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Plug-in Electric Vehicles: An Economic and Business View

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Quarterly Webinar for the U.S. Department of Energy Clean Cities Program



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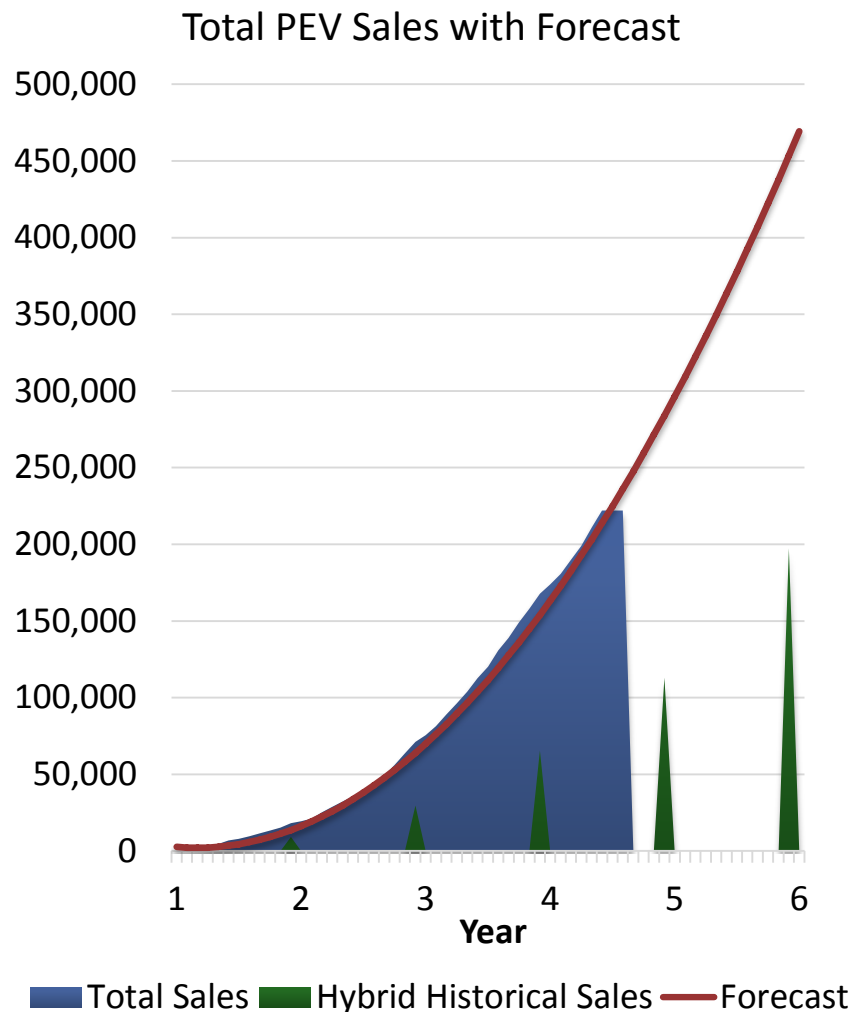
- **Independent, nonpartisan, nonprofit organization**
- **Working to advance strong policy and action to address the twin challenges of energy and climate change**
- **Founded in 1998 as the Pew Center on Global Climate Change**
- **Became C2ES in 2011**
- **On behalf of U.S. Department of Energy Clean Cities, working with Argonne National Laboratory to present a quarterly *State of Play* on PEVs**





- **PEV Market and Technology State of Play**
 - Auto industry expected to have highest sales since 2006
 - PEVs are priced more competitively than ever
 - Infrastructure is expanding and becoming more dense but business case still challenging
 - Charging standards and network interoperability have hampered infrastructure deployment
- **Spotlight on Community Readiness Grant Recipients**
 - Updating the lessons learned from the DOE's 2012 Clean Cities Community Readiness and Planning for Plug-In Electric Vehicles and Charging Infrastructure awardees
 - Exploring the business and economic developments and opportunities within targeted grant recipients' regions

