The EV Everywhere Grand Challenge

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• Outline
  – *EV Everywhere* Grand Challenge overview
  – R&D Program supporting *EV Everywhere*
  – Infrastructure supporting *EV Everywhere*
DOE’s *EV Everywhere* Grand Challenge

**EV Everywhere Goal:**

Enable U.S. companies to produce plug-in electric vehicles as affordable and convenient as today’s gas-powered vehicles by 2022

President Obama announced the EV Everywhere Challenge on March 7, 2012
The EV Everywhere Challenge

Initial Parameters:

• Benchmark: 5-passenger vehicle
• 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
Three Potential Scenarios

1. **PHEV-40** with limited fast-charge infrastructure,
2. **AEV-100** with significant intra-city and inter-city fast charge infrastructure, and
3. **AEV-300** with significant inter-city fast charge infrastructure

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Vehicle-level analysis provides a starting point for setting technical targets for these vehicles.
Stakeholder Input

- Five workshops were held to get broad stakeholder input
- Framing document facilitated discussion among participants
- Re-evaluate and refine the existing technical goals for increasing performance and cutting costs

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Comments from Workshops

• Themes from workshops:
  – “Majority of vehicle miles electric” vs “Maximize electric miles driven”
  – Payback time of 5 years may be too long for typical consumers
  – Need nationwide standardizations of charging stations, signage, and payment
  – Importance of workplace charging
  – EVs should not just be a replacement product, they need value added components
**EV Everywhere Impacts?**

- Beyond Li-ion battery technology?
- Pack-level battery innovation?
- Disruptive approaches to fast-charge/battery-swap?
- Innovations for grid stability for fast charge?
- Wide bandgap crystal growth?
- Non-economic drivers/psychological factors of PEV consumer adoption?
- New non-rare earth magnet/motor designs?
- Workplace Charging Challenge?
- New vehicle ownership/usage models?
- HOV Access for EV’s?
- Autonomous vehicle control to enable ultra-lightweight PEV’s?
EV Everywhere Technical Targets (2022)

- Vehicle Mass
  - 30% Weight Reduction

- Electric Drive System
  - $8/kW ($30/kW in 2012)
  - 1.4 kW/kg, 4 kW/L, 94% effic.

- Battery
  - $125/kWh ($500/kWh in 2012)
  - 250 Wh/kg, 400 Wh/L, 2 kW/kg
**EV Everywhere Research Initiative**

- Announced March 2013
- DOE investment of $45 million; industry cost-share required
- R&D proposals requested in 4 technical areas:
  - vehicle lightweighting
  - electric drive systems
  - advanced batteries
  - auxiliary load reduction
EV Everywhere Research Initiative

• Initiated 38 new projects in September 2013

• Vehicle lightweighting – 15 projects
  – cast magnesium, cast aluminum, high-strength steel, joining

• Electric drive systems – 4 projects
  – wide band-gap inverter; high-temperature DC bus capacitors

• Advanced batteries – 13 projects
  – high-energy cells; electrolytes; computer-aided engineering

• Advanced climate control – 2 projects
  – advanced heat pump; phase-change heating
EV Everywhere Deployment Issues

- Workplace Charging
- Interoperability
- Signage
- HOV Lane Access
- Codes & Standards
- Consistent Tax Policy
- Maximizing Federal Fleets
Workplace Charging Challenge

Goal: A tenfold increase in the number of U.S. employers offering workplace charging in five years

Workplace charging availability is a critical part of the deployment strategy for PEVs.

**Benefits for the nation**
- Fill infrastructure gap
- Increase electric-driven miles
- Increase visibility of PEVs
- Grow the PEV market

**Benefits for the employer**
- Corporate image
- Corporate sustainability
- Contribute to LEED certification
- Attracts/retains employees

>30 Partners

10 Ambassadors
Workplace Charging Partnership

Corporate Pledge
• Commit
• Take Action
• Share Progress

DOE Pledge
• Assist
• Connect
• Recognize
What does “DOE Assistance” really mean?

Helping Employers Overcome Barriers

- Understanding EVSE options
- Permitting requirements and codes
- Working with electrical contractors
- Working with property owner
- Installation costs
- Energy costs
- Management logistics
- Parking priority and availability
- Internal policy development
- Legal liability
- Fairness issues
- ADA compliance
Thank You!

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