host future PEV workshops, informational meetings for local planners, and electrical contractors. HGCCC will host trainings as outlined in Part 2 E.

HGCCC has committed to participate in the Texas Triangle PEV Readiness Planning activities. Also, the Coalition will make an effort to include PEVs in the ongoing Regional Planning for Sustainable Development.

B. What role will/could the coalition take in marketing, outreach and training related to this effort? Are any activities already planned?

HGCCC will continue to work cooperatively with H-GAC's existing network of contacts and regular outreach activities to conduct training related to PEVs. Planned communication includes possible blog postings, newsletter announcements, and Clean Cities' participation in public outreach events.

If the need is identified, the Coalition will work with other PEV leaders (like CenterPoint or NRG Energy) to develop informational documents and best practice information for communities. The Coalition is also researching the possibility of developing an interactive GIS mapping effort for alternative fuel stations across the region to encourage public engagement. Also, the Coalition will continue to work with trade groups and associations to bring their training courses to Houston region stakeholders.

As mentioned in Part 5 D, the Coalition would like to partner with local community colleges, mechanic training programs, existing professional training courses and other schools across the region to students and professionals who will need to be familiar with PEVs and EVSE. Training opportunities might involve development of training materials, supporting the establishment of a training course within existing curriculum, or hosting training courses at H-GAC facilities.

C. What resources do you need to help improve your implementation efforts (publications, model permits, model legislation, handbooks, training, etc.)?

- Training Resources – Access and information about available and reliable training providers.
- Funding Resources – Up-to-date information about funding opportunities and financial incentives available at the federal level and/or state level.
- Handbooks & Outreach Materials – HGCCC has received requests for additional information that can address concerns expressed by building owners and employers who are interested but hesitant about supporting PEVs and EVSE. Helpful resource materials would include case studies, best practices, and answers to FAQs for developers, building owners and managers, and employers.

REGIONAL RESOURCES & DOCUMENTS:

- (a) Recommended Electric Vehicle Charging Infrastructure Deployment Guidelines for the Greater Houston Area
<http://www.greenhoustontx.gov/ev/pdf/evdeploymentguidelines.pdf>
- (b) Electric Vehicle Charging Long Range Plan for the Greater Houston Area
<http://www.greenhoustontx.gov/ev/pdf/longrangeevplan.pdf>
- (c) Electric Vehicle Charging Micro-Climate Plan for the Greater Houston Area
<http://www.greenhoustontx.gov/ev/pdf/micorclimateplan.pdf>
- (d) Center for Commercialization of Electric Technologies – Texas PEV Clearinghouse
<http://ccet.wikispaces.com/>

Completed By:
Houston-Galveston Clean Cities Coalition
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IDENTIFICATION OF KEY CONTACTS/PERSONNEL: Identify and describe the established points of contacts or offices which are handling (or will handle) plug-in vehicle specific activities, coordinate efforts, engage in permitting, etc. These could be community organizations, government agencies, utility companies or other stakeholders in the community.

	Name of Organization or Company	Territory Served	Role in Implementation / Planning Efforts	Primary Contact Name	Phone	Email
1)	ECotality	Texas	Regional Sales Representative-Blink Area Manager—Stakeholder Services	Tony Talamas Dave Aasheim	832-520-1012 214-551-4014	ttalamas@ecotality.com DAasheim@ECotality.com
2)	City of Houston	City of Houston	Office of Sustainability Fleet Management	Laura Spanjian Ray Cruz	713-837-9269	Laura.Spanjian@houstontx.gov Raynareo.Cruz-Turcios@houstontx.gov
3)	NRG Energy	Texas	Retail Electricity Provider / EVSE Implementation	James Tillman	281-674-0040	james.tillman@nrgenergy.com
4)	CenterPoint	Texas	Electric Transmission & Distribution - EV Marketing Analytics & Support,	David Owen	713-207-6385	david.owen@CenterPointEnergy.com
5)	Houston Advanced Research Center (HARC)	Houston Area	Director, Sustainable Transportation Program	David Hitchcock	281-364-4007	dhitchcock@harc.edu
6)	The Woodlands Township	Woodlands Township	Planning and Development for EVSE in Woodlands	Kathie Herrick	281-210-3900	kherrick@thewoodlandstowship-tx.gov
7)	Houston Electric Auto Association	Houston Area	Electric Vehicle Stakeholder Group	Steve Kobb	713-398-5308	sk@kobbteam.com
8)	Nissan	South Central Region	EV Implementation and Promotion	Russell Vare	323-535-4460	Russell.vare@nissan-usa.com
9)	GM	South Central Region	EV Implementation and Promotion	Robert “Rob” Paxton	469-417-7045	Robert.paxton@gm.com
10)	Houston Electric Cars	Houston Area	EV Implementation and Promotion	Rick Ehrlich	713-237-9100	rehlich@houstonelectriccars.net
11)	Port of Houston	Houston Area	EV Promotion and Investigation for Port Applications	Lily Wells	713-670-2601	lwells@poha.com
13)	Center for Commercialization of Electric Technologies	Texas	EVSE Grant Coordination for Texas Triangle	Milton Holloway Bob Davis	512-472-3800	mholloway@electrictechnologycenter.com bdavis@electrictechnologycenter.com
14)	GRIDbot	Texas / US	EVSE Infrastructure & EV Energy Management	Richard Donnelly Chris Herbert	512-810-2322 512-279-0752	richard@gridbot.net cherbert@goodcompanyassociates.com
15)	Ford Motor Company	US	OEM – Product Sustainability	Carrie Majeske	313-322-1116	cmajeske@ford.com
16)	Project Management Group, LLC	Texas	EVSE Infrastructure	Ben Mendez	713-880-2626	benmendez@pmgunitied.com