- **Over 250,000 PEVs sold in United States since late 2010**
 - Only 1% of new passenger vehicle sales nationwide
 - 19 models sold in August 2014
 - Over 100,00 PEVs sold in California
- **Automakers offering incentives**
 - Nissan offering \$199/month lease for LEAF, similar to Altima
 - December 2013: Mitsubishi cuts PEV price by over \$6,000 (20% drop)
 - August 2013: \$5,000 price cut in Chevy Volt (13% drop)

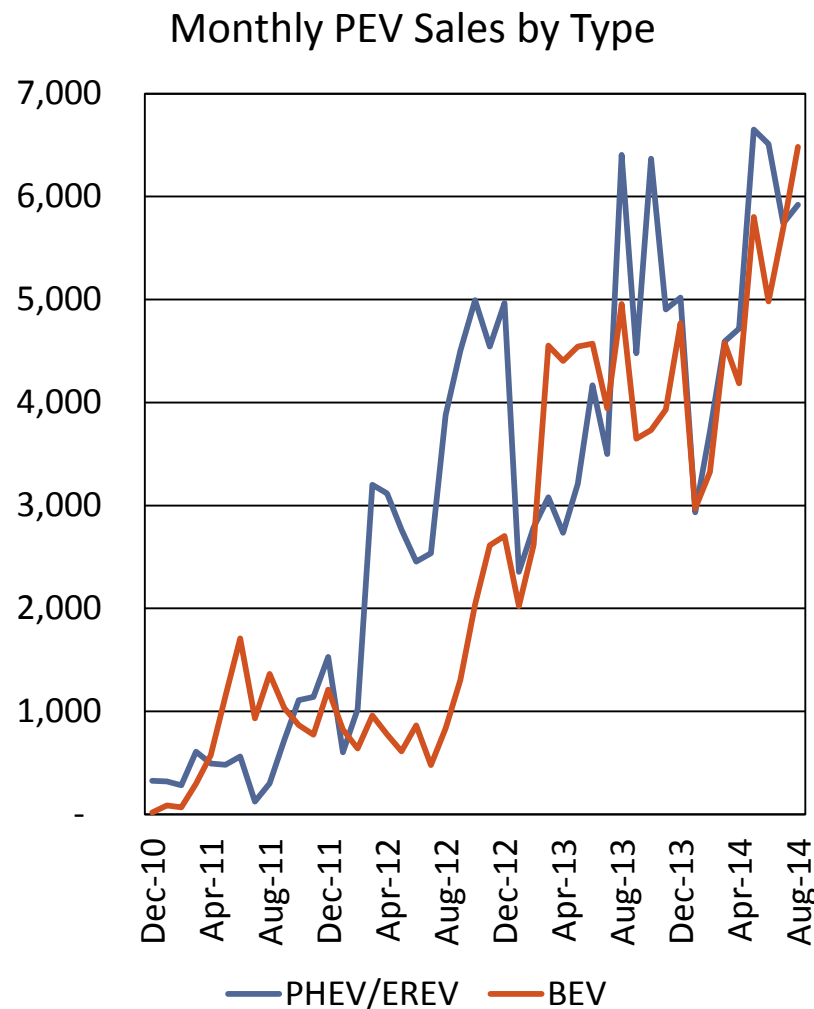


Source: hybridcars.com

Battery Electric Vehicle (BEV) vs. Plug-in Hybrid Electric Vehicle (PHEV) or Extended Range Electric Vehicle (EREV) Sales

