

**DEPLOYMENT ROLLOUT ESTIMATE OF ELECTRIC VEHICLES
2011-2015**

BY



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JANUARY 2011

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Acknowledgements

This study is the result of a group effort. The authors would like to thank our colleague at the Center for Automotive Research, Brett Smith, for his guidance and assistance with content.

Funding for this study was provided by a research grant from General Motors.

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Introduction

The purpose of this study is not to forecast sales of electric vehicles; rather, this study's aim is to estimate electric vehicle deployment by state. In order to create these estimates, CAR examined forecasts of total electric vehicle sales in the U.S. to generate a reasonable approximation of what electric vehicle sales might look like for the period 2012 to 2015. The national estimates used in this paper do not constitute a CAR forecast and only reflect projections that were available at the time of this study. In the study, Table 6 denotes the percentages used by CAR to divide national electric vehicle sales among states. With the state percentages, one could select any forecast and generate state-by-state results for that forecast.

In recent years, numerous announcements have been made by motor vehicle companies—big and small—regarding plans to produce electric-powered or electric-assisted vehicles. These include battery electric (BEV), extended range, plug-in hybrids, and fuel cell vehicles. Many businesses, organizations, communities and states are contemplating what level of support they would like to provide toward the deployment of these vehicles on their roads. This support could take many forms, including installation of recharging infrastructure, creation of monetary purchase incentives, provision of priority parking spaces, access to carpool lanes, purchases of these vehicles, and many other options. In determining whether or not to offer many of these incentives, stakeholders need an idea of how many drivers will be utilizing potential programs. For instance, at the state level, it may be important to know the likely deployment plan of these vehicles across the 50 states, and how such state and local incentives could play a role in determining the timing and quantity of distribution in each state. This information could help policy experts decide how to design incentives, which incentive programs to enact, and how much funding to budget toward particular initiatives.

The Center for Automotive Research (CAR) and its Automotive Communities Partnership (ACP) have undertaken this study to estimate the total number of vehicles projected to be produced each year and the likely deployment in the first few years of production. In addition, using national data on state market shares of hybrid vehicles as a proxy for likely electric vehicle demand, a reasonable estimation for the expected geographic distribution patterns of electric vehicles by state was created.

Automaker Production and Sales Announcements

The following information was gleaned from press releases and news articles during the fall of 2010.

General Motors began production of the Chevrolet Volt in early November with the intent to have initial sales be divided among markets in California, Texas, New York, New Jersey, Connecticut, Michigan, and Washington D.C. by the end of 2010. Within 12-18 months after entering these initial markets, the Volt will be sold nationwide. Production of the Volt will be at GM's Detroit-Hamtramck assembly facility; batteries will be assembled at a facility in Brownstown Township. Both facilities are located in Michigan.¹ According to a GM press release, there will be U.S. sales of 10,000 Volts in 2011 and 45,000 in 2012.²

Nissan plans to begin selling the LEAF in California, Oregon, Washington, Arizona, and Tennessee, beginning in December 2010. Sales will begin in Texas and Hawaii in January 2011; in the spring of 2011, sales will commence in North Carolina, Florida, Washington D.C., Virginia, Maryland, and Georgia. By late 2011, the LEAF will be sold nationwide. Initial production of the LEAF will be in Oppama, Japan; battery production for the LEAF will occur in Zama, Japan. Nissan's Smyrna, Tennessee assembly facility will begin production of the LEAF in 2012. Annual production capacity in Tennessee for the LEAF will eventually be 150,000 vehicles.³ Carlos Ghosn, chief executive of Renault-Nissan, did not release estimates for how many Nissan LEAFs he expected to sell in the first three years; however, he did say that, globally, the LEAF would hit 500,000 annually after three years.⁴

Ford's first all-electric passenger car, the Focus Electric, will be available in late 2011. Initial markets will include 19 cities across 15 states. The cities selected for introduction of the Focus Electric are Atlanta, Austin, Boston, Chicago, Denver, Detroit, Houston, Los Angeles, New York, Orlando, Phoenix, Portland, Raleigh Durham, Richmond, San Diego, San Francisco, Seattle, Tucson, and Washington, D.C. The Focus Electric will be produced at Ford's Michigan Assembly Plant in Wayne, Michigan.⁵ In a press release, Ford indicated that initial markets for the Focus Electric were chosen based on several criteria including past hybrid purchasing trends, utility company collaboration, and commitment to electrification by local governments. Sue Cischke, Ford's Vice President for Sustainability, Environment and Safety Engineering, has stated that during

¹ GM. (2010). "Chevrolet Invites Students Nationwide to an 'Electric' Education." General Motors. November 1, 2010. <http://media.gm.com/content/media/us/en/news/news_detail.brand_gm.html/content/Pages/news/us/en/2010/Nov/1101_volt>.

² GM. (2010). "6,348 Get Behind Wheel During Chevy Volt Unplugged Tour." General Motors. November 24, 2010. <http://media.gm.com/content/media/us/en/news/news_detail.brand_gm.html/content/Pages/news/us/en/2010/Nov/1124_gm_volt_unplugged>.

³ Nissan. (2010). "2011 Nissan LEAF Press Kit: Overview." Nissan North America. <<http://nissannews.com/newsrelease.do;jsessionid=24038E311562C55134F4367FB39A5B1E?&id=2008&mid=>>.

⁴ Wald, Matthew L. (2010). "Nissan Will Sell 500,000 Electric Cars a Year by 2013, Says Chief." New York Times. November 16, 2010. <<http://wheels.blogs.nytimes.com/2010/11/16/nissan-will-sell-500000-electric-cars-a-year-by-2013-says-chief/>>.

⁵ Ford. (2010). "Ford Names First Markets to Sell Focus Electric, The Company's First All-Electric Passenger Car." Ford Motor Company. November 16, 2010. <http://media.fordvehicles.com/article_display.cfm?article_id=33570>.

2012, Ford expects initial annual production of Focus Electrics to fall between that of the Chevrolet Volt (10,000-15,000 units) and the Nissan LEAF (20,000 units).⁶

While the electric vehicles discussed above will eventually be available nationwide, GM, Nissan, and Ford have all chosen initial deployment markets. Although there are different strategies for deployment, some states stand out as important markets. For instance, California is an initial launch state for the Volt, LEAF, and Focus Electric—likely due to its position as the largest automobile market in the U.S., as well as its relatively high penetration of hybrids and regulatory environment conducive to electric vehicle adoption. Other popular states for deployment include Arizona, Michigan (where Ford and GM Headquarters are located), New York, Oregon, Texas, Washington, and the District of Columbia. Table 1 summarizes the initial deployment locations for the three electric vehicles.

Table 1: Initial Deployment States for Selected Electric Vehicles

Model	AZ	CA	CO	CT	DC	FL	GA	IL	MA	MI	NC	NJ	NY	OR	TN	TX	VA	WA
Chevrolet Volt		X		X	X					X		X	X			X		
Nissan LEAF	X	X												X	X			X
Ford Focus Electric	X	X	X		X	X	X	X	X	X	X		X	X		X	X	X

Source: CAR Research

In addition to large automakers like GM, Nissan, and Ford, small producers will also be rolling out electric vehicles. Tesla Motors, which began selling production models of its Tesla Roadster in 2008, is a particularly visible example. Tesla sold 450 vehicles in 2009 and in the beginning of 2010, had built a cumulative total of 1,000 Tesla Roadsters and delivered them to customers in 43 states and 19 countries.⁷ Within a few years, Tesla will begin selling its Model S in the U.S. Other high profile electric vehicles soon to debut in the U.S. include the 2011 Fisker Karma, 2011 Coda Sedan, 2010 MINI E, 2012 Mitsubishi i-MiEV, 2011 smart fortwo electric drive, and 2012 Toyota RAV4 EV.

Some automotive experts have suggested that electric vehicles will make up about five percent of the global auto market by 2020. Derrick Kuzak, Ford’s head of product development, and Prabhakar Patil, CEO of LG Chem, agree with the figure of five percent of the auto market being battery electric vehicles. Nissan’s Ghosn is more optimistic, expecting around 10 percent of the market to be pure electric vehicles, but BorgWarner Inc. CEO, Timothy Manganello, projects that only two to five percent of the market will be electric vehicles by 2020.⁸

⁶ Priddle, Alisa and Shepardson, David. (2010). “Ford ups per-vehicle revenue.” The Detroit News. October 20, 2010. <<http://www.detroitnews.com/article/20101020/AUTO01/10200328/1148/>>.

⁷ Tesla. (2010). “Tesla Celebrates 1,000th Roadster.” January 12, 2010. <<http://www.teslamotors.com/about/press/releases/tesla-celebrates-1000th-roadster>>.

⁸ Automotive News. (2010). “Electric vehicles seen as sliver of 2020 market.” Automotive News Europe. November 22, 2010. <<http://www.autonews.com/apps/pbcs.dll/article?AID=/20101122/ANE/311209996/1193>>.

Fleet Vehicle Investments

Purchases of fleet vehicles have been vital to the deployment of hybrid electric vehicles and will also be an important factor in the successful deployment of full electric vehicles. The federal government has been one of the largest purchasers of hybrid fleet vehicles. In the past two fiscal years, the federal government has purchased 64 percent of all GM Chevy Malibu hybrid models, 29 percent of all Ford Fusion hybrid models, and 14 percent of all Ford Escape hybrids.⁹ Government agencies have said they will purchase electric models being introduced by automakers in the near future. The General Services Administration currently has a solicitation out for 100 electric vehicles and could make a decision on its purchases as early as December.¹⁰

General Electric has announced that the company will purchase 25,000 electric vehicles to be used as part of its own fleet as well as for its fleet customers. At least 15,000 of the vehicles will be used to replace half of the 30,000 vehicles in its global fleet. GE plans to purchase its first 12,000 electric vehicles from GM, beginning with the Chevrolet Volt in 2011. GE has an investment in providing complementary technologies for electric vehicles (such as charging stations), and the company would stand to gain from successful EV deployment—the electric vehicle market could deliver up to \$500 million in GE revenue over the next three years.¹¹

Enterprise Holdings, the largest rental car company in the nation, has announced that it plans to introduce electric vehicles into its fleet of over one million vehicles. Its fleet purchases for the next year will include as many as 500 Nissan LEAF models and as many as 100 Coda EV sedans.¹²

Several corporations have expanded their heavy duty fleets to include electric vehicles as well. Frito-Lay, Staples, and FedEx have all ordered electric delivery trucks. Frito-Lay has ordered 176, Staples has ordered 41, and FedEx has ordered 19.¹³ The vice president of fleet services at Staples has suggested that it is likely that Staples may purchase another 40 electric delivery trucks. One producer of these trucks, Smith Electric Vehicles, has received a \$32 million grant from the U.S. federal government to produce its first 500 electric vehicles, allowing the company to ramp up production and lower costs to customers. Smith's CEO has claimed that the company is on track to

⁹ Keane, Angela Greiling and Green, Jeff. (2010). "Obama Bolsters U.S. Hybrid Auto Sales as Popularity Among Consumers Wanes." Bloomberg. November 23, 2010. <<http://www.bloomberg.com/news/2010-11-23/obama-bolsters-u-s-hybrid-auto-sales-in-waning-consumer-market.html>>.

