

EV Everywhere Workshop
July 30, 2012

CONSUMER ACCEPTANCE AND PUBLIC POLICY

Charging infrastructure

Group D

Breakout Session #1 – Brainstorm Consumer Acceptance Barriers and Infrastructure Scenarios

- **Infrastructure Scenarios**
 - Limited infrastructure
 - PHEVs (110V infrastructure suitable)
 - AEVs (tethered to home)
 - Make commercial charging free (to consumers) – Google model
 - Utilities are compensated
 - Value proposition for site host? Infrastructure provider?
 - Parking garage – put EVSEs on high floors
 - Free parking for EVs
 - Fast charging – needs to be worked from the vehicle OEMs
 - Premature to discuss at this point – “you gotta sell cars” – chicken & egg
 - Issues: installation costs, standards, vehicle availability, energy costs/demand costs
 - Electrification and automation
 - Wireless charging, platooning, let the grid be the energy carrier

Charging infrastructure

Breakout Session #2 – Refine Consumer Acceptance Concepts and Infrastructure Scenarios

- Limited/Initial Infrastructure Scenario
 - Easy way out – not really consistent with EV Everywhere
 - Public charging is “a lot of money for a placebo”
 - Can OEMs meet CAFÉ in this scenario?
 - OEMs must meet consumer demand, which inversely matches gasoline prices
 - Forces consideration of priorities – residential charging
 - Barriers to MDU charging (expense, who pays?)
 - Workplace charging after residential
 - Misses market of consumers who have street-parking
 - More of a thought experiment – suitable in some locations?
 - What does “ubiquitous charging infrastructure” mean, anyway?
 - Suitability of Level 1 Charging
 - Extension cords
 - Repeated insertion of plug
 - Ability of plug to continuously pull 15A

Charging infrastructure

Breakout Session #2 – Refine Consumer Acceptance Concepts and Infrastructure Scenarios

- Free (to consumers) commercial charging
 - Leads into DC Fast Charge scenario (see next slide)

Charging infrastructure

Breakout Session #2 – Refine Consumer Acceptance Concepts and Infrastructure Scenarios

- DC Fast Charging scenario
 - How to do it in cooperation with OEMs / Utilities
 - Where are the vehicles? (Coming in 2013! (?))
 - What are the impacts on the battery?
 - Already seeing impacts?
 - Solution for consumers who can't charge where they lead their lives
 - A network of DCFCs builds range confidence
 - What is the capacity of the average human bladder? (3 hours)
 - Case for AEV-200
 - What is highest feasible charge rate?
 - Dependent on location
 - Limit due to business issues, not technical
 - We don't have to "fuel" our EVs like we do our ICEs
 - How do we accommodate the maximum number of people at the minimum cost?
 - Does government issue bonds to spread cost over long time horizon?

Charging infrastructure

Breakout Session #2 – Refine Consumer Acceptance Concepts and Infrastructure Scenarios

- Connected Vehicles / Wireless Charging
 - Very long-term vision – not within EV Everywhere (2022) timeframe?
 - Do not focus on this at expense of nearer term solutions
 - But do not lose opportunity to develop longer term technology
 - 2022 is really only one vehicle purchase away
 - Similarly to DCFC scenario, government could spread cost
 - Roads/highways are government-owned
 - In 10 years, will there still be plugs on vehicles?
 - Potential solution for ease of use, ADA issues
 - Technology prove-out via vehicles used on fixed routes (MD/HD vehicles)
 - Public will expect wireless charging. (In other applications, wires are a thing of the past.)
 - Wireless charging is a hedge against energy storage development

Charging infrastructure

Breakout Session #3 – Develop Action Plans and Major Findings

- **Limitations of proposed ideas**
 - Rate of OEM vehicle development vs. what we're trying to consider.
 - Vehicles are different than consumer electronics
 - Utility / infrastructure sector may be even slower to change
 - Backwards-compatibility of vehicles / obsolescence of infrastructure
 - Wireless charging – wait to install when repaving/rebuilding roads (10-20 years)
 - Layers of complexity:
 - Mobility – how does transportation fit into our lifestyle?
 - Connected world – information moves fast / Cloud computing
 - Many stakeholders/players that must come together
 - Millennials don't give a #&\$@! about vehicles
 - Government incentives / regulations / laws
 - Mobility of energy is a limiter of transportation

Charging infrastructure

Breakout Session #3 – Develop Action Plans and Major Findings

- **R&D needs**
 - Plug-in infrastructure – waiting for volume
 - Needs to be a business model to unit charger host and EVSP
 - Technology costs not currently a priority – marketplace is sorting it out
 - Recharging at 10 miles/min (180kW) is not on utilities' radar, much less 1MW
 - Storage-assisted recharging
 - Investigate grid-related issues
 - Load-leveling
 - Synergies with renewables
 - Smart-charging / interface with grid / dispatchable load
 - Wireless charging hardware needs
 - Rural electric utilities – how to offer fast-charge capability
 - Technology needs identified in previous workshops
 - Priority: Home -> Workplace -> Public AC Level 2 -> DCFC (Urban) -> DCFC (Rural)
 - Priority may shift based on perception

Charging infrastructure

Breakout Session #3 – Develop Action Plans and Major Findings

- **Regulatory / Standards needs**
 - Need to reduce “soft costs” for commercial installations
 - Standardization / commonality in design can influence this
 - Quality/timeliness of information among EVSE maps/information
 - EV parking / enforcement
 - Previous Clean Cities EV-Ready Cities planning study
 - Dissemination of results
 - Differing solutions for different locations
 - “We’re putting infrastructure where we can, not where it’s needed”
 - Government owns right-of-ways, roads, could leverage synergies

Charging infrastructure

Breakout Session #3 – Develop Action Plans and Major Findings

- **Actions needed / Leaders & Participants Involved**
 - Get vehicles deployed – it's a marathon, not a sprint (OEMs)
 - Leverage MD/HD vehicles
 - Rolling billboards (eyeballs to butts)
 - Shared infrastructure
 - Need for government leadership / cooperation / getting out of the way
 - DOJ/DOL/DOT/DOE/FCC/Treasury FHWA/OE
 - Examples: ADA guidance, Signage, does EV charging constitute taxable income
 - Not only at Federal level, but State/Local
 - Walk the walk (GSA fleet vehicle purchases)
 - Interoperability study (EVSPs, SDOs)
 - Access methods (6 different key fobs)
 - Vehicle/EVSE compatibility
 - Standards landscape assessment (60+ SAE standards related to EVs)
 - Expedite standards process
 - Education / Outreach in conjunction with utilities
 - Target consumers now for purchase in <10 years

Charging infrastructure

Breakout Session #3 – Develop Action Plans and Major Findings

- **Concluding remarks**
 - We don't need a 300-mile AEV!
 - Although we may perceive that we do
 - Utilities represent a very splintered market (3800+ companies, 50+ PUCs). How do we deal with such a complex “customer”? (EVSPs point of view.)
 - A number of things government can do to assist, by facilitating the deployment of infrastructure
 - Convening power (EV Everywhere workshop – case in point)
 - Government involvement can ensure long-term activity, not just short-term gain
 - Don't be distracted by bright shiny objects (again, it's a marathon, not a sprint)
 - ADA – “minor” issue with big impact. Should be solved in near-near-term.

Charging infrastructure

Breakout Session #3 – Develop Action Plans and Major Findings

- Timelines