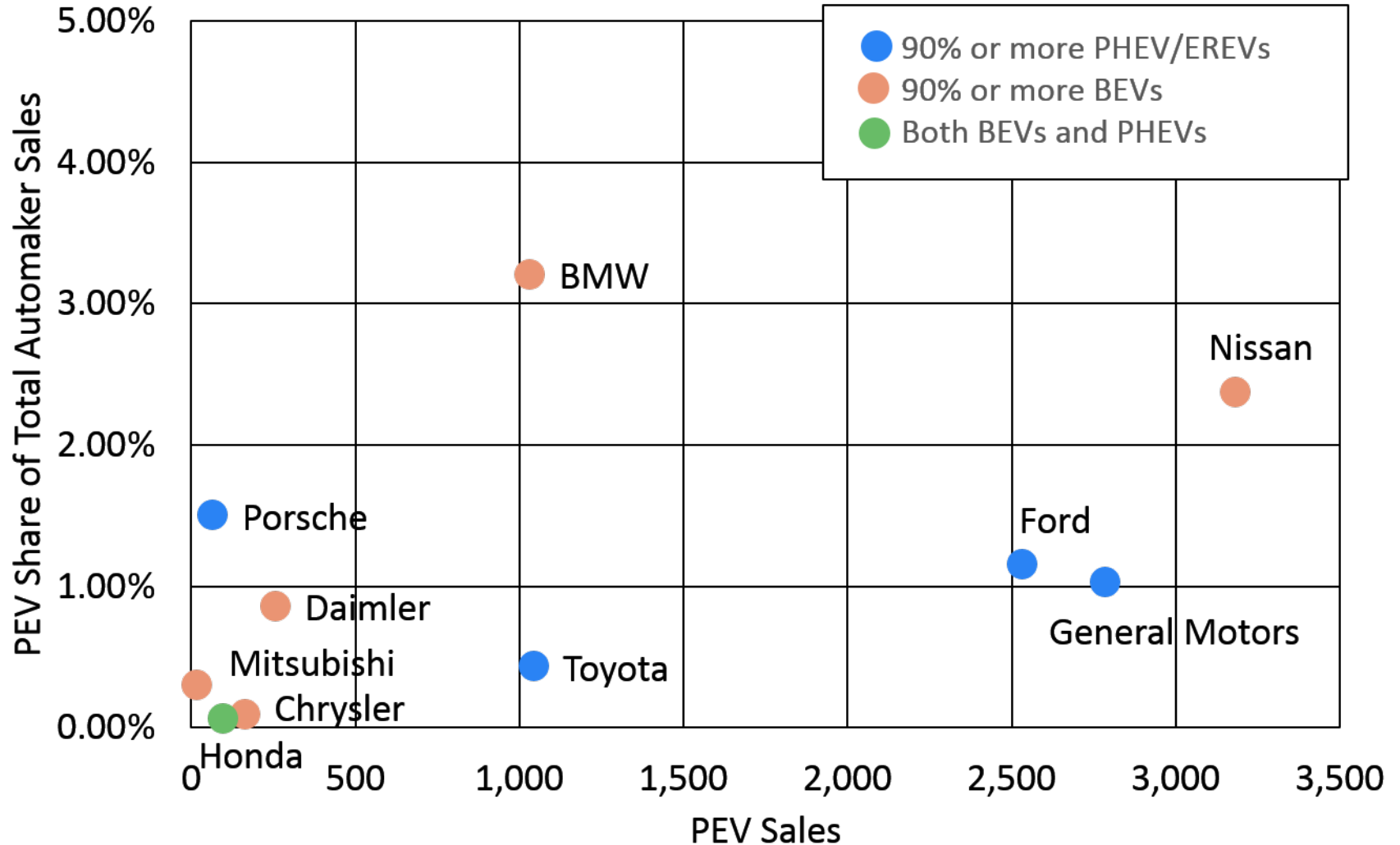


Sales (January 2010 to August 2014)		
	PHEV/EREV	BEV
BMW	9	3,047
Chrysler	0	1,271
Daimler	0	3,062
Ford	30,109	3,779
GM	68,478	1,404
Honda	793	980
Mitsubishi	0	1,827
Nissan	0	61,063
Porsche	663	0
Tesla	0	31,971
Toyota	36,326	2,039

