

3. VEHICLE DEPLOYMENT

3.1 Introduction to Vehicle Deployment Focus Area

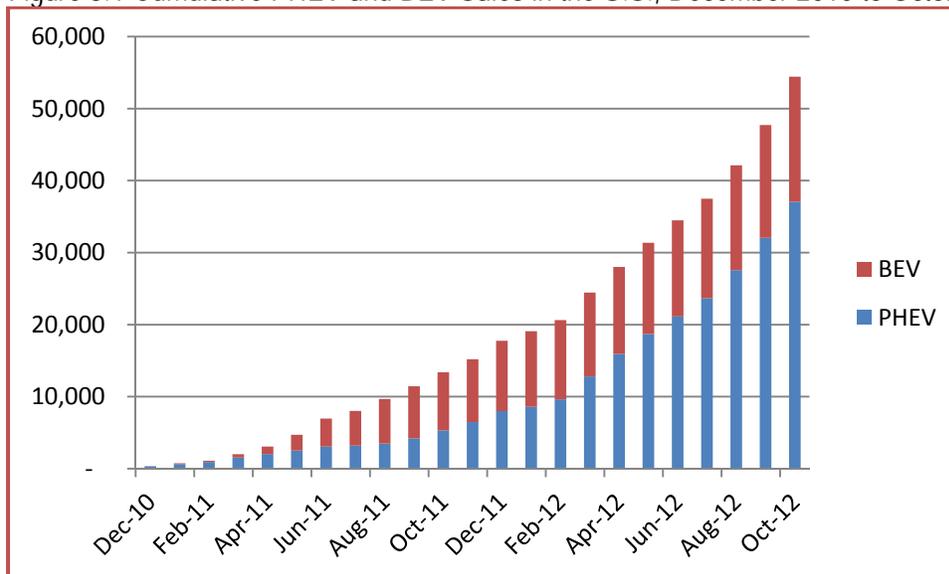
Plug-in electric vehicles first became available at dealerships in the Asheville region in late fall 2011. As PEV makes and models continue to grow, there will be an expanding opportunity to work with fleet managers, auto dealers, rental agencies, and other stakeholders to popularize electric vehicle adoption across the region. The primary goal of the Vehicle Deployment Working Group was to facilitate PEVs adoption in fleets, rentals and the general public, which involved addressing major barriers associated with initial purchase price and electric driving range. These barriers can be partially addressed at the regional level through technical assistance to fleets, vehicle incentives, marketing, and strategic partnerships. Implementation of these strategies will require the participation of CVC fleet managers, auto dealers, and car rental agencies.

3.2 Current Vehicle Adoption

Vehicle Adoption in the United States

The first U.S. sales of the Nissan LEAF and the Chevy Volt took place in select markets at the end of December 2010. From December 2010 to October 2012, over 54,000 electric vehicles have been sold in the U.S. market (Figure 3.1). During this time the Volt and the LEAF have become available in all US markets. Meanwhile new makes and models of PEVs have been released in select markets, including the Mitsubishi i-MiEV, the Toyota Prius Plug-in, the Ford C-Max, the Ford Focus EV, the Tesla Model S, the Fisker Karma, and the Coda Sedan. Over time sales of PHEVs like the Volt have continued to outpace sales of BEVs like the Nissan LEAF.

Figure 3.1 Cumulative PHEV and BEV Sales in the U.S., December 2010 to October 2012*

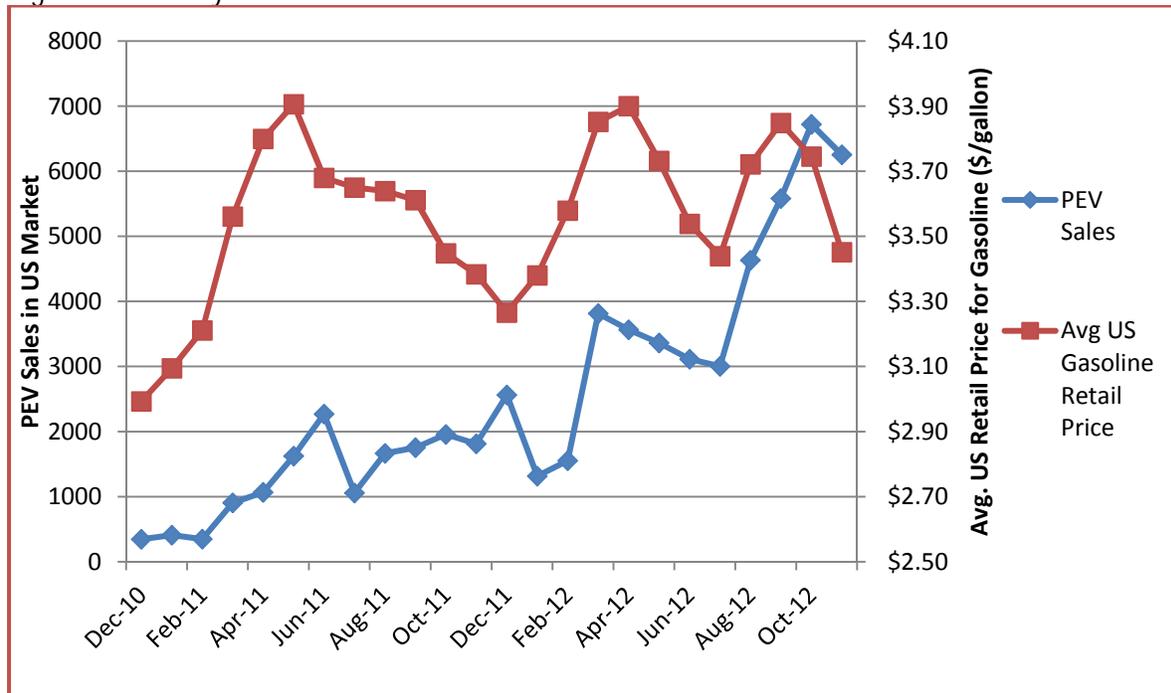


Sources: www.greencarreports.com ; <http://green.autoblog.com>

*Monthly PEV sales data was not available from Tesla, Fisker and Coda

PEV sales in the US are closely tied to trends in the price of gasoline. When US retail gasoline prices increase, PEV sales increase, and when gas prices decrease PEV sales usually decrease slightly (Figure 3.2). The clear exception to this rule is December 2011, when Nissan LEAF and Chevy Volt were first on sale nationwide. With each successive spike in gasoline prices, PEV sales reach new monthly highs. Assuming gas prices do not fall, this trend can be expected to continue new makes and models of PEVs are released and as existing PEV models become available in all US markets.

