Policy Forum Series
Zero Emission Vehicles: Beyond the Mandate
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Zero emission vehicles (ZEVs), which include plug-in electric and hydrogen fuel cell vehicles, offer the potential to reduce urban smog, achieve deep reductions in greenhouse gas emissions, reduce petroleum demand, and diversify our transportation energy supply. This policy forum draws from the latest research to explore some of the major challenges that remain to creating a commercial market for ZEVs, including technology, infrastructure and policy needs.

To meet our state’s air quality and climate goals and reduce petroleum dependency, California has adopted numerous vehicle and fuel policies that accelerate the introduction of alternative fuels and vehicles and support ZEV market expansion. These policies include the Advanced Clean Cars Program, Low Carbon Fuel Standard (LCFS), CPUC's alternative-fueled vehicle proceeding and the Alternative and Renewable Fuel and Vehicle Technology Program which funds alternative fuel and vehicle development, manufacturing, infrastructure and incentives. In addition, the state has helped launch and support public/private partnerships such as the California Fuel Cell Partnership (CaFCP) and the Plug-in Electric Vehicle Collaborative (PEVC).

Most recently, California Governor Jerry Brown signed an Executive Order that lays out a timeline and milestones so that by 2015 “all major cities in California will have adequate infrastructure and be zero-emission vehicle ready,” by 2020 “the state will have established adequate infrastructure to support 1 million zero-emission vehicles in California,” by 2050 “virtually all personal transportation in the state will be based on zero-emission vehicles, and greenhouse gas emissions from the transportation sector will be reduced by 80 percent below 1990 levels.”

Concurrently, the federal government and other numerous countries around the world are providing funding for research and development, vehicle purchase, infrastructure and manufacturing, each for various environmental, energy and competitive reasons.

The industry has responded. This year, nearly every major global automaker and several California based startups plan collectively to sell tens of thousands of plug-in-hybrid or battery electric vehicles nationwide with the primary market in California. At least five major automakers have stated
plans to introduce early commercial volumes of fuel cell electric vehicles in California by 2014/2015.

However, major barriers remain to creating a profitable commercial market for ZEVs. Their purchase price is currently high because ZEVs include new, expensive technology and are produced in low quantities compared to established gasoline and diesel models. Consumers are not well informed about these new technologies, and are uncertain about resale value, costs of operation, range, and safety. The lack of fueling infrastructure, for both electricity and hydrogen, inhibits automotive industry investments and consumer purchases of ZEVs.

The key overarching questions to be addressed in this policy forum series include:

1. How may existing and future policies influence the adoption of ZEVs and investments in ZEV infrastructure?
2. What are the market scenarios for ZEVs, and what are the resulting implications for infrastructure needs, environmental and economic benefits, policy, and industry investments?
3. What are likely investment sources for non-home charging and hydrogen infrastructure?
4. What lessons has California learned that are relevant elsewhere (and vice versa)?
5. How important is coordination between public and private stakeholders in determining market success? What are some barriers to coordination and how might we overcome them?

The series includes several sessions over two months.

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Unless otherwise noted, sessions will all be held at the University of California Center Sacramento (1130 K Street, Suite LL22, Sacramento, CA 95814) and lunch will be provided (please RSVP for head-count). For directions and parking information, see: Directions to the UC Center

For further information or questions, please contact:
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The UC Davis Policy Institute for Energy, Environment and the Economy is part of a bold new campus-wide initiative to dramatically increase the value of UC research to the policy-making process by identifying priority policy information needs, facilitating diverse collaborations, and translating science into policy-relevant products. If you would like to hear about future Policy Institute events such as this, please visit http://PolicyInstitute.UCDavis.edu and sign up for our distribution list.
Session 1: Zero Emission Vehicles 101

11:30AM-1:00PM
May 21, 2012

Check http://policyinstitute.ucdavis.edu and go to Informing Policy tab for presentation materials

What are zero emission vehicles (ZEVs) and how do they serve California’s energy and environmental policy goals? This session will provide an informational foundation for the ZEV policy series. It will cover (1) the overarching policy motivations behind commercializing ZEVs, (2) the main types of ZEV technologies, (3) the existing policies that are likely to affect their sales and use, and (4) remaining challenges to widespread adoption.