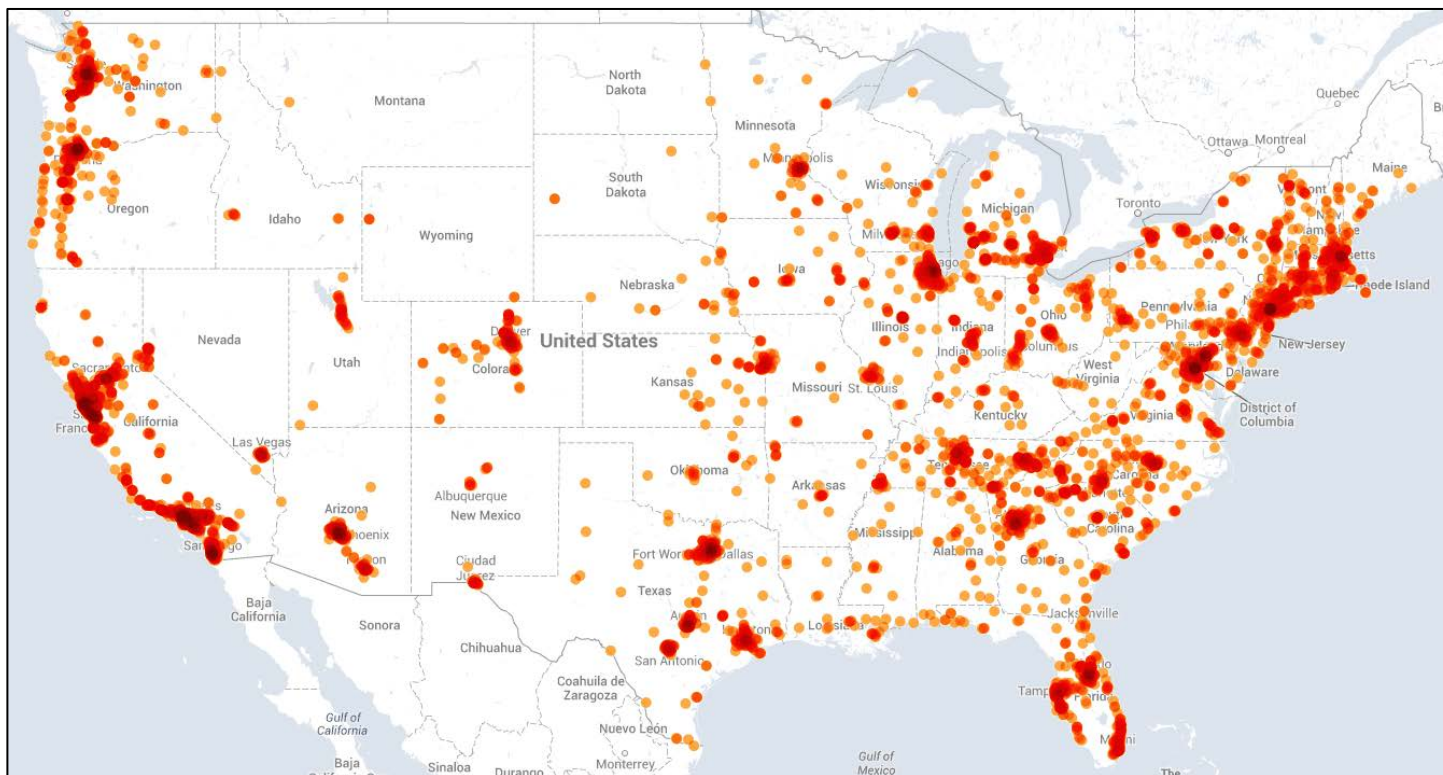


Source: hybridcars.com

PEV Share of Total Automaker Sales in August 2014



- **Public charging locations inadequate based on assumptions from research**
 - Ratio of PEVs to public Level 2 charging ports may need to be under 5:1
 - Currently 14 PEVs for every public Level 2 charging port

