• 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 100,000 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)
Battery Electric Vehicle (BEV) vs. Plug-in Hybrid Electric Vehicle (PHEV) or Extended Range Electric Vehicle (EREV) Sales

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

Monthly PEV Sales by Type

Source: hybridcars.com
PEV Share of Total Automaker Sales in August 2014

Electric Vehicles: An Economic and Business View

9/29/2014
• 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.
• 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
Drive Electric Ohio: Supporting the state of Ohio’s PEV community

- 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
Drive Electric Ohio: Supporting the state of Ohio’s PEV community

• 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: Supporting the state of Oregon’s PEV community

• 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
Additional Resources

• 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