¹⁰ Medici, Andy. "Feds revving up electric car fleet." Federal Times. November 13, 2010. <<http://www.federaltimes.com/article/20101113/FACILITIES01/11130301/>>.

¹¹ GE. (2010). "GE Announces Largest Single Electric Vehicle Commitment, Commits to Convert Half of Global Fleet By 2015." General Electric. November 11, 2010. <<http://www.genewscenter.com/Press-Releases/GE-ANNOUNCES-LARGEST-SINGLE-ELECTRIC-VEHICLE-COMMITMENT-COMMITS-TO-CONVERT-HALF-OF-GLOBAL-FLEET-BY-2015-2cb0.aspx>>.

¹² King, Danny. (2010). "Public Policy Changes for Fleet Purchases May Quadruple EV Demand – Coalition." Edmunds. November 15, 2010. <<http://blogs.edmunds.com/greencaradvisor/2010/11/public-policy-changes-for-fleet-purchases-may-quadruple-ev-demand---coalition.html>>.

¹³ Ramsey, Mike. (2010). "As Electric Vehicles Arrive, Firms See Payback in Trucks." The Wall Street Journal. December 8, 2010. <<http://online.wsj.com/article/SB10001424052748704584804575644773552573304.html>>.

lower its costs such that, once the government money runs out, the company will not have to increase prices to its customers.

Electric vehicles may be particularly advantageous for use in fleets for several reasons. Fleets generally have higher utilization rates for their vehicles, helping reduce per-mile fueling costs. In addition, electric vehicles have maintenance costs that are about half those of conventional gasoline vehicles. Route predictability that is common for many fleets can reduce range anxiety issues, and fleets can take advantage of cheaper commercial and industrial electricity rates, decreasing the cost of running the vehicle beyond what can be achieved by residential consumers.¹⁴

Government-Industry Partnerships

Clean Cities

Clean Cities is a partnership sponsored by the U.S. Department of Energy's (DOE's) Vehicle Technologies Program. It has almost 90 local coalitions and more than 6,500 public and private stakeholders. The mission of Clean Cities is to reduce petroleum consumption in the transportation sector. On August 26, 2009, the DOE announced the recipients of 25 cost-share grants totaling \$300 million from the American Recovery and Reinvestment Act. Of the 25 projects, 11 involve investment in vehicle electrification. In total, nearly 1,600 electric chargers will be installed and more than 600 electric vehicles will be purchased. Although almost a third of the money went to projects in Texas, New York, and California, the projects that included installation of electric vehicle infrastructure were dispersed across the country, with significant investments occurring in the Midwest.¹⁵ Table 2 displays the Recovery Act Awards for the Alternative Fuels and Advanced Vehicle Pilot Program which included an electric vehicle component.

¹⁴ King, Danny. (2010). "Public Policy Changes for Fleet Purchases May Quadruple EV Demand – Coalition." Edmunds. November 15, 2010. <<http://blogs.edmunds.com/greencaradvisor/2010/11/public-policy-changes-for-fleet-purchases-may-quadruple-ev-demand---coalition.html>>.

¹⁵ U.S. DOE. (2009). "Clean Cities Recovery Act Awards for Alternative and Advanced Vehicles." U.S. Department of Energy, Recovery and Investment, Clean Cities. August 5, 2009. <<http://www.energy.gov/recovery/cleancities.htm>>.

Table 2: Recovery Act Awards for Alternative Fuels and Advanced Vehicle Pilot Program

Project Title	Lead City	State	Electric Chargers	Electric Vehicles
Connecticut Clean Cities Future Fuels Project (Greater New Haven Clean Cities Coalition)	Bethany	CT	7	0
Chicago Area Alternative Fuels Deployment Project (City of Chicago, Department of Environment)	Chicago	IL	131	2
Michigan Green Fleets (Clean Energy Coalition)	Ypsilanti	MI	7	7
Midwest Region Alternative Fuels Project: Public fueling infrastructure for CNG, B20, E85, and electric charge points; AFV using CNG, HEV, PHEV, EV, B20, CNG, E85, and LPG (Metropolitan Energy Information Center)	Kansas City	MO	3	2
Carolinas Blue Skies & Green Jobs Initiative (Triangle J Council of Governments)	Research Triangle Park	NC	132	56
New York Statewide Alternative Fuel Vehicle Program for CNG, LPG, EV, and HEV vehicles and fueling stations (New York State Energy Research and Development Authority)	Albany	NY	75	11
Ohio Advanced Transportation Partnership (Clean Fuels Ohio Clean Cities Coalition)	Columbus	OH	37	38
North Central Texas Alternative Fuel and Advanced Technology Investments (North Central Texas Council of Governments)	Arlington	TX	4	34
Clean Cities Transportation Sector Petroleum Reduction Technologies Program – Utah (Utah Clean Cities Coalition)	Salt Lake City	UT	1	0
Puget Sound Clean Cities Petroleum Reduction Project (Puget Sound Clean Air Agency)	Seattle	WA	1173	202
Wisconsin Clean Transportation Program (State of Wisconsin)	Madison	WI	1	254

Source: U.S. Department of Energy

The EV Project

On August 5, 2010, the DOE awarded a \$99.8 million grant to Electric Transportation Engineering Corporation (eTec), a subsidiary of ECOTality North America for “The EV Project,” which will deploy electric vehicles and charging infrastructure in the United States. Consumers who qualify to participate in the project will receive a free residential charger, and the majority of installation costs will be covered by the project. When applying for the proposal, eTec had the support of more than 40 government and industry partners, including Nissan North America.

Originally the project involved installing approximately 2,500 chargers and deployment of 1,000 Nissan LEAF electric vehicles in each of five strategic markets located in Arizona, California, Oregon, Tennessee, and Washington. Cities selected for

deployment included Phoenix and Tucson (AZ), San Diego (CA), Portland, Eugene, Salem, Corvallis (OR), Seattle (WA), and Nashville, Knoxville, and Chattanooga (TN).¹⁶

In the summer of 2010, the project expanded to include the cities of Dallas/Fort Worth and Houston (TX), Los Angeles (CA), and Washington D.C. and received an additional \$15 million from the DOE. With matching funds from partners, the total funding for eTec's project is \$230 million. In addition, the project expanded to include 6,000 Nissan LEAFs, Chevrolet Volts in some markets, and a total of 15,000 charging stations.¹⁷

ChargePoint America

The ChargePoint America program is a \$37 million program sponsored by Coulomb Technologies and made possible through a \$15 million investment of stimulus money from the U.S. DOE. Ford, Chevrolet, and Smart USA are part of ChargePoint America, which covers nine regions. These regions include Bellevue-Redmond, WA; Sacramento, San Jose-San Francisco Bay Area, and Los Angeles, CA; Austin, TX; Detroit, MI; New York City, NY; Orlando, FL; and Washington D.C. The three automakers plan to offer the Chevrolet Volt, Ford Transit Connect, Ford Focus BEV and smart fortwo electric drive in the nine regions covered by the ChargePoint America program, beginning in 2010 and 2011. Between now and October 2011, the program will install 5,000 220 volt (level 2) charging stations, both public and private, free of charge. In order for individuals to be eligible for a station, they must reside in one of the nine regions and purchase one of the aforementioned vehicles. From then until October 2013, the program will collect data on vehicle charging.¹⁸

Public and commercial charging infrastructure has been installed by Coulomb Technologies in 29 states as well as Washington D.C. and Puerto Rico.¹⁹ Infrastructure has been installed by Coulomb Technologies in Arizona; San Francisco, San Jose, Walnut Creek, and Sonoma, California; Colorado; Washington, D.C.; Florida; Chicago, Illinois; Massachusetts; Detroit, Michigan; Minneapolis, Minnesota; New York; Cary, North Carolina; Ohio; Portland, Oregon; Nashville, Tennessee; Texas; Seattle, Washington; and Wisconsin. Currently, there are 269 public and commercial charging stations operating, according to the ChargePoint map. Of these, 58 stations are in California, 40 are in Texas, 29 are in Michigan, 27 are in Illinois, 23 are in Oregon, 14 are in Florida and 11 each are in New York and Washington.

¹⁶ ECotality. (2009). "ECotality's eTec Awarded \$100 Million for Transportation Electrification." ECotality North America. August 5, 2009. <http://www.ecotality.com/pressreleases/080509_DOE_Ecotality_eTec.pdf>.

¹⁷ ECotality. (2010). "The EV Project Expands To Texas." ECotality North America. July 15, 2010. <http://www.ecotality.com/pressreleases/07142010_Expansion_Texas.pdf>.

¹⁸ ChargePoint America. (2010). "ChargePoint America." Accessed December 2, 2010. <<http://www.chargepointamerica.com/>>.

¹⁹ Coulomb Technologies. (2010). "ChargePoint." Accessed December 2, 2010. <<http://www.mychargepoint.net/>>.