Figure 3.2 Monthly U.S. PEV Sales and Retail Price of Gasoline



Sources: www.eia.gov/dnav/pet/pet_pri_gnd_dcus_nus_w.htm ; www.greencarreports.com ; <http://green.autoblog.com>

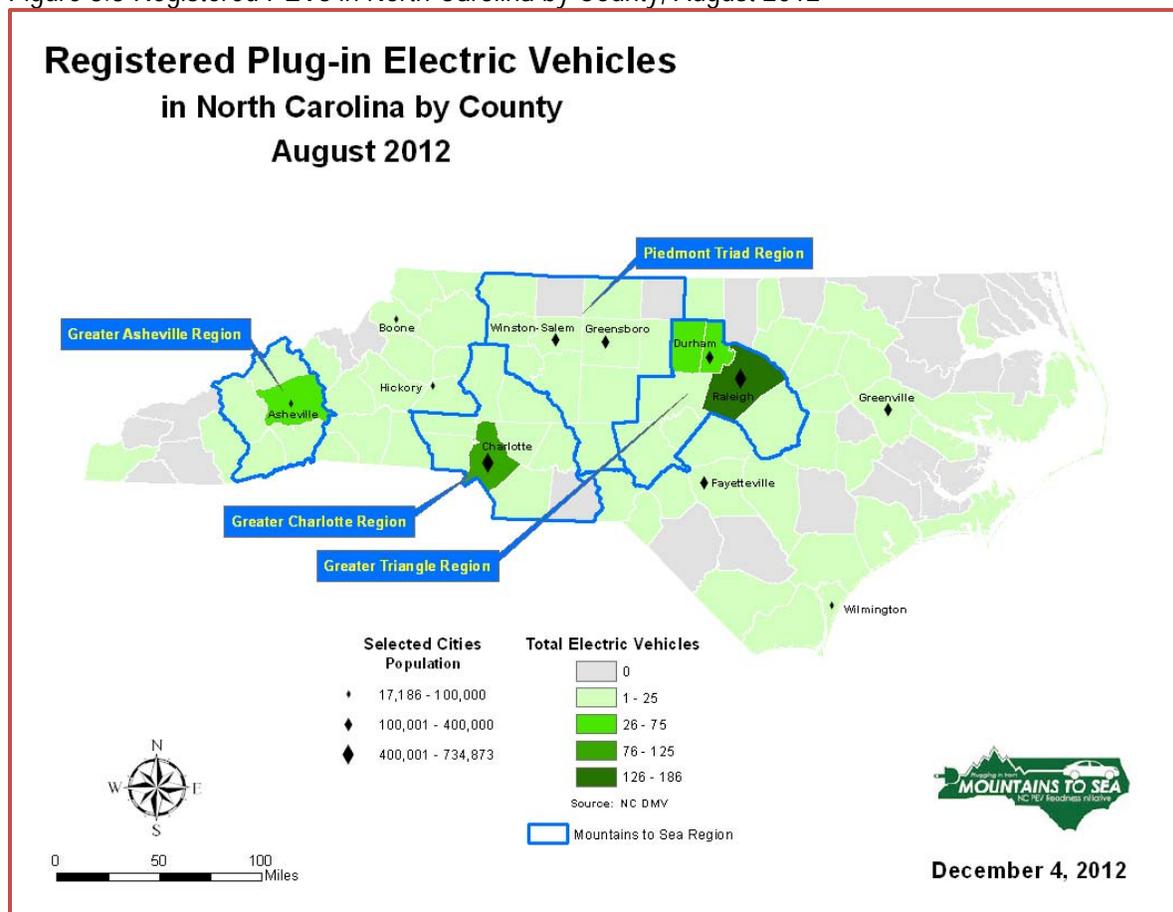
Vehicle Adoption in North Carolina

In fall 2011 the Nissan LEAF and the Chevy Volt became the first mass produced plug-in electric vehicles available for sale in North Carolina markets, including the Asheville region (Figure 3.4). In May 2012 the Mitsubishi i-MiEV became the third electric vehicle available in the state. In 2013 the Ford Focus Electric and Toyota Plug-in Prius are also expected to go on sale in North Carolina.

Vehicle registration data from the North Carolina Department of Motor Vehicles (NCDMV), indicates that 719 plug-in electric vehicles were registered in North Carolina as of August 2012. PEV registrations are highest in the urban counties within the Triangle region, the Greater Charlotte Region and the Greater Asheville Region (Figure 3.3). These registrations include 439 PHEVs and 280 BEVs, reflecting the national trend in which PHEV sales have outpaced BEV sales (Figure 3.7).

PHEV registrations in North Carolina are also dispersed over a larger number of counties than BEV registrations (Figure 3.6).³⁰

Figure 3.3 Registered PEVs in North Carolina by County, August 2012



³⁰ This trend may be due in part to the demographics and driving habits of residents in rural and suburban counties, which are less suited for BEV ownership. It could also be attributed to the larger number of Chevrolet dealerships. In the Asheville region for example, there are two Nissan dealerships and four Chevrolet dealerships.

Figure 3.4 PEV Availability in North Carolina Markets

When	Type	PEV	Driving Range	Battery (kwh)	MSRP
Today	PHEV	Chevy Volt	35 miles + gas	16	\$39,100
		Fisker Karma *	32 miles + gas	16	\$96,000
	BEV	Nissan LEAF	73 miles	24	\$35,200
		Mitsubishi i-Miev	62 miles	16	\$29,900
		Tesla Model S *	300 miles	85	\$88,000
		Coda Electric Sedan *	88 miles	34	\$39,900
2013 Target	PHEV	Toyota Prius Plug-in	11 miles + gas	4.4	\$32,000
		Ford C-Max Energi	21 miles + gas	9	\$33,800
	BEV	Ford Focus Electric	76 miles	23	\$40,000
		Honda Fit EV	82 miles	20	
		Chevrolet Spark		20	
TBA	PHEV	Volvo V70 Plug-in	30 miles + gas		
		VIA Motors VTrux	40 miles + gas		
	BEV	BMW Active E	94 miles		
		Toyota RAV 4 EV	100 miles		
		VW E-Golf	95 miles		

Vehicle Adoption in the Asheville Region

Close to 50 plug-in electric vehicles were registered within the five-county Asheville region as of August 2012.³¹ This PEV registration figure is relatively high for a region of Asheville's size. When compared with PEV adoption across the rest of the state, the Land-of-Sky region is second only to the Triangle in per capita PEV registrations.

Figure 3.5 PEV Registrations per 10,000 Residents by Region

Region	PEV registrations per 10K ppl
Triangle J	1.42
Land of Sky	0.79
Centralina	0.69
Piedmont Triad	0.34
Outside M2S Regions	0.30
North Carolina	0.45

PEVs registered in the Asheville region in August 2012 were evenly distributed between battery electric vehicles like the Nissan LEAF and plug-in hybrids like the Chevy Volt. This data stands in contrast with the state and national trends, which both show PHEVs making up about two thirds of

³¹ Based on interviews with auto dealers and PEV owners, registration data from the NCDMV may understate the total number of PEVs on the road in the Asheville region.

total PEV sales. Based on discussions with local Nissan and Chevrolet dealers, and on the relatively high PEV adoption rate in the Asheville region, this may have more to do with high Nissan LEAF sales, rather than low Chevy Volt sales.

