Shared, Autonomous, Electric EVs and How to Charge Them

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EV Roadmap 10
Palm Pilot vs. iPhone: What made the difference for consumer adoption?

- Intuitive
- Fully connected – voice, text, and www
- Faster
- Sleeker
- More capable
- Flexible – apps!
Are we there yet with EVs?

- Will next-gen EVs like the Chevrolet Bolt have iPhone-like mass appeal?

- If not, what are they missing to become the “gotta have” product?
Automation may be “it”

- Many automakers are developing automated EVs

**Tesla Model 3 Concept**
Source: tesla.com

**Future BMW iNEXT will be an electric crossover, feature Level 3 autonomy**

*BMW i News* | May 5th, 2017 by Nico DeMattia

When BMW displayed its concept for the BMW Vision NEXT 100, it looks like something plucked straight from the future. With a flexible skin-like body...

Source: www.bmwblog.com

**Volkswagen ID Concept**
Source: media.vw.com
Expectations are also high for shared-automated vehicles

The future car is driverless, shared and electric

Self-driving electric vehicles to make car ownership vanish
We will need to rethink charging infrastructure

Shared mobility and shared-automated vehicles have different operating patterns and fueling infrastructure requirements than personal-use vehicles.

“San Diego’s leading car sharing company [replaced] its all-electric vehicle fleet with gas-powered cars due to a lack of charging stations, a symbolic setback for the emission-reduction aspirations of the city’s ballyhooed climate action plan.”

Research is underway at the National Labs

• U.S. DOE recently launched the Energy Efficient Mobility Systems Program, including the SMART Mobility Laboratory Consortium

• The Advanced Fueling Infrastructure Pillar has begun researching the unique charging infrastructure requirements of shared mobility
DC fast charging design study completed

• Larger batteries, longer range mean BEVs need faster charging infrastructure

• A study was completed to examine the design and costs of high-power, multi-port DC fast charging complexes that provide a gas station-like experience

*Source: INL*
Scope and key conclusions

The study included:

• Summary of lessons learned from previous fast charging projects
• Design considerations for multi-port DCFC complexes
• A design case study with rough-order-of-magnitude cost estimate and business case analysis

Findings include:

• Significant cost savings can be realized with a well planned strategy for upgrading to higher power levels
• Under multiple scenarios, the break-even cost to charge is very high – $5-$9/gas gallon equivalent
• On-site energy storage will likely play a role in some scenarios to balance operating cost vs. higher upfront capital cost
• A follow-on project has been started to refine analysis
Full report entitled “Considerations for Corridor and Community DC Fast Charging Complex System Design” available at:

avt.inl.gov/project-type/charging-infrastructure-studies

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