Better Place

Better Place has begun work with stakeholders in California and Hawaii to promote electric vehicle deployment in those states. The U.S. Department of Transportation, via the Metropolitan Transportation Commission, has provided support to Better Place in deploying a switchable battery, electric taxi program to the San Francisco Bay Area in partnership with the cities of San Francisco and San Jose. In Hawaii, Better Place has partnered with Kyo-ya Hotels & Resorts' Sheraton Waikiki Resort and Hawaiian Electric Company. The project involves installing a small number of charge spots in Waikiki and around Oahu.²⁰

Other Partnerships and Programs

Several smaller scale programs to promote successful deployment of electric vehicles have been put in place. Some involve partnerships between communities, universities, businesses, and governmental entities, while others are undertaken by a single stakeholder. The following list highlights a few of these smaller programs:

- The town of Wytheville, VA and local businesses are working with a charging infrastructure provider, Evatran, to field test wireless charging technology at charging stations in town.²¹
- In Oregon, Portland General Electric (PGE) had installed 12 charging stations in Portland and Salem by September 2008.²² Shorepower Technologies was a partner in the project, designing and manufacturing the charging stations. Over the past two years, PGE worked with stakeholders in state and local government, higher education, and businesses to promote EV adoption and as a result, has been able to secure a spot for Oregon as one of the deployment states for "The EV Project."²³
- By 2008, Washington's King County was already providing public charging access at some park-and-ride lots and was adding access at newly constructed garages. The cities of Edmonds and Lacey, WA also offered recharging access near their city halls.²⁴

²⁰ Better Place. (2010). "Global Progress." Accessed December 2, 2010. <<http://www.betterplace.com/global-progress-north-america>>.

²¹ Wilson, Susan. (2010). "Evatran provides a plugless solution for EVs." GREEN.BLORGE. March 1, 2010. <<http://green.blorge.com/2010/03/evatran-provides-a-plugless-solution-for-evs/>>.

²² Doggett, Scott. (2008). "Oregon Utility, Ready for Waves of EVs, Installs Charging Stations in Two Cities." Green Car Advisor. July 3, 2008. <<http://blogs.edmunds.com/greencaradvisor/2008/07/oregon-utility-readying-for-waves-of-evs-installs-charging-stations-in-two-cities.html>>.

²³ PGE. (2010). "Expanding EVs in Oregon." Accessed December 2, 2010. <http://www.portlandgeneral.com/community_environment/initiatives/electric_vehicles/evs_in_oregon/expanding_ev_oregon.aspx>

²⁴ Le, Phuong. (2008). "Electric vehicle plug-in scarcity sparks creativity." Associated Press. October 20, 2008. <<http://www.decatordaily.com/stories/Electric-vehicle-plug-in-scarcity-sparks-creativity,20755?print=1>>.

- In June 2009, the Travis Park United Methodist Church in San Antonio, TX installed a charging station in their parking lot; it was the first publicly accessible vehicle charging station in San Antonio.²⁵
- Houston’s city government has already installed 10 charging stations and is planning on installing 15 more stations. A Houston utility company, NRG, plans to add 40 to 50 rapid-recharging stations around the city. These stations will be installed along Interstate 10 such that a vehicle driving along the route will never be more than five miles from a station. In planning these stations, NRG partnered with retailers such as Starbucks so drivers can keep occupied while their vehicles charge.²⁶

Electric Vehicle Ready Communities

Consumer Demand

Ford indicated that, when choosing initial markets for deploying its electric vehicles, it considered past hybrid purchasing trends, utility company collaboration, and commitment to electrification by local governments. In their “PEV Readiness Study,” Roland Berger Strategy Consultants note that cities play a crucial role in successfully implementing electric vehicles and that they should focus on developing robust plans, engaging and partnering with stakeholders, facilitating permitting, offering a mix of non-financial incentives, and educating consumers.²⁷ Also, when considering consumer readiness, the study examines factors behind consumer demand including environmental sensitivity; status and image considerations; wealth, premium, and total cost of ownership savings; awareness of benefits; and other transit options. These factors have affected hybrid vehicle purchasing decisions in the past, explaining Ford’s rationale in the use of hybrid purchasing trends in deciding its initial markets for deployment.

Consumer demand can also be influenced by incentives; the pattern of hybrid electric vehicle deployment can be partly explained by the incentives offered to consumers. Incentives can be monetary (e.g., grants, rebates, tax credits, loans, or registration fee exemptions) or nonmonetary such as having access to High Occupancy Vehicle (HOV)/High Occupancy Toll (HOT) lanes, discounted or more convenient parking, or exemptions from vehicle inspections and testing. Table 3 displays data on past and present incentives for hybrid vehicles by state.

²⁵ TPUMC. (2009). “Electric Vehicle Charging Station.” Travis Park United Methodist Church. June, 2009. <<http://www.travispark.org/templates/System/details.asp?id=42710&PID=702257>>.

²⁶ Galbraith, Kate. (2010). “With Subsidies, Electric Cars Gaining Foothold in Texas.” The Texas Tribune. July 23, 2010. <<http://www.texastribune.org/texas-energy/energy/subsidies-electric-cars-gaining-foothold-texas/>>.

²⁷ Roland Berger. (2010). “PEV Readiness Study.” Roland Berger Strategy Consultants, Rocky Mountain Institute, Project Get Ready. Fall 2010. <http://www.rolandberger.com/expertise/publications/2010-10-14-rbsc-pub-PEV_Readiness_Study_Electric_Vehicles_in_America.html>.

To examine the correlation between hybrid adoption and hybrid incentives, the leaders in terms of hybrid adoption can be compared to other states. On average, the top ten states in terms of annual hybrids registered per 10,000 residents had 1.7 of the government incentives and 1.2 of the private incentives discussed above. This compares to a national average of only 1.2 government incentives and 1.0 private incentive. This means that among the top fifth of states with greater hybrid adoption, there was an average of 32 percent more incentives than among states nationwide. Table 4 shows the top ten ranked states in terms of hybrid adoption and their incentive programs. Key among these incentives were rebates, tax exemptions, and parking incentives.

Table 4: State Incentive Strategies for Top 10 States in terms of Hybrids per 10,000 Residents

State	Hybrid Penetration Ranking	Incentive Type											Totals		
		Rebates/Grants	Tax Credit/Exemption	Reduced Local Registration Fee	HOV/HOT lanes	Discounted/Convenient Parking	Inspection Exemption	10-Year Plan for Hybrid Adoption	Taxi Use Extension	Green Vehicle Loans	R&D	Insurance Discount	Hotel Discount	Number of Government Incentives	Number of Private Incentives
VT	1										X		0	1	
WA	2		X				X				X		2	1	
CA	3	X			X	X				X	X	X	4	2	
SC	4	X	X								X		2	1	
MA	5		X			X		X				X	3	1	
CT	6		X			X					X		2	1	
VA	7				X	X					X		2	1	
NH	8										X		0	1	
OR	9		X			X					X	X	2	2	
MO	10										X		0	1	
Top 10 AVG		0.2	0.5	0.0	0.2	0.5	0.1	0.1	0.0	0.0	0.1	0.9	0.3	1.7	1.2
USA AVG		0.1	0.3	0.1	0.2	0.3	0.1	0.0	0.0	0.0	0.0	0.9	0.1	1.2	1.0

Source: CAR Research, U.S. Census

Infrastructure

Charging infrastructure will be an important factor influencing adoption of electric vehicles. There are two types of chargers: those for private use installed in homes and businesses and those for public use installed at charging stations. Private chargers are

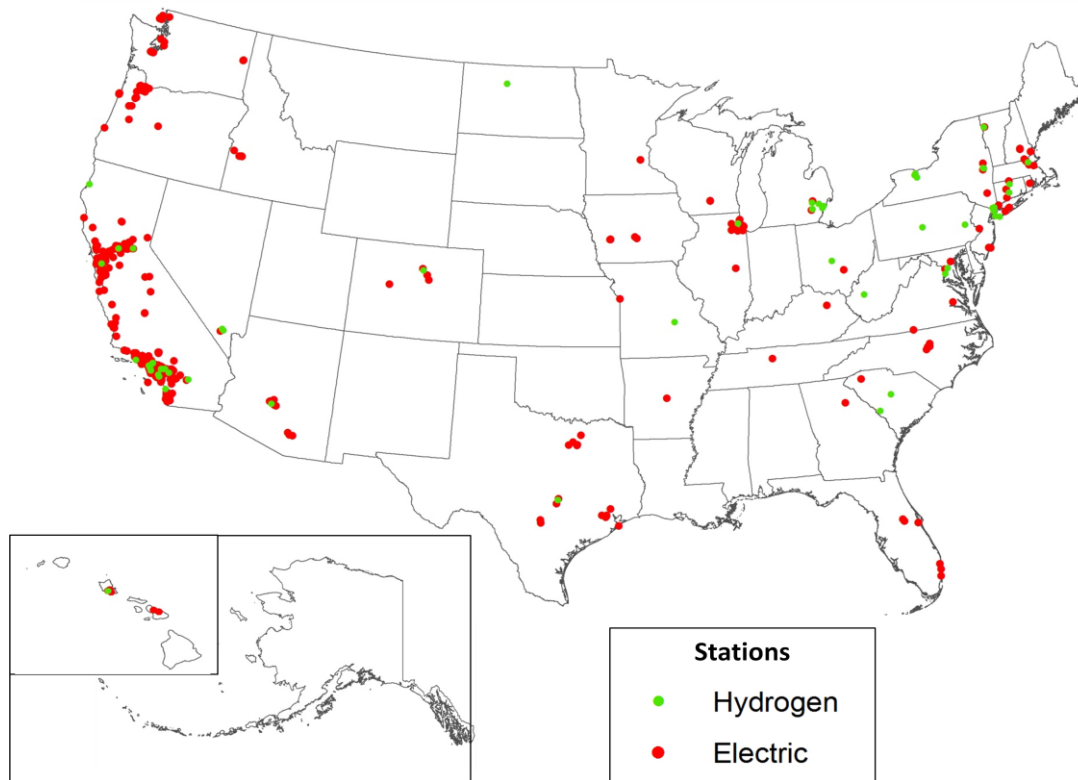
essential for electric vehicle adoption; verified installation of proper charging equipment is often required by automakers for consumers to be eligible to purchase their products. For instance, Nissan requires prospective purchasers of the LEAF to have a home charging unit installed by Nissan's exclusive contractor, AeroVironment, or sign a waiver certifying that they have installed their own charging equipment.