Figure 3.6 BEV and PHEV Registrations in North Carolina by County, August 2012

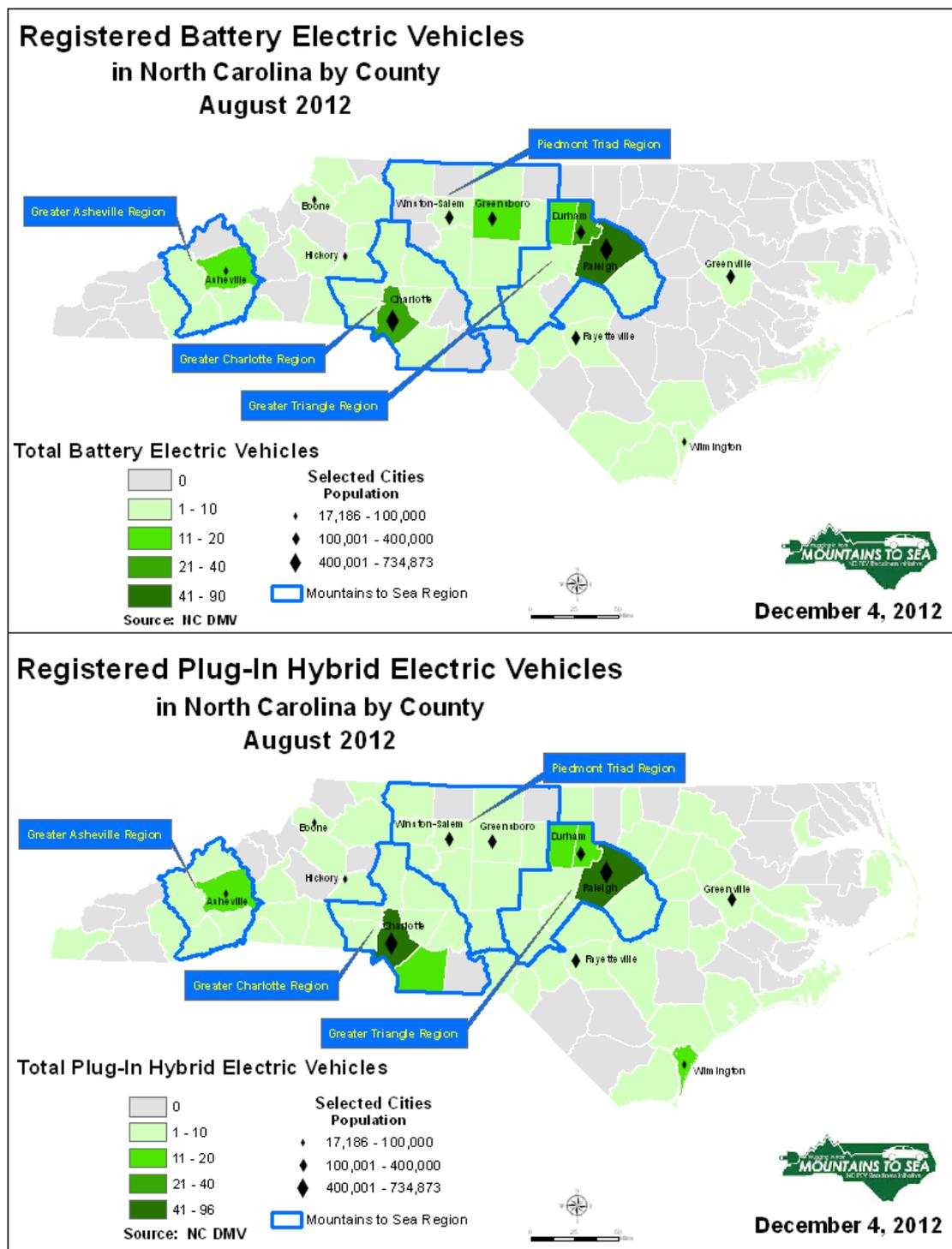
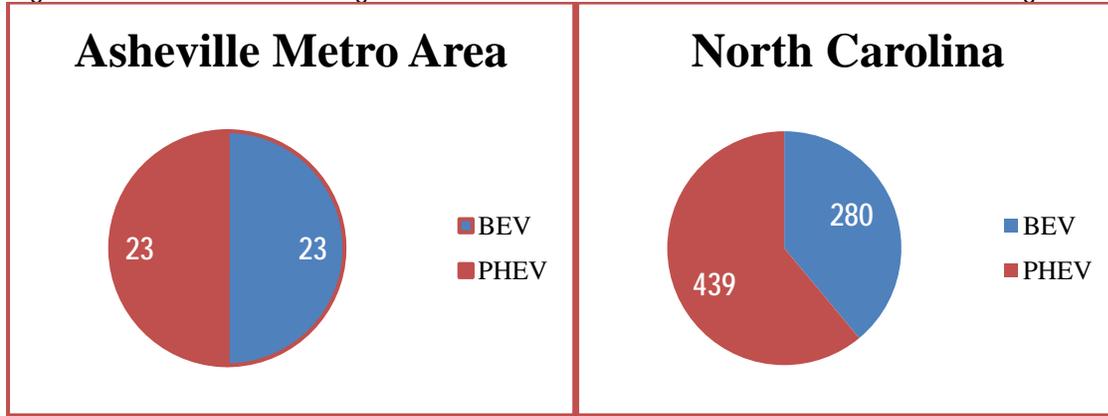
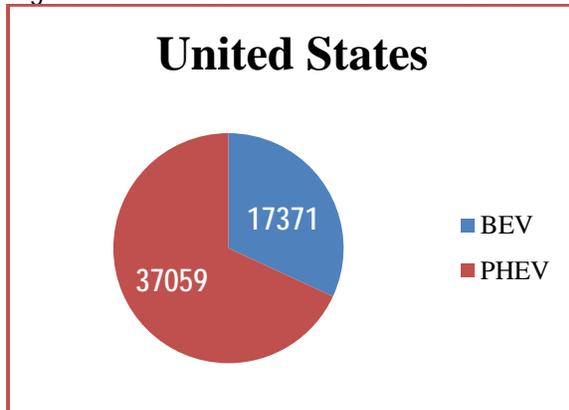


Figure 3.7 BEV and PHEV Registrations in Asheville Metro Area and North Carolina, August 2012



Source: NC Department of Motor Vehicles

Figure 3.8 Cumulative BEV and PHEV Sales in United States, October 2012



Source: www.greencarreports.com ; <http://green.autoblog.com>

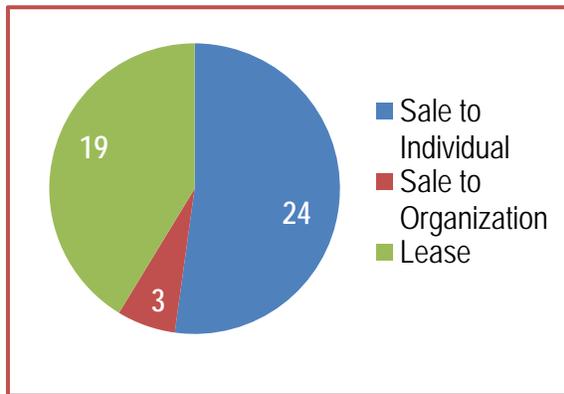
PEV Adoption by Individuals in the Asheville Region

The majority of PEVs registered in the Asheville region have been purchased or leased by individuals. Many of these PEV owners have attended EV Committee meetings and been involved in the community PEV planning process. Most of these PEV owners fit the mold of early adopters, especially owners of BEVs, such as the Nissan LEAF. Almost all of these PEV owners are well informed about PEVs and their benefits. The most common reasons cited by this group for driving a PEV are reduced emissions and reduced dependence on foreign oil. Many of these early adopters are outspoken and eager to tell people about their car, and some even bring their own education & outreach materials to events. Interestingly, many of these PEV owners are over 40 years old, and a significant number are retirees. Other PEV owners include engineers, doctors, small business owners and attorneys.

Figure 3.8 Local PEV Owners



Figure 3.9 PEV Sales and Leases in Asheville Region, August 2012



Source: NC Department of Motor Vehicles, 2012

PEV Adoption by Private and Public Fleets in the Asheville Region

Several public and private fleets in the Asheville region have purchased or leased plug-in electric vehicles, with more considering shifting portions of existing fleets as vehicle availability improves. Examples include the City of Asheville, Buncombe County, Eaton, A-Loft Hotel, Progress Energy Carolinas and Adelaide Spa.

Most PEV fleet vehicles in the Asheville region were purchased or leased by organizations interested in meeting environmental goals, branding themselves as green, or promoting PEV technology. Although PEVs offer significant savings on the cost of fuel, none of these fleets cited this as a primary motivation for using an electric vehicle.