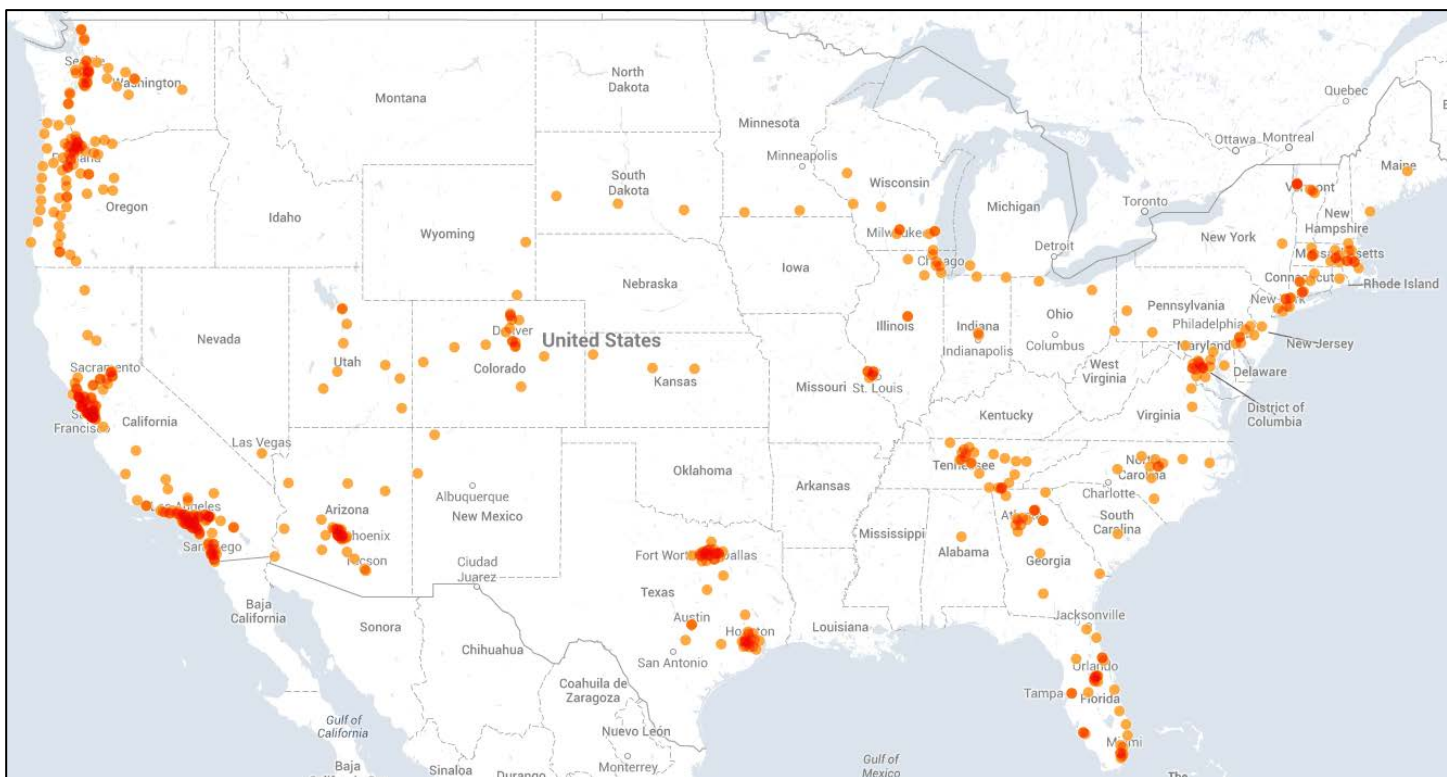


Source: C2ES, U.S. DOE AFDC

Charging Infrastructure (DC Fast Charging)



- No DC fast charging access to most of the country for BEV drivers
- Now 182 PEVs per DC fast charging port
 - Nearly all only support CHAdeMO or Tesla, highlighting compatibility issue



Source: [C2ES](#), U.S. DOE AFDC

- **Challenging to construct a compelling, profitable business case for PEV charging investments**
 - Multiple non-compatible systems have already failed, including bankruptcies at Better Place, ECOtality, 350Green in 2013
 - Unclear if remaining charging providers will be successful
- **ChargePoint raised \$22.6 million in funding in May 2014**
 - Largest charging service provider in U.S.
 - A total of \$110 million raised from large venture capital firms and BMW
- **BEV makers are subsidizing their charger costs for sales benefit**
 - Nissan, Tesla, and BMW investing in DC fast charging networks
 - In April 2014, Nissan started EZ-Charge to access multiple different public charging networks, including AeroVironment, Car Charging Group Blink network, and NRG eVgo
 - Tesla has been building its own national network (adapters available for CHAdeMO)