Public charging infrastructure is less vital to successful electric vehicle deployment, but public chargers are still necessary to overcome range anxiety. It is unlikely that a region can successfully deploy electric vehicles without many public charging stations in place. Some believe that, initially, people who purchase electric vehicles will not be recharging at work or other public places; they will live close enough to work to make round trips and recharge at home. The Roland Berger report suggests that even with only one public charging station per 100 electric vehicles, range anxiety should be overcome during the initial deployment of electric vehicles. This situation would obviously change as sales expand nationwide. Communities that already have the beginnings of a public electric vehicle charging network are better poised to expand their network and successfully deploy electric vehicles, overcoming purchaser anxiety.

Currently, California has the majority of the electric recharging stations, with 431 of the total 603 listed in the DOE's database.³³ Distant followers include Oregon with 39, Texas with 22, and Washington with 15. Illinois has 9, and Florida and Hawaii have 7 each. There is also a significant charging station investment in the New England states. Hydrogen vehicles are largely limited to fleet vehicles; hence, nearly all of the hydrogen refueling stations currently in place are for private access only. Figure 1 displays the geographic distribution of electric charging and hydrogen fueling stations.

³³ DOE. (2010). "Alternative Fueling Station Database Custom Query." U.S. Department of Energy, Alternative Fuels & Advanced Vehicles Data Center. November 15, 2010. <http://www.afdc.energy.gov/afdc/fuels/stations_query.html>.

Figure 1: Electric Charging and Hydrogen Fueling Stations in the U.S.



Source: U.S. Department of Energy

Electric Vehicle Deployment Projections

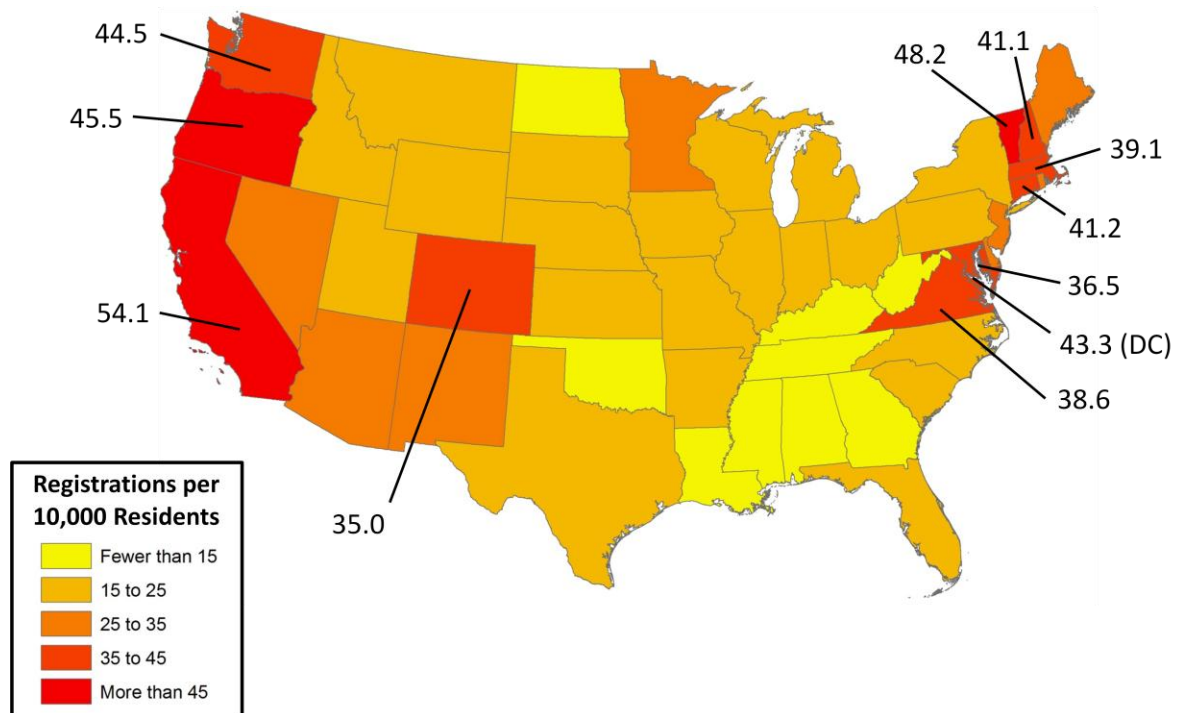
This study assumes that hybrid adoption is a reasonable proxy for early electric vehicle adoption. Spatial patterns between hybrids and electric vehicles are apparent: national hybrid distribution mirrors both strategic electric vehicle deployment regions announced by automakers as well as location of electric charging stations. In this portion of the study, spatial distribution of hybrid sales will be examined, vehicle sales will be estimated by year, and estimates of how many electric vehicles will be sold in each state will be made.

Geographic Distribution of Hybrid Vehicles

Hybrid registrations could be an important indicator in determining electric vehicle demand. By examining registrations of hybrids by state, it can be seen that automakers have chosen initial rollout markets for their electric vehicles which have relatively high percentage of hybrid registrations. California, New York, Texas, and Florida are the largest hybrid markets in the nation (each with over 15,000 retail hybrid registrations in 2009) and have also been selected as initial rollout markets for electric vehicles.

Besides looking at size of current hybrid markets, it is useful to examine their penetration when trying to determine support for adoption. Normalizing registrations by population helps distinguish between which states have populations that have been more willing to purchase hybrids and which simply have large populations. Figure 2 displays retail hybrid registrations per 10,000 residents. Among the highest densities are West Coast, New England, Mid-Atlantic, and Southwestern states, all of which contain states that are deployment locations.

Figure 2: U.S. Retail Hybrid Registrations by State per 10,000 Residents, 2007 - 2009



Source: Polk, U.S. Census

Aggregate data for three years shows that the west coast is clearly the dominant location for hybrid deployment, with California at the top of the list for registrations per 10,000 people and Oregon and Washington taking the third and fourth places respectively. The New England and Mid-Atlantic states follow, with the southwestern states of Arizona, Colorado, and New Mexico taking places just outside of the top 10. Table 5 displays retail hybrid registrations per 10,000 residents for 2007 to 2009.

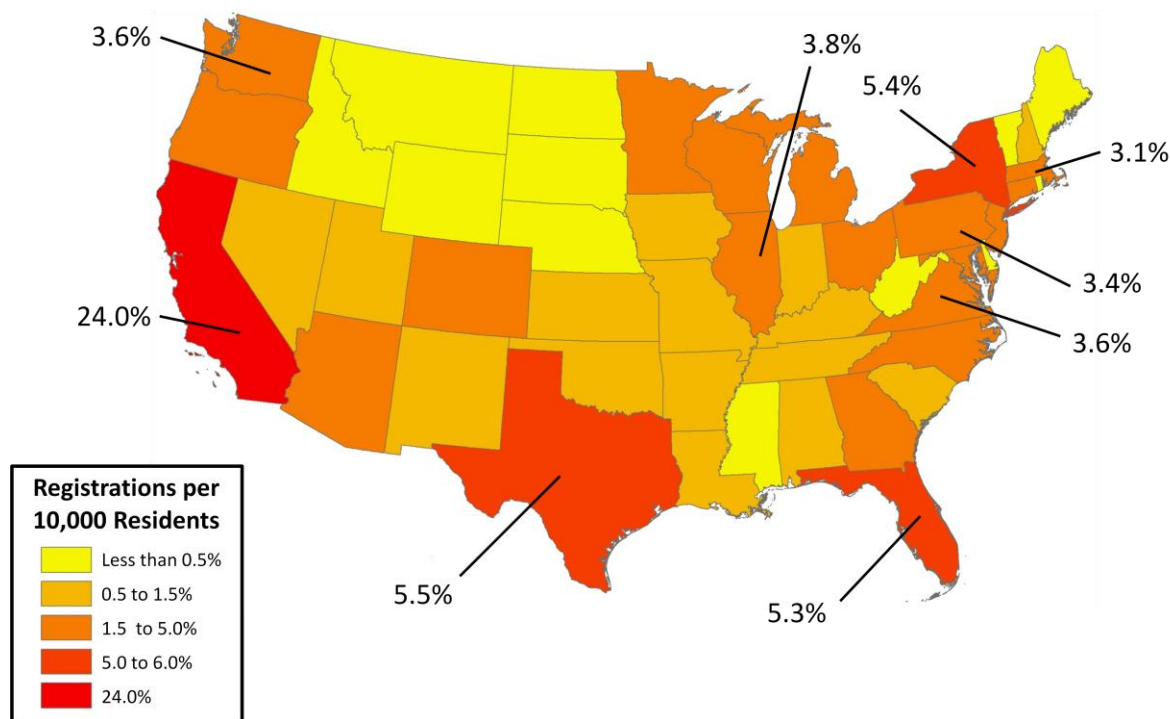
Table 5: State Retail Hybrid Registrations per 10,000 Residents for Top 20 States (2007-2009)

State	Registrations	State	Registrations
California	54.0	Colorado	35.0
Vermont	48.3	Arizona	33.6
Oregon	45.6	Maine	31.1
Washington	44.4	Hawaii	30.3
District of Columbia	43.2	Rhode Island	30.3
Connecticut	41.1	New Mexico	30.2
New Hampshire	41.1	Delaware	27.9
Massachusetts	39.0	New Jersey	26.8
Virginia	38.7	Nevada	25.7
Maryland	36.6	Minnesota	25.1

Source: Polk, U.S. Census

With nearly 200,000 retail hybrid registrations in the past three years, California includes a considerable portion (nearly a quarter) of the nation’s hybrid fleet. Distant followers include Texas, New York, and Florida, which have between five and six percent of new hybrid sales from 2007 to 2009. More than half of all states have less than one percent of the hybrid fleet for these years. Figure 3 depicts this distribution graphically; Table 6 contains the actual number of retail hybrid registrations and the percentage of total hybrid registrations by state.