Figure 3.10 Asheville Police Department's Chevy Volt



Fleet adoption of PEVs may be expected to grow faster if the business case can be made to them. A new report from Pike Research that compared the total cost of ownership (TCO) of alternative and conventional fuel vehicles, showed that BEVs offer the lowest TCO for a majority of fleet applications in the United States, assuming that the operator is able to claim the \$7,500 federal tax credit.³² In addition, the plug-in hybrid was projected to offer a lower TCO than the mid-sized gasoline sedan in most scenarios, especially for vehicles with a lifespan at or above 120,000 miles. According to a total cost of ownership study by EPRI, PEVs can have a 2 to 6 year payback period, which can save fleets a significant portion of their operations and maintenance costs over a 10 year duty cycle.³³ Findings from a NC PEV Taskforce survey of fleet managers across North Carolina found that 65% of respondents utilize vehicles in the range of 7 to 10 years and 34% keep vehicles for 10 or more years which allow for PEV total cost of ownership savings to accrue.³⁴ If appropriate PEV applications can be identified, these findings suggest that a business case for PEV ownership can already be made to significant portion fleets in North Carolina. As gas prices continue to rise over \$4, the equation will tilt further toward options like PEVs that reduce gasoline use and insulate fleet budgets from volatile price shocks.

PEV adoption among local governments may be hindered in part by their tax exempt status, which prevents them from taking the \$7,500 federal tax credit. Although it is possible for dealers to pass the tax credit on through lease agreements, public fleet managers rarely lease vehicles.

Auto Dealers

There are currently seven dealerships in the Asheville region that are selling and leasing PEVs. The Chevy Volt is available for purchase at Asheville Chevrolet, Boyd Automotive, Sunshine Chevrolet and Waynesville Automotive (Figure 3.11). The Nissan LEAF is on sale at Anderson Nissan and Hunter Nissan. In May 2012 Skyland Automotive began selling the Mitsubishi i-MiEV.

The CVC has formed working relationships with all of these dealerships and educated them about PEV readiness efforts in the Asheville region. The CVC currently provides marketing support to auto dealers in the region selling PEVs by:

- Creating opportunities to enter PEVs into local festivals, expos and EV events (e.g. Bele Chere, holiday parades, EV Test Drive events)
- Providing dealers with *Public EV Charging Station Map* handouts to distribute to car buyers
- Providing dealership contact information and PEV brochures to CVC members and posting on the CVC website

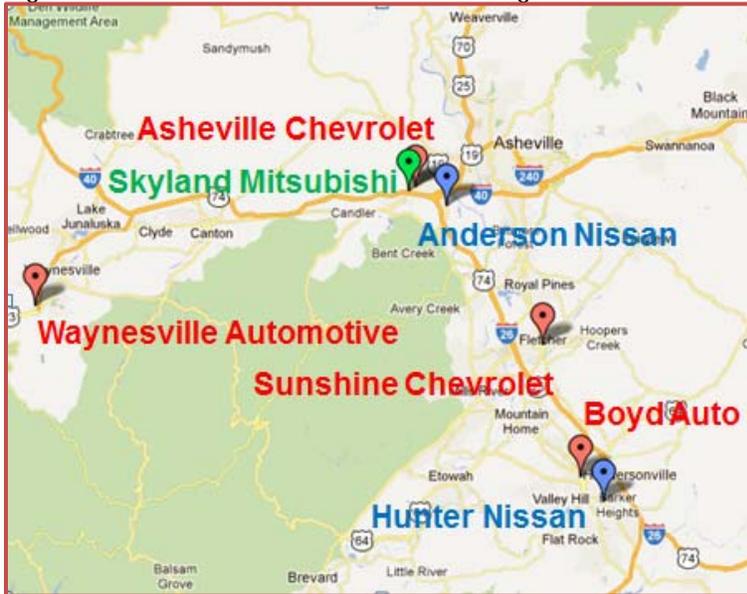
Dealerships are also periodically contacted by the CVC for PEV sales figures and demographics.

³² <http://www.pikeresearch.com/newsroom/alternative-fuel-vehicles-offer-fleet-operators-lower-total-cost-of-ownership-hedge-against-future-fuel-price-shocks>

³³ Duvall, Mark "Electric Transportation" Presentation at Energy and Climate Change Research Seminar on May 18th 2012.

³⁴ NC Solar Center. "PEV Incentives Analysis and Options for North Carolina". September 2012

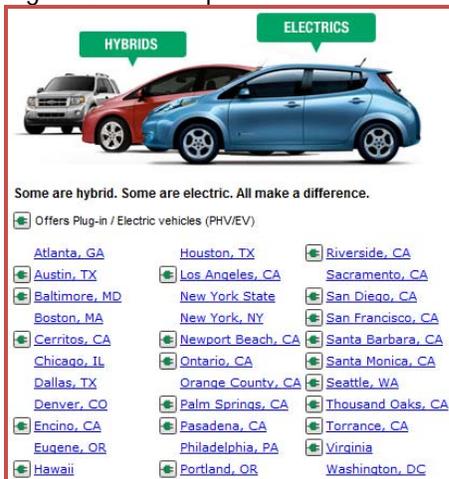
Figure 3.11 PEV Dealers in the Asheville Region



Car Rental Agencies

PEV rentals will provide PEVs with exposure to a broader audience beyond early adopters that includes tourists, potential PEV buyers, corporate customers and students. There are currently no car rental agencies in the Asheville region with electric vehicles in their fleet. Rental car agencies, such as Hertz and Enterprise, have deployed PEVs in larger markets, but have been waiting to see demand increase before offering PEVs in smaller markets such as Asheville. During the PEV planning process the CVC reached out to rental agencies, including U-Save and Enterprise, about partnerships to introduce PEVs into their rental fleets.

Figure 3.12 Enterprise PEV Rental Advertisement



Piloting PEVs in car share programs represents an alternative avenue to expose existing and future car buyers to PEVs. Car sharing programs allow people to rent cars for short periods of time, often by the hour, and are targeted to customers who make only occasional use of a vehicle, as well as

others who would like occasional access to a vehicle of a different type than the primary vehicle they use from day to day. Several local organizations in the Asheville are interested in launching a car share program (UNC-Asheville, the City of Asheville, the Western North Carolina Alliance) and all are receptive to the idea of including a PEV in a car share fleet. Car share vendors, including Enterprise WeCar and U-Haul, have also expressed a willingness to use PEVs in such a car share program. The most likely scenario for an Asheville-based car share program would be an initial fleet of four vehicles with designated parking spaces in downtown Asheville and on the UNC-Asheville campus. The CVC suggested deploying a PEV as one of the four vehicles and installing a charging station at the dedicated parking space for that vehicle. One of the hurdles previously encountered by City of Asheville staff attempting to launch a car share program was finding convenient downtown parking spaces that the City was willing to dedicate for car sharing.

Figure 3.13 Hertz PEV Rental Advertisement



Figure 3.14 Nissan LEAF in City of Greenville Enterprise WeCar Fleet



Incentives

Utilizing incentives is an important way to support the level of early adoption necessary to make PEVs a common consumer choice. The CVC determined that the feasibility and impact of incentives was much greater at the state level than in the Asheville region. As a result, the CVC worked primarily through the NC PEV Taskforce Incentives Working Group to develop vehicle incentive strategies. The NC PEV Taskforce Incentives Working Group identified existing incentives available in North Carolina and evaluated various financial and non-financial incentives that could encourage organizations and individuals to drive PEVs. Existing PEV incentives in North Carolina are detailed below, along with several popular incentives that are not available to PEV owners in North Carolina. Some of the most popular types of incentives used by governments, utilities and private businesses are summarized in Figure 3.15.