- **State lawmakers and regulators are reviewing which entities can own and operate PEV public charging stations**
 - Charging service providers in many states could face regulations similar to electric utilities, making their business operations untenable
 - MA and WV recently declared that charging service providers should not be regulated as utilities
 - 14 states now allow charging service providers to offer per kilowatt-hour pricing



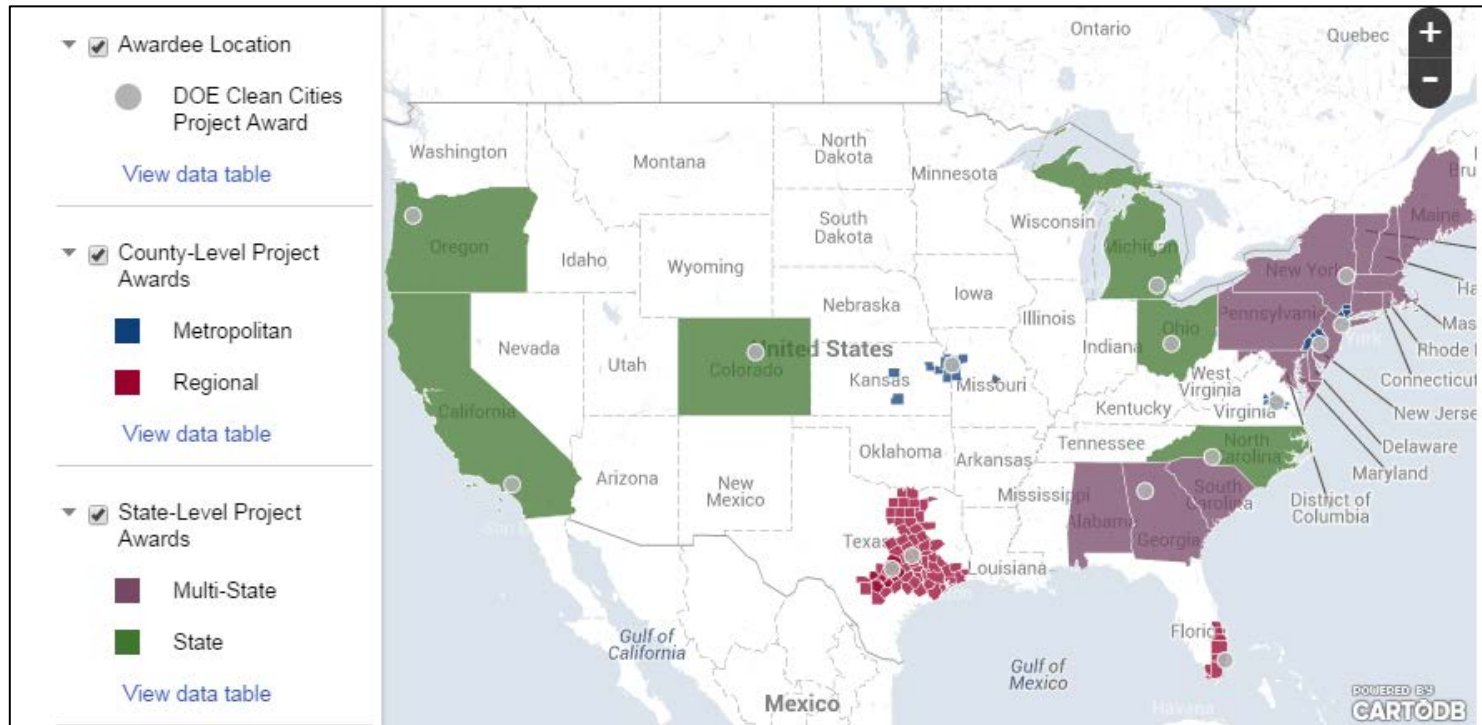
Source: [C2ES Map](#)