Figure 3: U.S. Retail Hybrid Registrations: 2007-2009 (Percent of Total Hybrid Fleet)



Source: Polk

Table 6: U.S. Retail Hybrid Registrations by State: 2007-2009 (Percent of Total Hybrid Fleet)

State	Registrations	Percent	State	Registrations	Percent	State	Registrations	Percent
CA	199,958	24.0%	CT	14,503	1.7%	AR	4,982	0.6%
TX	45,831	5.5%	GA	14,475	1.7%	LA	4,653	0.6%
NY	44,848	5.4%	WI	13,617	1.6%	ME	4,095	0.5%
FL	44,166	5.3%	MN	13,242	1.6%	HI	3,926	0.5%
IL	31,826	3.8%	IN	11,858	1.4%	ID	3,351	0.4%
VA	30,397	3.6%	MO	10,763	1.3%	RI	3,191	0.4%
WA	29,676	3.6%	TN	8,857	1.1%	NE	3,116	0.4%
PA	28,279	3.4%	SC	7,370	0.9%	VT	2,994	0.4%
MA	25,756	3.1%	IA	7,006	0.8%	DC	2,597	0.3%
NJ	23,332	2.8%	NV	6,799	0.8%	WV	2,583	0.3%
AZ	22,148	2.7%	KS	6,179	0.7%	DE	2,472	0.3%
NC	21,023	2.5%	NM	6,063	0.7%	MS	2,399	0.3%
MD	20,798	2.5%	AL	5,935	0.7%	MT	2,371	0.3%
OH	20,529	2.5%	KY	5,622	0.7%	AK	1,572	0.2%
CO	17,598	2.1%	NH	5,444	0.7%	SD	1,472	0.2%
OR	17,403	2.1%	UT	5,359	0.6%	WY	1,157	0.1%
MI	15,001	1.8%	OK	5,345	0.6%	ND	945	0.1%

Source: Polk

The percentages in Table 6 will be used as a proxy to allocate projected sales of electric vehicles among states. Because this method of allocation does not take into account specific deployment strategies of individual companies, the resulting allocations for initial sales years will be less valid. However, they should provide estimates for the geographic distribution of vehicles in the longer term and give states a starting point for planning purposes.

Production and Sales of Electric Vehicles

The long term production and sale of electric vehicles is difficult to estimate because, depending on market conditions, automakers could bring production levels up or down. In addition, the sales performance of early electric vehicles will affect the releases of additional electric vehicles. General Motors, for instance, expects to produce 10,000 to 15,000 Volt models in 2011 and 45,000 in 2012, producing 60,000 models for years thereafter.^{34,35} Nissan has been less open with the press in disclosing production forecasts for the LEAF, but 2011 sales could be around 20,000. The Smyrna plant opening in 2013 will have an annual production capacity of 150,000 units; however, it is difficult to predict what utilization will be and how many of those vehicles produced in

³⁴ ElectroVelocity. (2010). "GM Aiming to Triple Volt Production." ElectroVelocity. December 2, 2010. <<http://electrovelocity.com/2010/12/02/gm-aiming-to-triple-volt-production/>>.

³⁵ Reuters. (2010). "Chevy Volt production could hit 60,000 year-exec." Thomson Reuters. October 14, 2010. <<http://www.reuters.com/article/idUSN1429383520101014>>.

Tennessee will be exported outside the U.S.^{36,37,38} Ford also has not released official figures, but comments from Sue Cischke, head of sustainability at Ford, would suggest that volumes will be between 10,000 and 20,000 in 2012.^{39,40}

If one believes the company announcements, production of electric vehicles will experience a relatively steep ramp up over the next few years. Some previous company sales forecasts are optimistic and can be balanced out with a more conservative third-party forecast. IHS Global Insight and JD Power and Associates have created forecasts of electric vehicle sales in the U.S. The IHS sales forecasts for specific vehicle models included Chevrolet Volt, Nissan LEAF, Tesla Roadster and Model S, and Fisker Karma electric vehicles. These model forecasts were aggregated to create a sales forecast for some of these early entrants.⁴¹ The Ford Focus Electric was not included in this aggregate forecast, because IHS does not differentiate between models of different powertrains that share the same nameplate. J.D. Power has created a forecast specifically for electric vehicles through 2020, however, that forecast excludes the Chevrolet Volt as it was considered a plug-in hybrid for the organization's purposes.⁴² For the purposes of this study, however, the J.D. Power forecast was modified to include the Volt in the electric vehicle forecast.

Estimates of Sales by State

Based on the estimates discussed above, reasonable estimates for national electric vehicle sales were generated. Originally, CAR planned to use two different national estimates for calculating state allocations. These were (1) aggregated company announcement values gathered from press releases and news articles and (2) a sales forecast estimate that integrated numbers from the IHS Global Insight forecast, the J.D. Power forecast, and CAR research. The available company announcement values, however, were often vague and not scientifically based, and despite having very few models represented, resulted in an unreasonably high national sales estimate. For those reasons, and so as to not confuse the consumers of this study, the company announcement estimate of national sales was not used to determine state allocations. The state allocation figures came from the sales forecast estimate, which had the following values: 27,000 for 2011, 77,000 for 2012, 116,000 for 2013, 136,000 for 2014,

³⁶ Japan Times. (2010). "Nissan mass-produced EV Leaf debuts Dec. 20." The Japan Times. December 4, 2010. <<http://search.japantimes.co.jp/cgi-bin/nb20101204a1.html>>.

³⁷ Automotive News. (2010). "In-demand Leaf prompts Nissan to reduce the number of dealer demos." Autoweek, Crain Communications, Inc. November 18, 2010. <<http://www.autoweek.com/article/20101118/GREEN/101119859>>.

³⁸ Smith, Rachel. (2010). "Renault-Nissan to Produce 500,000 EVs by 2013." U.S. News & World Report. November 16, 2010. <<http://usnews.rankingsandreviews.com/cars-trucks/daily-news/101116-Renault-Nissan-to-Produce-500-000-EVs-by-2013/>>.

³⁹ Priddle, Alisa and Shepardson, David. (2010). "Ford ups per-vehicle revenue." The Detroit News. October 20, 2010. <<http://www.detroitnews.com/article/20101020/AUTO01/10200328/1148/%3E>>.

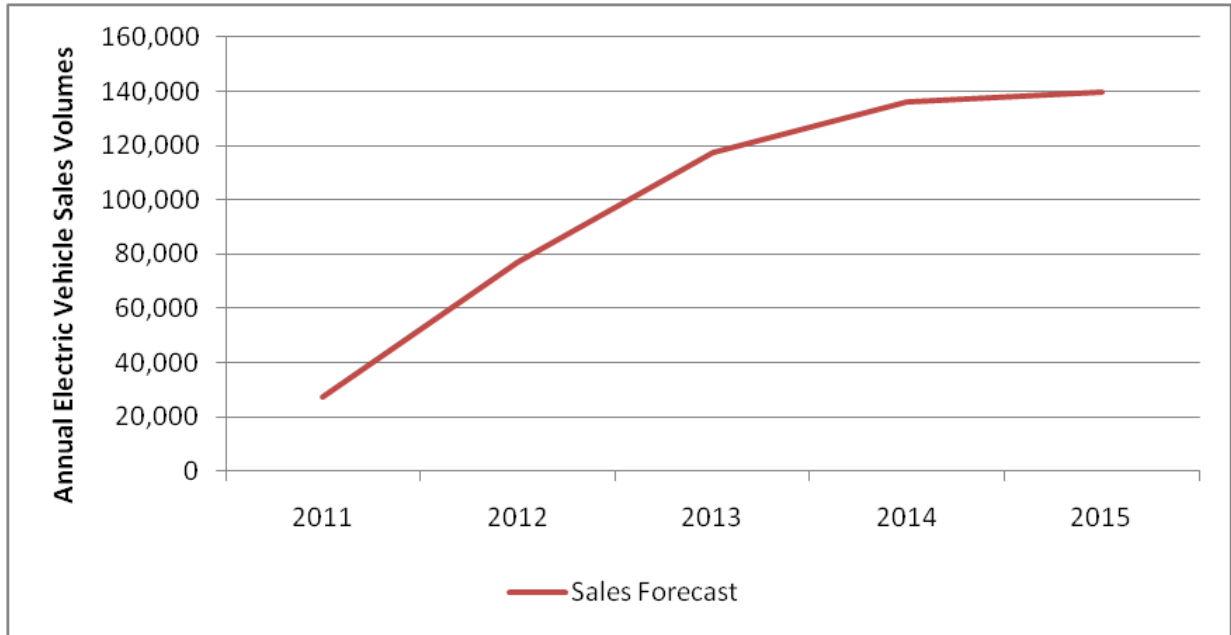
⁴⁰ Loveday, Eric. (2010). "Ford sets 2011 electric Focus 2011 production target at 10,000-20,000 units." Autobloggreen. October 22, 2010. <<http://green.autoblog.com/2010/10/22/ford-sets-2011-electric-focus-2011-production-target-at-10-000-2>>.

⁴¹ IHS. (2010). "Autolnsight Database" November 12, 2010. <<http://www.ihsglobalinsight.com/>>.

⁴² J.D. Power. (2010). "Drive Green 2020: More Hope than Reality?" J.D. Power and Associates. The McGraw-Hill Companies. November 2010. <http://businesscenter.jdpower.com/JDPAContent/CorpComm/pdfs/DriveGreen2020_102610.pdf>.

and 140,000 for 2015. The national electric vehicle sales forecast estimate is visually depicted in Figure 4 below. Using the selected national estimate, a state distribution was created. The number of vehicles sold in each state for years 2012 to 2015 can be seen in Table 7.