Participants:

Moderator:
- Anthony Eggert, Director, UC Davis Policy Institute for Energy, Environment and the Economy

Panelists:
- Tom Cackette, Deputy Executive Officer, Air Resources Board
- Dan Sperling, Director, UC Davis Institute of Transportation Studies
- Clifford Rechtschaffen, Senior Advisor, California Governor’s Office

References/Materials:
5. Governor’s ZEV Executive Order - http://gov.ca.gov/news.php?id=17463
By the end of 2012, nearly every major automaker is expected to have a plug-in electric vehicle (PEV) on the road in California. Several automakers have also committed to make available 10,000’s of hydrogen fuel cell vehicles (FCVs) in the 2014-2017 timeframe. However, significant uncertainty exists about the consumer demand for these products and most automakers are entering the early market cautiously with limited offerings. This session will discuss (1) the current status of vehicle technology, (2) the strategies of the industry and how that is influenced by policy, (3) how the vehicles look to consumers and what factors are likely to influence sales. The session presents the latest thinking from researchers and industry.

Participants:

Moderator:
- Anthony Eggert, Executive Director, UC Davis Policy Institute for Energy, Environment, and the Economy

Panelists:
- Tom Turrentine, Director, Plug-in Hybrid Electric Vehicle Research Center at UC Davis
- Ken Kurani, Research Engineer, Institute of Transportation Studies, UC Davis
- Andreas Klugescheid, Vice President Governmental Affairs, BMW Group Representative Office
- John Tillman, Manager of Regulatory-Affairs, Mercedes-Benz Research & Development North America, Inc.

For more information please see:

http://steps.ucdavis.edu/

http://phev.ucdavis.edu/
What comes first, the cars or the infrastructure? For plug-in electric vehicles, one of the biggest selling points is their ability to charge at home. However, home infrastructure presents cost and logistical challenges, especially for those without dedicated parking. Furthermore, even for those with home charging, many have stated a desire to expand their range and reduce ‘range anxiety’ through the availability of public charging. California’s recent settlement with NRG requires that the company spend $100M on plug-in electric vehicle (PEV) infrastructure. Furthermore, the California Energy Commission’s AB118 program continues to provide funding for a variety of public infrastructure providers. Where could this money be put to best use to increase vehicle sales and overall utility of PEVs? What laws and regulations governing electricity use will play a large role in the attractiveness of this new automotive ‘fuel’? This session highlights the latest analytical and market survey research that can help guide PEV infrastructure policy and investments.

Session 3 – Charging ahead:
Topics:
1. What type of infrastructure is needed, how much, and where?
   a. Based on usage?
   b. Based on convincing the public to buy vehicles?
   c. What mix of capacity?
   d. Public vs. Non-public (e.g. workplace) vs. semi-public (e.g. grocery store)
2. Who pays for installation and use?

Moderator:
- **Anthony Eggert**, Director, UC Davis Policy Institute for Energy, Environment and the Economy

Panelists:
- **Tom Turrentine**, Director, Plug-in Hybrid Electric Vehicle Research Center at UC Davis
- **Mike Nicholas**, UC Davis Post-doctoral Researcher, Plug-in Hybrid Electric Vehicle Research Center
- **Nancy Ryan, Deputy** Executive Director for Policy and External Relations, California Public Utilities Commission (CPUC)
- **Joshua Cunningham**, Director, California Plug-in Electric Vehicle Collaborative

_In partnership with:_
- UC Davis Sustainable Transportation Energy Pathways (STEPS) [http://steps.ucdavis.edu](http://steps.ucdavis.edu)
- UC Davis Plug-In Hybrid & Electric Vehicle Research Center (PHEV) [http://phev.ucdavis.edu](http://phev.ucdavis.edu)
Hydrogen fuel cell vehicles (FCVs) have zero tailpipe emissions, fast refueling time, long driving range and could be competitively priced with high volume sales. However, for this market to develop, it is considered essential to have an adequate infrastructure in place first. In this session we look at refueling infrastructure rollout strategies for FCVs in California. Thinking has evolved from the early “Hydrogen Highway” concept to a more sophisticated “Cluster Strategy” wherein infrastructure placement is coordinated with vehicle sales to minimize infrastructure cost and provide adequate accessibility to early adopters. We will explore key questions for FCV rollout: How many stations are needed? Where should they be placed? What support is needed to build a business case for a new infrastructure?

Topics:
1. Infrastructure challenges/opportunities.
2. What do we really need to create a market and is there a business case for infrastructure?
3. What policies are likely to influence infrastructure deployment?

Moderator:
- Anthony Eggert, Director of the UC Davis Policy Institute for Energy, Environment, and the Economy

Panelists:
- Joan Ogden, Co-Director of the Sustainable Transportation Energy Pathways (STEPS) Program at the Institute of Transportation Studies (ITS-Davis)
- Analisa Bevan, Chief of the Sustainable Transportation Technology Branch at the California Air Resources Board
- Jim McKinney, Manager of the Emerging Fuels and Technologies Office of the California Energy Commission
- Catherine Dunwoody, Executive Director of the California Fuel Cell Partnership (CaFCP)

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