- **Electricity suppliers eligible to earn renewable energy credits**
 - EPA's new Renewable Fuel Standard pathway permits biogas-generated electric producers to generate credits for fueling PEVs
 - Incentive to develop charging network to earn credits from the nation's 239 agricultural digesters and 636 landfill methane capture facilities
 - Vermont alone has enough biogas to power 30,000 EVs
- **Grid services can enhance PEV value**
 - VEIC estimated utilities can earn between \$300 and \$480 per PEV annually
 - PEV owners can earn up to \$480 per year by providing frequency regulation services
 - PNNL estimated PEV-delivered grid services could be valued at between \$1,400 and \$6,700 per vehicle over 10 years

Lessons Learned from DOE PEV Community Readiness Grant Recipients



- Among the many valuable policy tools, financial incentives are popular because they are the most direct incentives that drive PEV demand
- Each PEV has a local economic benefit to the state or region
- Education and outreach create public interest and dispel PEV myths
- Business partners can act as leaders to drive local demand



Source: [C2ES Map](#)



- **Snapshot: approximately 4,000 PEVs on the roads with 107 public Level 2 charging stations and 12 public fast charging stations with a total of 168 publically available charging ports**
- **Initiative aims to promote economic development and job creation on a statewide level through PEV adoption and manufacturing in Ohio**
 - Each PEV creates a \$1,300 annual net benefit for Ohio, according to internal research
 - State incentives are crucial to PEV deployment and to growing local PEV manufacturing and business opportunities
 - Outreach events spur PEV growth by educating consumers and creating comfort and familiarity with a new technology
 - Corporate partnerships increase PEV visibility and enhance corporate prestige

• Current Actions

- Meeting with major cities to develop individual PEV readiness templates
- Hosting PEV events, such as ride-and-drives and PEV parades, to engage consumers directly and personally
- Providing resources and expertise to companies as part of the Workplace Charging Initiative

• Looking down the Road

- OH House Bill 336 would provide \$500 PEV tax credit; passed the state House but must clear the state Senate
- The state's PEV infrastructure support program was voted into law, has not begun providing loans





**Drive
Oregon**

Innovation in Electric Mobility



- **Snapshot: approximately 5,000 PEVs on the roads with 347 public Level 2 charging stations and 70 fast charging stations with a total of 728 public available charging ports**
- **Initiative founded to stimulate Oregon's economy and reduce overall emissions through increased PEV deployment**
 - Financial incentives will move the needle toward greater PEV adoption
 - Community leaders — government reps or corporate presidents — act as PEV champions, creating and enabling local PEV demand

• Current Actions

- Running Energizing Oregon Coalition in conjunction with governor's office to engage individuals and corporations by leveraging existing networks and ensuring best practices
- Hosting PEV events, most notably ride-and-drives, to engage customers directly and personally

• Looking down the Road

- Publish research paper on economic benefit of PEVs
 - Complement previous study showing PEVs contribute \$266 million to statewide economy
- Install charging stations at popular nature destinations along the state's Scenic Byways
 - Part of Drive Oregon's sustainable tourism initiative



- **Community Readiness Projects**

- www1.eere.energy.gov/cleancities/electric_vehicle_projects.html

- **U.S. Department of Energy - Clean Cities Program**

- www.cleancities.energy.gov

- **Clean Cities Webinar Archives (Recordings and PPT Slides)**

- http://www1.eere.energy.gov/cleancities/toolbox/training_archives.html

- **Alternative Fuels Data Center (AFDC)**

- www.afdc.energy.gov

- **AFDC – Charging Plug-In EV’s in Public – NIST Handbooks**

- http://www.afdc.energy.gov/fuels/electricity_charging_public.html

- **C2ES PEV Dialogue Initiative**

- www.c2es.org/initiatives/pev



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FOR MORE INFORMATION

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