Figure 4: U.S. National Electric Vehicle Adoption Assumptions: 2011-2015



Source: HIS Global Insight, JD Power, CAR Research

Table 7: Expected Distribution of U.S. Electric Vehicles by State by Sales Forecast

State	Electric Vehicles Sold Per Year				Aggregated Electric Vehicles on Road*			
	2012	2013	2014	2015	2012	2013	2014	2015
AK	145	218	256	264	145	363	619	883
AL	547	825	967	995	547	1,372	2,339	3,334
AR	459	692	812	835	459	1,152	1,963	2,799
AZ	2,043	3,077	3,608	3,714	2,043	5,120	8,728	12,442
CA	18,442	27,783	32,573	33,531	18,442	46,224	78,797	112,328
CO	1,623	2,445	2,867	2,951	1,623	4,068	6,935	9,886
CT	1,338	2,015	2,362	2,432	1,338	3,353	5,715	8,147
DC	240	361	423	435	240	600	1,023	1,459
DE	228	343	403	415	228	571	974	1,389
FL	4,073	6,137	7,195	7,406	4,073	10,210	17,404	24,811
GA	1,335	2,011	2,358	2,427	1,335	3,346	5,704	8,131
HI	362	545	640	658	362	908	1,547	2,205
IA	646	973	1,141	1,175	646	1,620	2,761	3,936
ID	309	466	546	562	309	775	1,321	1,882
IL	2,935	4,422	5,184	5,337	2,935	7,357	12,542	17,878
IN	1,094	1,648	1,932	1,988	1,094	2,741	4,673	6,661
KS	570	859	1,007	1,036	570	1,428	2,435	3,471
KY	519	781	916	943	519	1,300	2,215	3,158
LA	429	646	758	780	429	1,076	1,834	2,614
MA	2,375	3,579	4,196	4,319	2,375	5,954	10,150	14,469
MD	1,918	2,890	3,388	3,488	1,918	4,808	8,196	11,683
ME	378	569	667	687	378	947	1,614	2,300
MI	1,384	2,084	2,444	2,515	1,384	3,468	5,911	8,427
MN	1,221	1,840	2,157	2,221	1,221	3,061	5,218	7,439
MO	993	1,495	1,753	1,805	993	2,488	4,241	6,046
MS	221	333	391	402	221	555	945	1,348
MT	219	329	386	398	219	548	934	1,332
NC	1,939	2,921	3,425	3,525	1,939	4,860	8,284	11,810
ND	87	131	154	158	87	218	372	531
NE	287	433	508	523	287	720	1,228	1,750
NH	502	756	887	913	502	1,258	2,145	3,058
NJ	2,152	3,242	3,801	3,913	2,152	5,394	9,194	13,107
NM	559	842	988	1,017	559	1,402	2,389	3,406
NV	627	945	1,108	1,140	627	1,572	2,679	3,819
NY	4,136	6,231	7,306	7,520	4,136	10,368	17,673	25,194
OH	1,893	2,852	3,344	3,442	1,893	4,746	8,090	11,532
OK	493	743	871	896	493	1,236	2,106	3,003
OR	1,605	2,418	2,835	2,918	1,605	4,023	6,858	9,776
PA	2,608	3,929	4,607	4,742	2,608	6,537	11,144	15,886
RI	294	443	520	535	294	738	1,257	1,793
SC	680	1,024	1,201	1,236	680	1,704	2,904	4,140
SD	136	205	240	247	136	340	580	827
TN	817	1,231	1,443	1,485	817	2,047	3,490	4,975
TX	4,227	6,368	7,466	7,685	4,227	10,595	18,061	25,746
UT	494	745	873	899	494	1,239	2,112	3,010
VA	2,803	4,223	4,952	5,097	2,803	7,027	11,978	17,076
VT	276	416	488	502	276	692	1,180	1,682
WA	2,737	4,123	4,834	4,976	2,737	6,860	11,694	16,671
WI	1,256	1,892	2,218	2,283	1,256	3,148	5,366	7,649
WV	238	359	421	433	238	597	1,018	1,451
WY	107	161	188	194	107	267	456	650
Total	77,000	116,000	136,000	140,000	77,000	193,000	329,000	469,000

*Does not include electric vehicles sold before 2012.

Source: CAR Research

In producing the state distribution, estimates for the year 2011 were excluded. In 2011, companies will be following their initial deployment plans and the distribution of sales across states will be skewed toward deployment communities. In general, however, state allotments in 2011 will be significantly smaller than those in subsequent years, making estimates for them less important. Within 12 to 18 months after their introduction, vehicles for a particular model should be available across the country, making state sales estimates for calendar year 2012 and onwards more valid. In addition, state legislation for electric vehicle purchase incentives is unlikely to become effective during calendar year 2011 given the length of the legislative process and waiting period before bills become effective. Given the above factors, vehicles sold before 2012 were excluded from the state estimates for aggregate electric vehicles on the road.

According to the distribution from Table 7, by 2015, California will be selling close to 35,000 electric vehicles each year with over 110,000 electric vehicles registered in the state. Other states will be selling fewer than 8,000 electric vehicles per year, with fewer than 26,000 total registrations by 2015, even in the large markets of Texas, New York, and Florida. Of course, these estimates are highly subject to variation and could be altered by unexpected shocks such as a major oil price spike or by planned conditions such as aggressive incentive programs.

While the specific numbers created in this study may not be exact, their magnitude should be correct along with relative sales among states. It is unlikely, for instance, that a state projected to sell only a couple hundred vehicles annually by 2015 will be selling thousands. It is also unlikely that California will be selling only a few thousand electric vehicles annually by 2015. If anything, states that have been selected as early deployment states, or have already committed to being leaders in electric vehicle deployment and have been recognized as such, will see faster rates of electric vehicle adoption (higher levels of sales than the table above predicts), while other states may experience slower adoption rates (lower sales levels).

Conclusion

In this study, CAR and ACP have examined electric vehicle production announcements and automakers' strategic deployment plans, explored the potential for commercial fleet purchasing and government programs to influence deployment of electric vehicles, and generated geographic sales estimates for electric vehicles over the next few years. The information within this study will be important for companies as they work with states, communities, and fleet operators to form partnerships and provide advice on incentive programs to encourage successful deployment.

Estimating deployment of electric vehicles across all 50 states at this point in time is extremely difficult given that the vehicles are just now reaching the market. This study attempts to make a reasonable estimate on the geographic distribution of electric vehicle sales based on prior deployment of hybrid vehicles as a proxy. Given this uncertainty, actual deployment across the states will undoubtedly be different from the estimates; however, this study and estimating tool give a reasonable starting point and can be revisited as more vehicles enter the marketplace.

We obviously find that many factors could affect deployment. Among these are fleet operations decisions, development and expansion of EV-friendly cities and regions, and enactment of government programs. Both local government and private sector fleets can serve as a major driving force for deployment of electric vehicles. As fleet managers gather data on the performance of electric vehicles, they can determine in which niches these vehicles might fit well. Companies can write off electric vehicle purchases as a business expense; due to high levels of utilization, these vehicles will have a relatively short payback period, favoring early deployment among fleets.

EV-friendly cities and regions can offer perks to owners of vehicles by creating plug-in-infrastructure and providing special parking and driving privileges, serving to assist in driving consumer demand. Additionally, governmental programs such as the Clean Cities initiative and other partnerships bring together multiple stakeholders to ensure that deployment is organized and that support for vehicles is available even before they arrive in cities.

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Appendix: Detailed Hybrid Incentives by State

The following information on hybrid incentives was taken from a variety of online sources and represents an attempt to document the various hybrid vehicle incentives that either currently exist or once existed.^{43,44,45,46,47} Tables 3 and 4 from the main document use the information documented in this appendix.

Federal

Tax Credits - Advanced vehicle technologies are eligible for tax credits ranging from \$250 to \$3,400 depending on the vehicle's level of fuel economy improvement. For a limited time, quality hybrids like the Honda Civic Hybrid, Toyota Prius or Ford Escape Hybrid qualified for tax credits in the range of \$1,700-\$3,150. The tax credits were available from January 1, 2006 through December 31, 2010, although they expired earlier for the most popular hybrids. The full tax credits are available until a manufacturer reaches 60,000 vehicles sold. Once a manufacturer has sold 60,000 vehicles, a one-year "phase out" will begin after the next complete calendar quarter; 50 percent of the credit will be available for that manufacturer's hybrids in the first two quarters of the phase out period and 25 percent in the final two quarters. Toyota, Honda, and Ford have met the 60,000 sales threshold. Federal tax credits are no longer available on hybrid vehicles from these automakers.

Arizona

HOV Access - Drivers of all model years of the Honda Insight, Honda Civic Hybrid and Toyota Prius could apply to participate in the Energy Efficiency Plate program which allowed these vehicles to be driven in HOV lanes regardless of the number of people in the vehicle. The program issued the maximum limit of 10,000 special plates. Later, the Arizona Department of Transportation was ordered to study the effect of single occupancy vehicles in HOV lanes. A newer program with more stringent vehicle requirements created a Low Emissions and Energy Efficient Vehicles special plate for use of HOV lanes regardless of occupancy; however, the program has been halted for new applicants until the impact of this incentive can be assessed.

⁴³ McCarthy, Kevin E. (2008). "State Incentives for Hybrid Vehicles." National Conference of State Legislatures. August 2008. <<http://www.ncsl.org/?tabid=12980>>.

⁴⁴ Vaidyanathan, Shruti. (2010) "Light-Duty Hybrid and Diesel Vehicle Tax Credits in the Energy Bill." American Council for an Energy-Efficient Economy. March 31, 2010. <<http://www.aceee.org/blog/2010/04/light-duty-hybrid-and-diesel-vehicle-tax-credits-energy-b>>.

⁴⁵ UCS. (2010). "State and Federal Hybrid Incentives." Union of Concerned Scientists. <<http://go.ucsusa.org/hybridcenter/incentives.cfm>>.

⁴⁶ HybridCARS. (2010). "Hybrid and Plug-in Incentives and Rebates – Region by Region." HybridCARS. March 8, 2010. <<http://www.hybridcars.com/local-incentives/region-by-region.html>>.

⁴⁷ DOE. (2010). "Federal & State Incentives & Laws." Energy Efficiency & Renewable Energy, Alternative Fuels & Advanced Vehicles Data Center. November 16, 2010. <<http://www.afdc.energy.gov/afdc/laws/search>>.

California

HOV Access - Qualified hybrid electric vehicles and alternative fuel vehicles can use HOV lanes regardless of the number of occupants in the vehicle. An identification sticker and FasTrak account must first be obtained from the Department of Motor Vehicles and only 85,000 decals will be made available. Until January 1, 2011, hybrids are eligible for this benefit if they were produced during model year 2004 or earlier, have a fuel economy rating of 45 miles per gallon or greater, and meet specified state vehicle emission standards.