PEV Incentives Available in North Carolina

Federal Government Incentives

- The **Qualified Plug-In Electric Drive Motor Vehicle Tax Credit with a value of up to \$7,500** is available for the purchase of new plug-in electric vehicle that draws propulsion from batteries with at least four kilowatt hours of capacity. The minimum credit amount is \$2,500, and the credit may be up to \$7,500, based on each vehicle's traction battery capacity and the gross vehicle weight rating.³⁵ Car buyers that purchase PEVs with batteries that are 16 kWh or larger are able to take the full \$7,500 tax credit.³⁶ The credit will begin to be phased out for each manufacturer after 200,000 qualified plug-in electric drive vehicles have been sold by that manufacturer for use in the United States.

State Government Incentives

- North Carolina has **no state tax credit or rebate** for the purchase of an electric vehicle or installation of electric vehicle service equipment. States such as California, Tennessee, South Carolina and Georgia offer PEV tax incentives that range in value from \$2,000 to \$5,000.
- As per 2011 legislation, qualified plug-in electric vehicles may use North Carolina **HOV lanes**, regardless of the number of occupants.³⁷ As of 2012 the only HOV lanes in the state were located in the Charlotte region and the Triangle region. There are no current plans for HOV lanes in the Asheville metro area.
- Qualified plug-in electric vehicles are **exempt from annual state emissions inspection** requirements. This fee in North Carolina is \$30.³⁸

Utility Incentives

- Progress Energy Carolinas currently offers a **whole house time-of-use rate** which may be utilized by customers with PEVs.

Local Incentives

- All public charging station hosts in the Asheville region are offering free charging to promote PEV adoption.

³⁵ It is important to note that the tax credit does not actually reduce the purchase price of an electric car. Buyers can claim the rebate on their next tax return, but only receive a rebate that matches their tax liability. (e.g. If an individual owes \$3000 in taxes, they will only receive \$3000 back)

³⁶ BEVs and PHEV40s (e.g. Chevy Volt) have batteries large enough for the full \$7,500 credit to be taken. PHEV10s like the Toyota Plug-in Prius have smaller batteries that will only allow buyers to claim a certain portion of the credit.

³⁷ Reference House Bill 222, 2011, Senate Bill 194, 2011, and North Carolina General Statutes 20-4.01 and 20-146.2.

³⁸ Visit <http://www.ncdot.gov/dmv/vehicle/registration/inspection/> for more information. See also: http://daq.state.nc.us/motor/inspect/emission_faq.shtml#G14

Figure 3.15 Potential PEV Incentives

Financial Incentive	Responsible Party
Rebates or tax credits on vehicles	Federal and state governments
Exemptions from vehicle registration taxes or license fees	State governments
Discounted tolls and parking fares	City, county, and state governments and property managers
Tax rebates for charging equipment and installation	Federal and state governments
Discounted electricity rates for EV users from utilities	Utilities
Non-financial Incentive	Responsible Party
Free charging at public and workplace charging stations	Property managers, employers, local governments
Access to restricted highway lanes	State governments

The NC PEV Taskforce Incentives Working Group also conducted a survey of 187 fleet managers from across North Carolina and used finding from the report to inform state PEV incentive recommendations.³⁹ Below are key findings from the survey.

- 65% of respondents utilize vehicles in the range of 7-10 years, and almost 34% keep vehicles 10 or more years which allow for PEV total cost of ownership savings to accrue.
- 83% of respondents stated that their organization would consider purchasing a PEV that initially cost more than a conventional vehicle if they could recoup 100% of the difference between the PEV and conventional vehicles. 69% stated they would purchase a PEV if 60% of the price difference was provided for.
- Out of a choice that included seven financial and non-financial incentives, 49% of respondents rated grants as extremely effective at incentivizing PEV purchases, while 46% considered vehicle purchase price rebates extremely effective

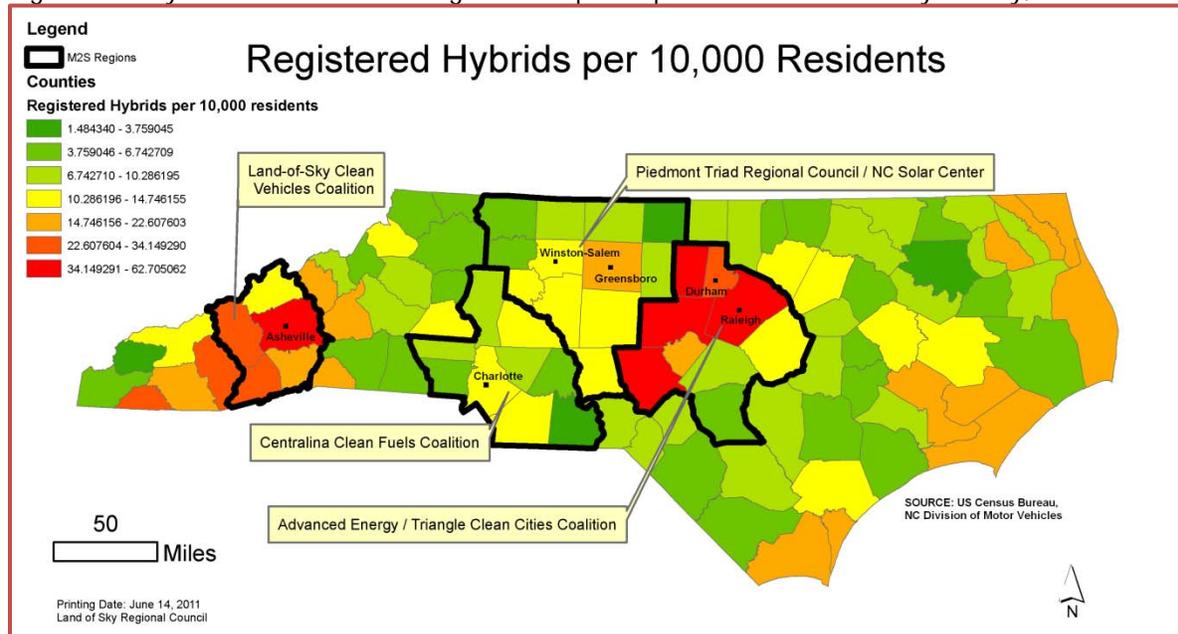
³⁹ NC Solar Center. "PEV Incentives Analysis and Options for North Carolina". September 2012.

3.3 Projected PEV Adoption

PEV deployment in the Asheville region is projected to be above average, relative to the size of the population. Such projections are partially based on historical adoption of hybrid electric vehicles, such as the Toyota Prius. Hybrid adoption is being used as a proxy to predict plug-in electric vehicle adoption.

Data from the NC DMV indicates that in 2011 per capita hybrid ownership in the Asheville region was very high relative to other regions and the rest of the state. In fact, in 2011 there were more hybrid electric vehicles registered in Buncombe County than there were in Mecklenburg County.

