

EV Everywhere Framing Workshop

Report Out & Lessons Learned

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**EV Everywhere:
A Grand Challenge in Plug-In Electric Vehicles**

Initial Framing Document

White Paper to Explore
A Grand Challenge in Plug-In Electric Vehicles



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Disclaimer: The purpose of this paper is to facilitate discussion among participants in the "EV Everywhere Grand Challenge" Workshops. This paper does not represent, reflect, or endorse an existing, planned, or proposed policy of the U.S. Government, including but not limited to the U.S. Department of Energy. The U.S. Department of Energy does not guarantee the accuracy, relevance, timeliness, or completeness of information herein, and does not endorse any sources used to obtain this information. As such, this paper is not subject to the Information Quality Act and implementing regulations and guidelines.

- 5 workshops this summer
- Framing document
 - Draft: Facilitate discussion among participants
- Recruit the best and brightest American scientists, engineers, and businesses to tackle this electric vehicle challenge
- Re-evaluate and refine the existing technical goals for increasing performance and cutting costs

Topic	Date	Location
Kick-Off Framing Workshop	June 21	Dearborn, MI
Electric Drive Components	July 24-25	Chicago, IL
Advanced Batteries	July 26	Chicago, IL
Consumer Behavior and Charging Infrastructure	July 31 – Aug 1	Los Angeles, CA
Lightweight Vehicles and Structures	TBD	TBD

The EV Everywhere Challenge Involves All of DOE



U.S. DEPARTMENT OF **ENERGY**

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- Benchmark: 5-passenger vehicle suitable for an average American family
- Majority of vehicle-miles-traveled powered by electricity under standard drive cycles
- 5-year simple payback vs. equivalent gasoline powered vehicle
- Any “vehicle range-charging infrastructure” scenario to be considered must credibly allow for the majority of American consumers to be willing to purchase the PEV as a primary vehicle
- No reduction in grid reliability

1. **PHEV40** with limited fast-charge infrastructure,
2. **AEV100** with significant intra-city and inter-city fast charge infrastructure, and
3. **AEV300** with significant inter-city fast charge infrastructure

Vehicle-level analysis provides a starting point for setting EV Everywhere technical targets for these vehicles.

Plenary Session

- Presentations by senior leadership
 - Keynote address by Secretary Steven Chu
 - Acting Undersecretary Sandalow
 - EERE Assistant Secretary Danielson
- Analysis Presentation
- Panel Sessions





OEM Panel: Key Challenges in Plug-in Electric Vehicles

- Moderator: John McElroy, Vehicle Journalist, Autoline
- Nancy Gioia, Ford Motor Company
- Tony Posawatz, General Motors Company
- Mark Perry, Nissan

Stakeholder Panel: Plug-in Electric Vehicle Opportunities

- Moderator: John McElroy
- Dennis Beal, FedEx
- Andrew Brown, Delphi Automotive
- Robbie Diamond, The Electrification Coalition
- Bart Riley, A123 Systems
- Mike Rowand, Duke Energy

1. Batteries
2. Drivetrain (Power Electronics and Motors)
3. Charging Infrastructure/Fast Charge/Grid Integration
4. Vehicle Design/Lightweighting
5. Consumer Acceptance and Public Policy

Major Findings:

- General enthusiasm about EV Everywhere
- Focus on all types of electric drive
- Targets
 - No absolute consensus, but no strenuous objection
 - Targets for each area will be the focus of the remaining workshops
- In general, framing workshop did not provide the required technical depth now sought in the remaining workshops

- 1.) Wide Band Gap devices should be emphasized - industry has Si-based approaches in hand.
- 2.) DOE should consider projects with vertically integrated teams from materials to system on power electronics for EV's.
- 3.) Create an "incubator" program in WBG for next generation WBG power materials/devices
- 4.) Activity focused on WBG power device reliability. Devices are currently overdesigned, adding cost. Would require strong industry participation in addition to high end capabilities in materials characterization). Develop common set of materials and device measurements, evaluation methods.
- 5.) The number of variables and interdependencies of subsystems implies the need for improved systems modeling tools

- 1.) Need for a balanced battery portfolio between aggressive Li-ion and beyond Li-ion.
- 2.) Ensure the competition of “beyond Li-ion” funds reward innovative approaches, not incremental improvements over the state-of-the-art.
- 3.) Need for a detailed cell/pack model and roadmap for Li-ion to approach EV-Everywhere aggressive goals. Need more pack level models for beyond Li-ion approaches to carefully evaluate the probability of meeting goals.
- 4.) Hybrid energy storage systems may be relevant for the beyond Li-ion technology which may achieve energy performance, but not peak power performance. Effort needed to explore the trade-offs and opportunities with hybrid approaches.
- 5.) High risk/reward R&D for charging rates approaching those of gasoline refueling.
- 6.) Consider support of standard cells/modules/packs.
- 7.) Independent testing activity that validates performance of batteries and measures/tracks the state of the art is in various battery areas.

- Need to emphasize the need for new ideas sought during the breakout sessions
- Extremely important for innovators to participate in the focused workshops
- Panel sessions were very engaging
- Overall goal of beginning public dialogue and engagement has been successful