Parking – The cities of San Jose, Los Angeles, and Santa Monica offered free parking at street meters as well as free parking at some parking lots. The Port of San Diego also offered priority designated hybrid-only parking spaces.

R&D - The California Energy Commission administers the Alternative and Renewable Fuel and Vehicle Technology Program to increase the use of alternative and renewable fuels and innovative technologies. Grants and loans are available for R&D projects relating to alternative fuels and energy saving vehicle technologies.

Rebate - The "Driving Alternatives" vehicle rebate program has allocated \$ 1. 8 million toward vehicle incentive grants for qualifying alternative fuel vehicles, including plug-in hybrids. Grants of up to \$ 5,000 will be made to consumers who purchase or lease such vehicles. Ford briefly offered a rebate worth up to \$1,000 on the Escape Hybrid in California. Santa Barbara County also offered a limited rebate on ten hybrid vehicles, worth \$1,000, that was available for Santa Barbara Air Pollution Control District residents.

Colorado

HOV Access - Vehicles that are classified as inherently low emission vehicles by the U. S. Environmental Protection Agency and have a gross vehicle weight rating of 26,000 pounds or less may drive in HOV lanes regardless of the number of occupants and without payment of a special toll or fee. A special sticker must be obtained from the Department of Transportation. Qualified hybrids must obtain and display an HOV lane exemption decal. Initially, only 2,000 decals will be issued. The program is scheduled to expire on September 30, 2009, unless the federal government extends the authorization for hybrids to HOV lanes.

Parking – The city of Aspen allows hybrid owners to park in residential and carpool zones. Manitou Springs offers free parking to drivers of hybrid vehicles at two of its city parking lots.

Rebate - A rebate is available from the Department of Revenue for the purchase of a hybrid or alternative fuel vehicle. Vehicles must be owned by the state, a political subdivision of the state, or a tax-exempt organization, and used in connection with its official activities. The rebate is a percentage of the vehicle's incremental cost. For a purchase that permanently replaces a motor vehicle or power source that is ten or more years old, the percentage specified is doubled, up to a maximum of 100 percent of the cost of converting the vehicle to alternative fuels. Each qualified entity is limited to \$350,000 per state fiscal year in total rebates.

Registration - The city of Aspen offered a \$100 rebate on license registration.

Tax Credit – Allowed residents to claim up to a \$6,000 tax credit for the purchase of a hybrid vehicle, a plug-in hybrid electric vehicle or a converted plug-in hybrid electric vehicle. The amount of the tax credit was determined taking into account vehicle specifications. In addition, an income tax credit was available from the Colorado Department of Revenue for the incremental cost of purchasing an Alternative Fuel Vehicle or for the conversion of a vehicle to operate using an alternative fuel. Hybrid Electric Vehicles also qualified for this incentive.

Connecticut

Parking - New Haven passed a law permitting hybrid vehicles (registered in New Haven) free parking at metered spots within the city.

Tax Exemption - Hybrids getting at least 40 mpg were exempt from the state's 6 percent sales tax.

District of Columbia

Registration Fee - The owner of any new motor vehicle that achieves a city fuel economy rating of at least 40 mpg will pay a reduced registration fee of \$36 for the first two years of the vehicle's registration—half of the \$72 fee paid for a conventional vehicle.

Tax Exemption - Owners of hybrid and other alternative fuel vehicles are exempt from the excise tax on their vehicles.

Florida

HOV Access - Hybrids that are certified and labeled in accordance with federal regulations may be driven in HOV lanes at any time, regardless of the number of passengers in the vehicle. All eligible vehicles must comply with the minimum fuel economy standards set forth in 23 U. S. Code, section 166(f)(3)(B). The vehicle must display a decal issued by the Division of Motor Vehicles, obtained for a \$ 5 fee, and

renewed annually. Vehicles with decals may use any HOV lane designated as a HOT lane without requiring payment of the toll. To be eligible, the hybrid must meet or exceed the qualifying California standards for a low emission vehicle.

Parking - The Miami Beach City Commission approved a pilot program that provides parking perks to hybrid owners. Residents who own a hybrid vehicle can get a 25 percent discount on neighborhood parking permits. Hybrid owners who live outside of the city can get a 25 percent discount on the monthly parking rate at city garages and lots. Discounted on-street parking decals, which can be used at metered spaces or city surface lots throughout Miami Beach, will also be available to hybrid owners. Finally, under the program, a select number of spaces at city owned parking garages would be set aside for hybrid vehicles.

Rebate - The City of Parkland provides a \$200 one-time payment to Parkland residents and businesses that purchase a hybrid car.

Georgia

HOV Access - The departments of Revenue and Natural Resources are authorized to develop a list of hybrid models that qualify for an HOV lane exemption regardless of the number of passengers, pending federal legislative or regulatory approval. The U. S. Environmental Protection Agency (EPA) issued a Notice of Proposed Rulemaking in May 2007 on this issue and a final rule is expected in September 2008, which will include criteria for defining exempt hybrids. The Department of Transportation must determine whether allowing the qualifying hybrids to travel in HOV lanes would degrade the performance of the lanes. Refer to the GDOT Web site for more information.

Idaho

Inspection Exemption - Electric and hybrid motor vehicles are exempt from the vehicle emission inspection and maintenance program.

Illinois

Rebate - Illinois pledged \$2 million to its "Green Rewards" program which offered \$1,000 rebates to Illinois residents who purchased hybrid or other energy-efficient vehicles. To get a rebate, buyers had to secure a car loan from a participating bank or credit union for a new hybrid vehicle or an eligible electric or fuel cell vehicle. Purchasers received one rebate per vehicle, allowing municipalities or other entities to receive additional cash back when acquiring fuel-efficient fleets. To fund the program, state funds were deposited at local banks and credit unions at a below-market interest rate. The money that those institutions saved in interest was passed on to consumers in

the form of \$1,000 rebates at the time of purchase. There were no income or price restrictions for this rebate.

Registration - The City of Wilmette raised its vehicle sticker fee to \$75, providing a discount only to vehicles that meet the EPA's SmartWay or SmartWay Elite criteria. Only two models sold in Illinois, the Honda Civic Hybrid and Honda Civic GX NGV, qualify for the SmartWay Elite designation and reduced fee of \$25, although more cars qualify for the Smart Way designation and reduced fee of \$50. Frankfort Village has a sticker discount as well; the village waives the \$5 registration sticker fee for hybrid vehicles.

Louisiana

Tax Credit - Louisiana offered a state income tax credit worth 20 percent of the incremental cost of purchasing an Original Equipment Manufacturer (OEM) alternative fuel vehicle (AFV). For the purchase of an OEM AFV, the tax credit could not exceed the lesser of 2 percent of the total cost of the vehicle or \$1,500. Only those vehicles registered in Louisiana could receive the tax credit. Hybrid vehicles were allowed to receive this credit. The tax credit was replaced by a newer tax credit in 2009 which provides a state income tax credit worth 50 percent of the cost of converting a vehicle to operate on an alternative fuel or to become a hybrid. If the technology is installed by the vehicle's manufacturer or if one elects not to determine the exact cost of converting a vehicle, the tax credit will be worth the lesser of 10 percent of the vehicle cost or \$3,000.

Massachusetts

10-Year Plan - Massachusetts is required to develop a statewide plan for the advancement of hybrid electric and alternative fuel vehicles. The plan should cover a 10-year period, beginning in 2010, and take into account geographic diversity, demographics, transportation needs, infrastructure, and the current and emerging alternative fuel and advanced vehicle technologies. Goals set forth in this plan may include the purchase of alternative fuel or advanced vehicles and the production or distribution of alternative fuels. The plan should include strategies and methods for achieving these goals.

Parking - Boston Logan airport offers 160 prime parking spots for hybrid vehicles. Most of the spots are on the sixth floor of the central parking garage. Same rates apply.

Tax Credit - The town of Williamstown, Massachusetts launched a program which offers owners of 2003-2007 model hybrids and other fuel-efficient vehicles registered in the town a reimbursement of up to 75 percent of the state motor vehicle excise tax paid. For vehicles that have an EPA-rated fuel economy of at least 50 miles per gallon (city); owners can get up to 75 percent of the excise tax due in fiscal year 2007. Owners of

vehicles with an EPA-rated fuel economy of at least 30 miles per gallon (city) can apply for a reimbursement grant of 50 percent of the state motor vehicle excise tax paid.

Maine

Tax Credit - Until 2006, Maine provided a partial sales tax credit of approximately \$500 for hybrid cars for which there is no comparable vehicle powered by gasoline, such as the Toyota Prius and Honda Insight. It also allowed a credit of approximately \$300 for vehicles that have a comparable gasoline-powered model, such as the Honda Civic Hybrid.

Maryland

Inspection Exemption - Qualified hybrids and zero-emission vehicles are exempt from certain motor vehicle emissions and inspection testing requirements for the first three years after the vehicle is originally registered in the state, if the vehicle obtains a rating from the EPA of at least 50 miles per gallon during city fuel economy tests. A qualified hybrid must meet the current vehicle exhaust standard set under the federal Tier 2 program for gasoline-powered passenger vehicles and draw propulsion energy from both gasoline or diesel fuel and a rechargeable energy storage system. This exemption expires September 30, 2012.

Parking - The city of Baltimore has offered discounted parking for hybrid vehicles at 15 locations around the city. A set number of first-floor spots are designated in each garage for hybrids and a corresponding number of decals will be issued for that garage. Baltimore is also considering reduced metered parking charges for hybrids.

Tax Credit - A tax credit is allowed against the excise tax for the purchase of qualified hybrids. The credit may not exceed: (1) \$ 250 if the vehicle battery provides at least 5% but less than 10% of maximum power available; (2) \$ 500 if the battery provides 10% to 20% of maximum power available; (3) \$ 750 if the battery provides at least 20% to 30% of maximum power available; and (4) \$ 1,000 if the battery provides at least 30% of maximum power available. A qualified hybrid must meet the current vehicle exhaust standard set under the federal Tier 2 program for passenger vehicles.

Michigan

Parking - The city of Ferndale allows free parking at city meters for drivers of hybrids and other vehicles that average 30 miles per gallon or more in city driving. Owners of eligible automobiles must register and pay an annual fee in order to get a permit for the exemption.