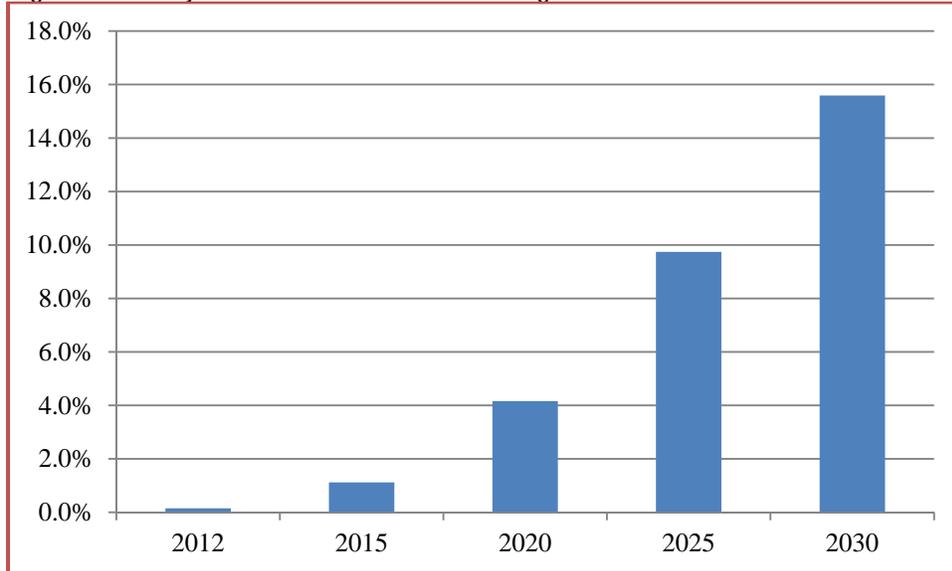
Figure 3.16 Hybrid Electric Vehicle Registrations per Capita in North Carolina by County, 2010



The Land-of-Sky Clean Vehicles Coalition worked with Progress Energy to project future PEV sales in the five-county Asheville PEV planning region using electric vehicle sales forecasts developed by the Electric Power Research Institute (EPRI). The Electric Power Research Institute (EPRI) has modeled the growth of the PEV market at the county level in the US over the next 20 years. This model can be used as a starting point for discussions about what we can expect future PEV deployment to look like in the Asheville region.

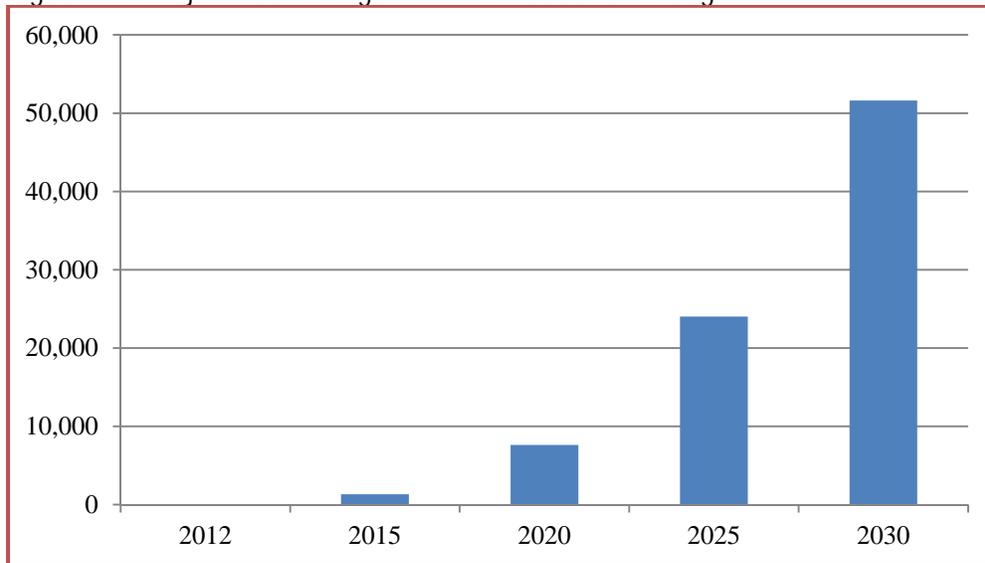
As with the overall market in the state, analysts seem to agree that the PEV market in the Asheville area will grow slowly over the next few years, but it is expected to pick up dramatically. Uncertainty in the degree of this increase grows when factoring in the possible impacts of increases in the costs per gallon of petroleum, but the increase itself is not often questioned.

Figure 3.17 Projected PEV Sales as Percentage of Annual Vehicle Sales in Asheville Region



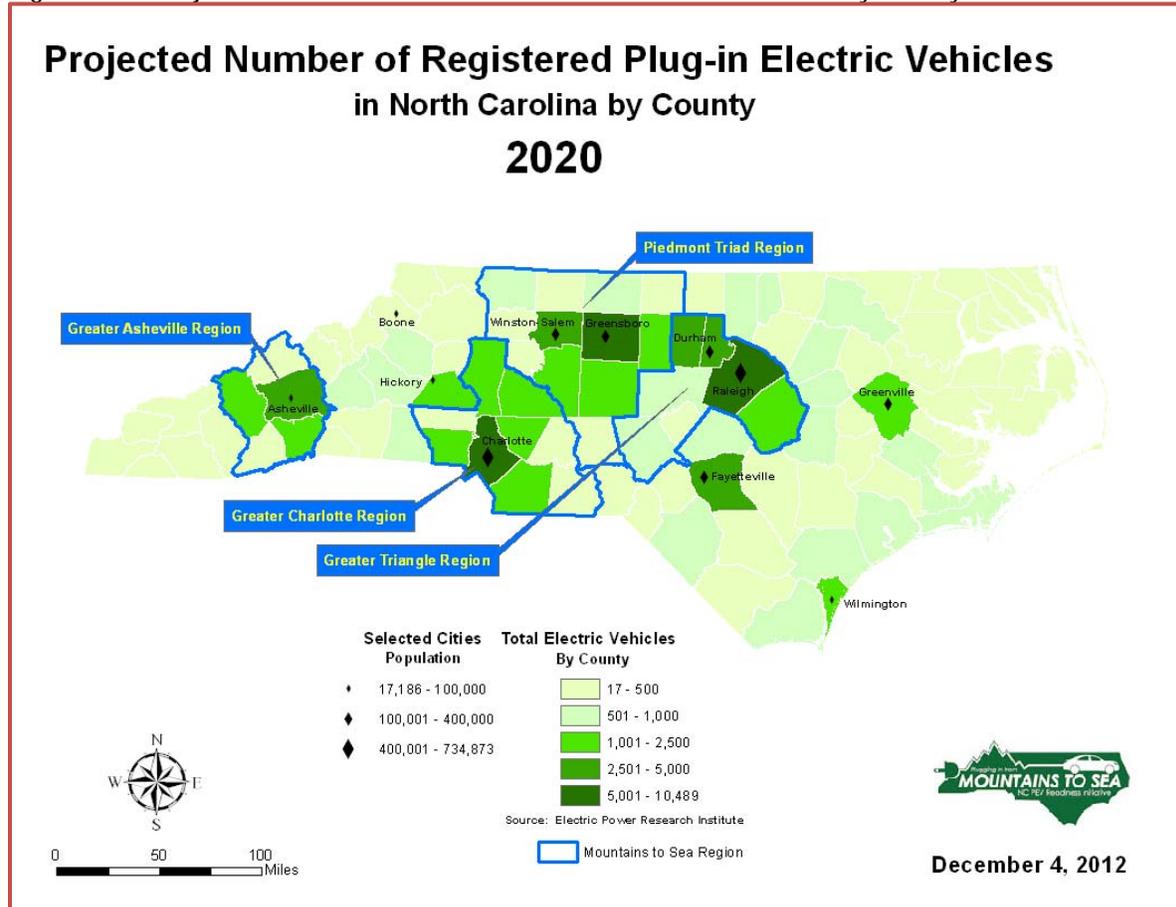
PEV sales are projected to rise to over 4% of total vehicle sales in the Asheville region by 2020, and nearly 16% by 2030. Over that same period the number of registered PEVs in the region is expected to near 8,000 by 2020 and exceed 50,000 by 2030.

Figure 3.18 Projected PEV Registrations in the Asheville Region



The majority of PEV sales are expected to be concentrated in Buncombe County, Henderson County, and Haywood County. PEV sales per capita are projected to be especially high in Buncombe County.