Montana

Parking - The new Bozeman Public Library has reserved some of its prime parking spaces for hybrid and carpool vehicles.

Nevada

Inspection Exemption - Hybrids are exempt from emission inspection testing until the model year of the vehicle is six years old.

Taxi Use Extension - Hybrid electric vehicles can to be operated as taxicabs for an extra 24 months beyond the existing limits. Prior to the law, a vehicle could be operated as a taxicab for 67 months if acquired as a new vehicle or 55 months if acquired as a used vehicle with less than 30,000 miles registered by the odometer.

New Jersey

HOV Access - The New Jersey Turnpike Authority allows eligible hybrids to travel in the HOV lanes on the New Jersey Turnpike. For a complete list of eligible hybrids see the New Jersey Turnpike Authority Web site.

New Mexico

Parking - Albuquerque allows any hybrid vehicle to park free at any city meter for the duration of that meter.

Tax Exemption - Hybrids with a U. S. Environmental Protection Agency estimated combined fuel economy rating of at least 27.5 miles per gallon are eligible for a one-time exemption from the motor vehicle excise tax if the original certificate of title for the vehicle is issued through June 30, 2009.

New York

HOV Access - Through the Clean Pass Program, eligible hybrids may use the Long Island Expressway HOV lanes, regardless of the number of occupants in the vehicle. Vehicles must display the Clean Pass vehicle sticker, available from the Department of Motor Vehicles. A list of eligible vehicles is available on the Clean Pass Program website.

Parking - In Westchester hybrid, electric, and fuel efficient (35 mpg average) vehicle owners with a monthly permit have been allowed to park for free at two county-owned commuter lots. The cost of a monthly permit is usually \$75.00. The town of Huntington will allow hybrids and alternative-fuel vehicles, affixed with special "Keep Huntington Green" window stickers, free parking at town meters, free access to all Huntington

beaches, and free commuter parking at any of the town's four Long Island Rail Road stations.

Tax Credit – Until 2007, the Alternative Fuel Vehicle Tax Incentive Program offered tax credits and a tax exemption for purchasing new hybrid electric vehicles (HEVs), alternative fuel vehicles (AFVs), and/or installing clean fuel vehicle refueling equipment. Purchasers of qualified HEVs were eligible for a tax credit of up to \$3,000, depending on the vehicle's fuel economy. The Toyota Prius and Honda Insight qualified. The maximum value of the incentive was \$5,000 for vehicles weighing less than 14,000 pounds (lbs.) gross vehicle weight rating (GVWR). The incremental cost of clean-fuel vehicles was exempt from state sales tax; this exemption expired February 28, 2004.

North Carolina

Loans - The State Employees' Credit Union and the Local Government Federal Credit Union offer green vehicle loans to purchase new and used qualified fuel-efficient vehicles. Vehicles with a combined fuel economy rating of a minimum of 28 miles per gallon, according to revised fuel economy ratings posted on www.fueleconomy.gov, qualify. The loan interest rates are 0.5% lower than traditional new or used vehicle loan rates.

Oklahoma

Tax Credit - Oklahoma provides a one-time income tax credit for 50 percent of the cost of converting a vehicle to operate on an alternative fuel such as electricity, or for 50 percent of the incremental cost of purchasing a new electric-drive vehicle. The state also provides a tax credit for 10 percent of the total vehicle cost, up to \$1,500, if the incremental cost of the vehicle cannot be determined. For qualified electric vehicles propelled by electricity only, the credit is based on the full purchase price of the vehicle. For vehicles equipped with an internal combustion engine, such as a hybrid electric vehicle, the credit is based on the portion of the motor vehicle which is attributable to the propulsion of the vehicle by electricity.

Oregon

Parking - A joint partnership between the Oregon Environmental Council and City Center parking offers a \$15 per month discount on monthly parking for hybrid vehicles that get an estimated 35 miles per gallon or more for either city or highway driving.

Tax Credit - The Oregon Department of Energy offers two income tax credits for hybrids, one for individuals and one for business owners. Oregon residents are eligible for a residential energy tax credit, which provides credits of up to \$ 1,500 toward the purchase of qualified hybrids. A credit of up to \$ 750 is also available for the cost of

converting vehicles to operate on an alternative fuel. Oregon business owners who invest in new hybrids for business use are eligible for a business energy tax credit of up to 35% of the incremental cost of the hybrid. Business owners with or without an Oregon tax liability, non-profit organizations, and public entities may transfer their tax credit eligibility to a business or individual with an Oregon tax liability in exchange for a cash payment equal to the pass-through rate at the time of application.

Pennsylvania

Rebate - Pennsylvania provides a \$500 rebate for the purchase or lease of hybrid vehicles registered in the state that operate primarily within the state. Rebate request forms and required documentation must be submitted no later than six months after the vehicle is purchased. Rebates are provided only for the purchase of the cleanest and most fuel-efficient “full hybrid” vehicles that use hybrid technology to significantly increase fuel economy while significantly reducing emissions. To be eligible, the vehicle must have a combined city and highway fuel efficiency of more than 55 miles per gallon and emit less than 7.0 tons per year of carbon dioxide. “Mild hybrids” that use the hybrid technology to increase a vehicle's power and performance rather than significantly reducing emissions do not qualify for the rebates.

South Carolina

Rebate - The state provides a sales tax rebate of up to \$ 300 for the in-state purchase or lease of a hybrid vehicle between June 30, 2008 and July 1, 2013. A hybrid is defined as a gasoline-electric vehicle that is partially powered by a large on-board battery. The credit is phased in over five years, i.e., the credit in 2008 is \$ 60.

Tax Credit - The state provides, for taxable years beginning after 2007 and before 2011, a \$ 2,000 tax credit against the income tax for the in-state purchase or lease of a plug-in hybrid vehicle. A plug-in hybrid vehicle is one that shares the same benefits as an internal combustion and electric engine with an all-electric range of at least nine miles. The credit is nonrefundable and if the amount of the credit exceeds the taxpayer's liability for the applicable taxable year, any unused credit may be carried forward for five years. The total amount of credits is limited to \$ 200,000.

Tennessee

HOV Access - Single-occupant use of HOV lanes is allowed for inherently low-emission vehicles (ILEV) and low-emission and energy efficient vehicles (LEEEV) in HOV lanes, provided that such authorization does not violate federal guidelines or jeopardize federal funds to the state. The TDOT issues decals for qualifying vehicles and studies how the authorization affects the HOV lanes.

Texas

Parking - The city of Austin now allows city-registered owners of hybrid vehicles that receive an EPA air pollution score of 8 or better \$100 pre-paid parking cards to park in any of the city's 3,700 parking meters. San Antonio allows hybrid vehicle owners to register their vehicles with the city and receive a display placard permitting them to park free at any of the city's 2,010 street parking meters, including the pilot Pay & Display locations.

Utah

HOV Access - Vehicles with clean fuel group license plates are authorized to travel in HOV lanes regardless of the number of occupants. The clean fuel plate may be purchased for \$15 from any Motor Vehicle Division office by presenting a clean special fuel certificate.

Parking - Salt Lake City offers free metered parking for vehicles that get at least an EPA-estimated 50 mpg or achieve an EPA pollution score of at least 8 (for new vehicles available for sale in the Utah sales area). Vehicles must display a Utah Clean Fuel special group license plate or a Salt Lake City Green Vehicle parking permit, available from the City's Transportation Division office, in order to park free at city meters.

Tax Credit - The state has a \$750 tax credit for the original purchase of a new vehicle that meets air quality and fuel economy standards.

Virginia

HOV Access - Eligible hybrids displaying the Virginia Clean Special Fuels license plate may use Virginia HOV lanes, regardless of the number of occupants, until July 1, 2009. For HOV lanes serving the I-95/395 corridor, only registered vehicles displaying Clean Special Fuels license plates issued prior to July 1, 2006, are exempt from HOV lane requirements. A Virginia Department of Motor Vehicles Web site has a complete list of qualifying vehicles. The annual fee for Clean Special Fuels license plates is \$25, in addition to the prescribed fee for state license plates.

Parking - Tyson's Corner Center designated 15 hybrid-only parking spaces. The spaces are spread throughout the mall's parking lots and are close to store entrances.

Washington

Tax Exemption - All new passenger cars, light-duty trucks, and medium-duty passenger vehicles that use hybrid electric technology and have a U. S. Environmental Protection Agency estimated highway fuel economy of at least 40 miles per gallon are exempt from state sales and use tax. This tax exemption expires January 1, 2011.

Inspection Exemption - Hybrids with an EPA fuel economy rating of at least 50 miles per gallon of gasoline during city driving are exempt from emission control inspections.

West Virginia

Tax Credit - There was a credit for the purchase of a new motor vehicle that runs on an alternative fuel or for the conversion of a traditionally fueled motor vehicle to an alternatively fueled motor vehicle. Alternative fuel types include compressed natural gas, liquefied natural gas, liquefied petroleum, methanol, ethanol, coal-derived liquid fuels, electricity, solar energy and fuel mixtures containing at least 85 percent alcohol. The tax department included hybrids in this tax credit. The maximum credit was \$3,750 for vehicles weighing 10,000 pounds or less, \$9,250 for vehicles weighing 10,001 to 26,000 pounds, and \$50,000 for vehicles weighing more than 26,000 pounds.

Private

Hotels - A number of hotels are offering discounted or free parking and special room rates to customers who own or rent a hybrid. Guests driving hybrid cars park free at the 60 Renaissance Hotels & Resorts properties across the U.S. Kimpton Hotels offers special promotions for hybrid drivers—up to \$20 off rooms, half-price parking, or both—at its properties in Boston, Washington, D.C., Portland and other cities. Additional hotels in California, including the Fairmont hotel chain, the Argent Hotel in San Francisco and the Little River Inn near Mendocino offer similar perks.

Insurance - Hybrid vehicle drivers are eligible for insurance discounts through Fireman's Fund Insurance, Travelers Insurance, and Farmers Insurance Group. Fireman's Fund Insurance has an offer in six states, Travelers Insurance's offer covers 44 states, and Farmers Insurance's offer covers 40 states. Alaska, Hawaii, Massachusetts, and West Virginia are the only states where none of these discounts are offered.