Figure 3.19 Projection of 2020 Cumulative PEV Sales in North Carolina by County



3.4 Vehicle Deployment Planning

Vehicle Deployment Goals

- Facilitate PEV adoption by fleets, rental agencies & individuals
- Track PEV sales

Vehicle Deployment Barriers

The Vehicle Deployment Working Group developed the following list of barriers and opportunities related to increasing PEV adoption in fleets, rental car agencies, and the general public.

- Initial purchase price
- Battery Electric Vehicle driving range
- Unproven technology
- Lack of vehicle choice
- Limited awareness of PEV benefits (TCO and non-financial)
- Lack of EV and EVSE information at point of sale
- Lack of policies to incentivize green fleet purchases

Vehicle Deployment Strategies

The Stakeholder Taskforce identified a number of potential strategies to address the identified barriers and opportunities related to increasing the number of PEVs in operation within the Asheville region, which are detailed in the figure below.

<i>Category</i>	<i>Strategy</i>	<i>Responsible Party</i>	<i>Time Frame*</i>	<i>Priority Level**</i>
Fleets	Fleet assessments ,PEV workshops, and meetings with fleet managers	CVC staff, WRP, public & private fleets	Ongoing	High
Fleets	Tie AFV use to organizational sustainability goals	Local governments, public & private fleets, CVC	Short-term	
Fleets	Develop AFV purchase policies within regional fleets	CVC staff, WRP, public & private fleets	Mid-term	
Marketing	Joint marketing of PV and EV by auto dealers and solar installers	Solar PV installers, auto dealers, CVC	Mid-term	High
Marketing	Distribute guidance info on EV benefits & incentives to dealers	CVC	Short-term	
Funding	Grant writing to help finance strategic PEV deployment in fleets	CVC	Ongoing	High
Rentals	Introduce PEVs into car sharing program	WNCA, UNCA, City of Asheville, Rental car agencies	Mid-term	High
Rentals	Form partnerships to introduce PEVs in rental fleets	CVC, Rental car agencies, hotels, Brightfield, NC Green Travel	Short-term	
<i>Category</i>	<i>State-level Strategy</i>	<i>Responsible Party</i>	<i>Time Frame</i>	<i>Priority Level</i>
Incentives	Encourage state legislation to eliminate NC Highway Use Tax for PEV buyers or a point-of-sale PEV rebate	NCPEVTF Incentives Working Group, NCSEA, NC General Assembly	Short-term	High
Tracking	NCPEVTF will periodically collect PEV registration data by county from NC DMV	NCPEVTF Vehicles Working Group, NC DMV	Ongoing	
Marketing	Work with auto dealers to create a NC GreenPower marketing package for PEV buyers	NCPEVTF Vehicles Working Group, NCGreenpower, Auto dealers	Short-term	

*Short term (1 year or less); Medium-term (1 to 2 years); Long-term (More than 2 years)

**Strategies with a “High” priority level received the highest scores in a survey that asked stakeholders to rank their top 5 strategies. All strategies shown in the table were flagged as priorities by a majority of stakeholders in working group and EV Committee meetings.

Technical Assistance to Fleet Managers

Fleets can lead by example. Adopting clean vehicle options into fleets helps regions meet air quality standards and improves fleet image. Large fleet purchases also help to drive purchase price down as economies of scale for PEV production are reached. Technical assistance to fleet managers will be the initial and primary tool that the CVC will use to promote vehicle deployment in the Asheville region.

- **PEV workshops** represent a first step in assisting fleet managers with PEV adoption. These sessions can help fleet managers decide if there are applications for PEVs in their fleet, and lay out first steps and considerations for fleet managers interested purchasing a PEV.

Example: In August 2012 the CVC and Advanced Energy organized a PEV Workshop for Fleet Managers.

- The CVC will provide additional assistance to CVC member fleets interested in PEV adoption through **one-on-one meetings** and **fleet assessments**. The Clean Vehicles Coalition provides fleet assessments to partners to help them identify alternative fuel vehicle applications in their fleet, including electric vehicle applications, that help them reach organizational goals, such as fuel economy and emissions reduction. Data collected from fleet assessments can also be used to strengthen grant applications for funding to help deploy PEVs.

Example: The Clean Vehicles Coalition provided a fleet assessment to the Town of Weaverville in 2012 to help the Town identify alternative fuel vehicle applications in their fleet, including electric vehicle applications that help them reach goals in their Strategic Energy Plan, including energy efficiency and emissions reduction.

- Through these fleet assessments, the CVC will encourage member organizations to **develop alternative fuel vehicle purchase policies** that can drive future PEV adoption. Alternative fuel vehicle purchase policies are usually developed as a strategy to meet larger organizational sustainability plans and goals. Many local governments and businesses in the region have developed Sustainability Plans or Strategic Energy Management Plans that lay out goals for improving the sustainability and energy efficiency of their facilities and operations. A sustainability plan for fleets is an obvious extension from the traditional focus on facilities. The CVC will encourage decision makers within member organizations to **tie PEV use to organizational sustainability goals**. Waste Reduction Partners, which helped many local governments in the region draft energy plans, has agreed to market CVC fleet assessment services to clients.

Example: The City of Asheville replaced one of their police department fleet vehicles with a Chevy Volt as part of an alternative fuel vehicle purchase policy that was developed to help the city meet the greenhouse gas emissions reduction goal in their Sustainability Plan

Marketing

While the high initial purchase price of PEVs is difficult to address at the regional level, effective marketing to car buyers on the reasons to drive electric, such as the low total cost of ownership and low emissions, can help them justify the higher upfront costs.

- The CVC will continue to **distribute guidance info on EV benefits & incentives to auto dealers** in the form of handouts and online resources for dealers post on their website, such as Total Cost of Ownership (TCO) calculators, vehicle emissions calculators, and charging station maps.

Example: The AFDC Vehicle Cost Calculator (www.afdc.energy.gov/calc) uses basic information about your driving habits to calculate and compare the total cost of ownership and emissions for makes and models of most vehicles, including alternative fuel and advanced technology vehicles. The CVC has provided EV dealers with handouts listing the location of public charging stations in the region.

- Recent consumer research suggests a significant overlap between PEV buyers and solar PV customer demographics. One survey of current PEV owners found that a third of them already own or plan to install solar PV at their home.⁴⁰ During the planning period the CVC hosted a meeting with solar installers, EVSE installers and auto dealers to explore the idea of **PV-EV joint marketing partnerships between solar PV installers and auto dealers** as a means of sharing customers, increasing business for both industry groups, and making it easier to drive zero emissions PEVs. The CVC will host a follow-up meeting with auto dealers and solar PV installers to evaluate joint marketing strategies targeting PEV buyers and solar PV customers, and set a reasonable short term marketing goal, such as the creation of a “PV-EV” flyer for dealers and solar installers to distribute to customers. In the long term the CVC will support closer partnerships that create special offers on solar PV systems for PEV buyers.

Example 1: Ford Focus Electric buyers will have the option to purchase a 2.5 kilowatt rooftop solar system from SunPower

Example 2: REC Solar plans to offer reduced price solar systems to auto dealers that market their residential solar PV system to PEV buyers

Rentals

While many early adopters are well versed in the reasons the drive electric, the average car buyer will be more cautious with adopting new technology, especially if they have never driven a PEV or seen one in person. PEV rentals provide an opportunity to expand the PEV experience to a broader audience that includes tourists, potential PEV buyers, and students. PEV rentals allow for affordable access to PEV technology and create try-before-you-buy opportunities for potential PEV buyers. As of Fall 2012, there were no rental agencies offering PEVs. During the PEV planning process the EV Committee reached out to rental agencies about offering PEV rentals in the Asheville area. Most

⁴⁰ REC Solar presentation at 2012 ASES Conference

rental car agencies have deployed PEVs in larger markets, but have been waiting to see demand increase before offering PEVs in smaller markets such as Asheville.

- In the coming years CVC members will **form partnerships to facilitate the deployment of PEVs in rental fleets**. Over the next year the CVC will encourage rental car agencies to deploy PHEVs in their fleet as part of a pilot program to assess demand for PEV rentals and glean lessons for marketing to target demographics such as tourists, business travelers, and potential PEV buyers. In addition, Brightfield Transportation Solutions is currently partnering with a local car rental company, U-Save, on a tourism development grant proposal to deploy PEV rentals at U-Save locations and install charging stations at partnering hotels.

Example: Enterprise Rent-A-Car has added Nissan LEAFs and Chevy Volts to their rental fleets in twenty cities across the US.

- PEV adoption among rental car agencies can also be incentivized through the NC Green Travel Initiative. The NC Green Travel Initiative is a free program created by the NC Department of Environment and Natural Resources (NCDENR) to promote economic growth and environmental stewardship in the travel and hospitality sector through the recognition of "green" travel-oriented businesses. Over the next year the CVC will help NCDENR develop a sustainable transportation category that recognizes rental car agencies that offer low emission vehicles, including PEVs.
- The CVC will host meetings with the City of Asheville, UNC-Asheville and the Western North Carolina Alliance to **explore scenarios for a car share program that uses one or more PEVs**. Enterprise WeCar and U-Haul U-Car Share, which have already submitted offers to the City of Asheville in the past, both expressed a willingness to incorporate a PEV into an Asheville-based car share fleet. The CVC will look to local EVSE manufacturers and vendors to facilitate the deployment of charging infrastructure for PEVs in this car share program.

Example: The City of Greenville, S.C. contracted with Enterprise WeCar to launch a car share fleet that includes a Chevy Volt and a Nissan LEAF with dedicated parking spaces in a downtown municipal parking garage. WeCar program members can rent these vehicles at an hourly rate of \$11.50 or at a daily rate of \$68.

Funding

Despite the low total cost of ownership and reduced emissions associated with PEV, many fleet managers will still find the initial price premium of PEVs too high to justify or decide that the payback period is too slow. Outside funding from grants and other sources for strategic vehicle deployment in fleets can help make PEVs a more familiar and proven technology, encourage peer organizations to consider PEV adoption, and help the CVC learn more about issues and opportunities associated with PEV ownership.

- The CVC and other key stakeholders will **identify funding opportunities and develop grant proposals to help finance strategic PEV deployment in fleets and rental car agencies**. Grant funding will be used to offer vehicle rebates that cover some portion of the initial price premium between a PEV and a conventional vehicle. According to a survey of fleet managers conducted by the NC PEV Task Force, nearly 70% of respondents indicated that their organization would consider purchasing a PEV that initially cost more if a financial incentive were available to recoup up to 60% of that premium.⁴¹

These vehicle rebates will be targeted to public and private fleets that have identified PEV applications in which vehicles will see regular use and be highly visible. Preference will also be given to small local rental car agencies, such as U-Save, which cannot afford to deploy PEVs without grant funding. Participation in the program should also be contingent on basic data collection related to the driving and charging habits.

Example: In 2011 Advanced Energy used grant funding from the NC State Energy Office to offer \$5,000 rebates to 40 residents in the Greater Triangle region that purchased the 2011 Nissan LEAF.

State-level Vehicle Deployment Strategies

Some barriers to PEV adoption, such as the high initial cost of PEVs, can be better addressed at the state level through the NC PEV Taskforce. The CVC will continue to participate in the NCPEVTF working groups on Vehicles and Incentives to promote state level strategies that promote PEV adoption in the Asheville region.

NC PEV Taskforce Incentives Working Group

The CVC will support state incentives proposed by the Incentives Working Group.

- **Vehicle rebates in the amount of \$2,000 per PEV** were ranked by the Incentives and Economic Development Working Group as the highest priority incentive to help increase adoption rates. Respondents of the PEV Fleet Survey and the PEV Prioritization Table both rank rebates as extremely effective. Forty-six percent of PEV Fleet Survey respondents attributed rebates as extremely effective, almost tying with vehicle grants as the most effective way to spur industry growth.

Example 1: The State of Illinois through its Green Fleet Program has been effectively providing vehicle rebates for all alternative fuel vehicles (AFVs) since 1998. Over \$6 million in rebates has been issued through 2011 for the implementation of over 8,000 AFVs statewide. Illinois offers up to \$4,000 or 10% of the total purchase price to offset a portion of the incremental costs of PEVs as compared to conventional vehicles. Funding for this program comes from a \$20 additional license plate renewal fee on private fleets with 10+ vehicles. The program currently has an annual cap of \$1million.

⁴¹ NC Solar Center. "PEV Incentives Analysis and Options for North Carolina". September 2012.

Example 2: Tennessee offers a \$2,500 rebate on Nissan Leafs and Chevy Volts. Tennessee also has the greatest penetration of PEVs per capita and per auto registrations of case-study examples reviewed by the NC PEV Taskforce

- **Tax Credits** are ranked high by respondents to the PEV Prioritization Table, however they are considered by researchers as less effective than a more immediate point of sale or mail in rebate. Tax credits also depend on an applicant's tax liability, hence are perceived as more uncertain or unknown.

Example: The State of South Carolina offers an income tax credit for plug-in electric vehicles equal to \$667, plus \$111 if the vehicle has at least five-kilowatt hours of battery capacity, plus an additional \$111 for each kilowatt-hour of battery capacity in excess of 5kWh. The maximum credit allowed by this section is \$2,000.

- **Sales and use tax exemptions/reductions** are perceived to have a greater effect for less cost to the State. A sales tax exemption or reduction is immediate and automatic at the time of purchase so will have a direct impact on a PEVs "sticker price". The immediacy may push a consumer more who is sitting on the fence about a purchase decision than a tax credit that they will have to wait for. Further, a tax credit often carries a higher cost to the state than a sales and use tax exemption. For example in the U.S. case study states cited in this paper, GA, MD, and SC all offer an income tax credit with maximums ranging between \$2,000 and \$5,000 while North Carolina's highway use tax (HUT), which is used in place of a sales tax, is 3% of the vehicle purchase price. For a \$41,000 PEV such as the Chevy Volt the HUT equates to \$1,230 added to the cost of the vehicle. Eliminating the HUT will cost less than one half of a \$2,000 tax credit to the state. A Faculty Research Working Paper Series study conducted by Harvard University estimates that a " sales tax waiver of mean value (\$1,037) is associated with more than twice as large a demand effect as a tax credit of mean value (\$2,011)"⁴². **Eliminating or reducing the HUT is recommended for North Carolina and would do more to stimulate PEV purchase rates at less expense.**

NC PEV Taskforce Vehicles Working Group

The CVC will rely on the Vehicles Working Group to track PEV registrations and market NC GreenPower to PEV owners.

- In the past the CVC has relied on a survey of local auto dealers to track PEV deployment in the Asheville region. In the future, the CVC will rely primarily on NC DMV registration data acquired through the NC PEV Taskforce Vehicles Working Group to **track state and regional PEV deployment.**
- The CVC will also support Vehicles Working Group with the **creation of a NC GreenPower marketing package for existing and prospective PEV owners.** NC GreenPower is a program that allows utility customers to offset all of their electricity use with blocks of green energy.

⁴² Kelly Sims Gallagher and Erich Muehlegger ", Giving Green to Get Green: Incentives and Consumer Adoption of Hybrid Vehicle Technology " Harvard University, 2008 page 6.