

PLANNING AND EXECUTING CHARGING INFRASTRUCTURE PROJECTS

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Topics

- **EV Infrastructure 1996 to 2008**
- **Locating Charging Infrastructure**
- **Installation Process**
- **What Can We Do to Streamline the Installation Process?**
- **Costs and Incentives**
- **Recommendations for the Future**



Clean Fuel Connection, Inc. (CFCI)

- **Started in 1999 by two former employees of Edison International**
- **Initial focus**
 - **Charging infrastructure for electric vehicles**
 - **Mobile source air quality consulting**
- **Expanded focus includes**
 - **PV--residential and commercial/government**
 - **Infrastructure for Heavy-Duty Hybrids**
 - **CNG Refueling**



EV Charging 1996 to 2008

- **Chargers: Toyota Tsusho, GM MagneCharge and EVI chargers (inductive vs. conductive)**
- **Sold over 7,500 chargers—approximately 2 for every vehicle sold or leased**
- **Installed approximately 1,000 public, fleet and workplace chargers in BayArea including Costcos, SF garages, Bart stations, universities**



EV Charging 1996 to 2008

- Developed standardized installation procedures
- Trained local building officials unfamiliar with EV infrastructure
- Successfully lobbied for millions in vehicle and charging incentives
- Helped design EV friendly local ordinances and policies
- That was 10 years ago
- Need to do it again!



Lessons Learned from 1996 to 2008

- Installation process is time-consuming with many stakeholders and hand-offs
- Multiple hand offs add time
 - average installation time in 2002—30 to 45 days
 - average installation time 2009—same or longer
- Difficult to sell cars if have to wait a month or more for infrastructure to be installed
- Need single charger standard, not “Beta-VHS”



Lessons Learned from 1996 to 2008

- Drivers want public charging but many public charging stations were not used (range anxiety)
- Empty charging spaces were not a good advertisement for plug-in vehicles
- Need more workplace charging
- Each new introduction requires education of local building officials and safety personnel
- Utility issues—on-peak charging can be costly and is not good energy management
- Cost differences between regions--as high as 55%



Lessons Learned Project

- **Funded by Detroit Edison (Michigan Economic Development Grant)**
- **Analyze costs and cost drivers for residential, fleet and public charging installations i.e.,**
 - **Panel upgrades, transformers, conduit runs, trenching, coring, etc.**
- **Evaluate charger service repairs—warranty and non-warranty**
- **Evaluate time for installation**
- **Compare to recent results from other sources (ie., Progress Energy**
- **Initial findings to be presented in October at “Business of Plugging In” conference in Detroit**



Where do Drivers Charge

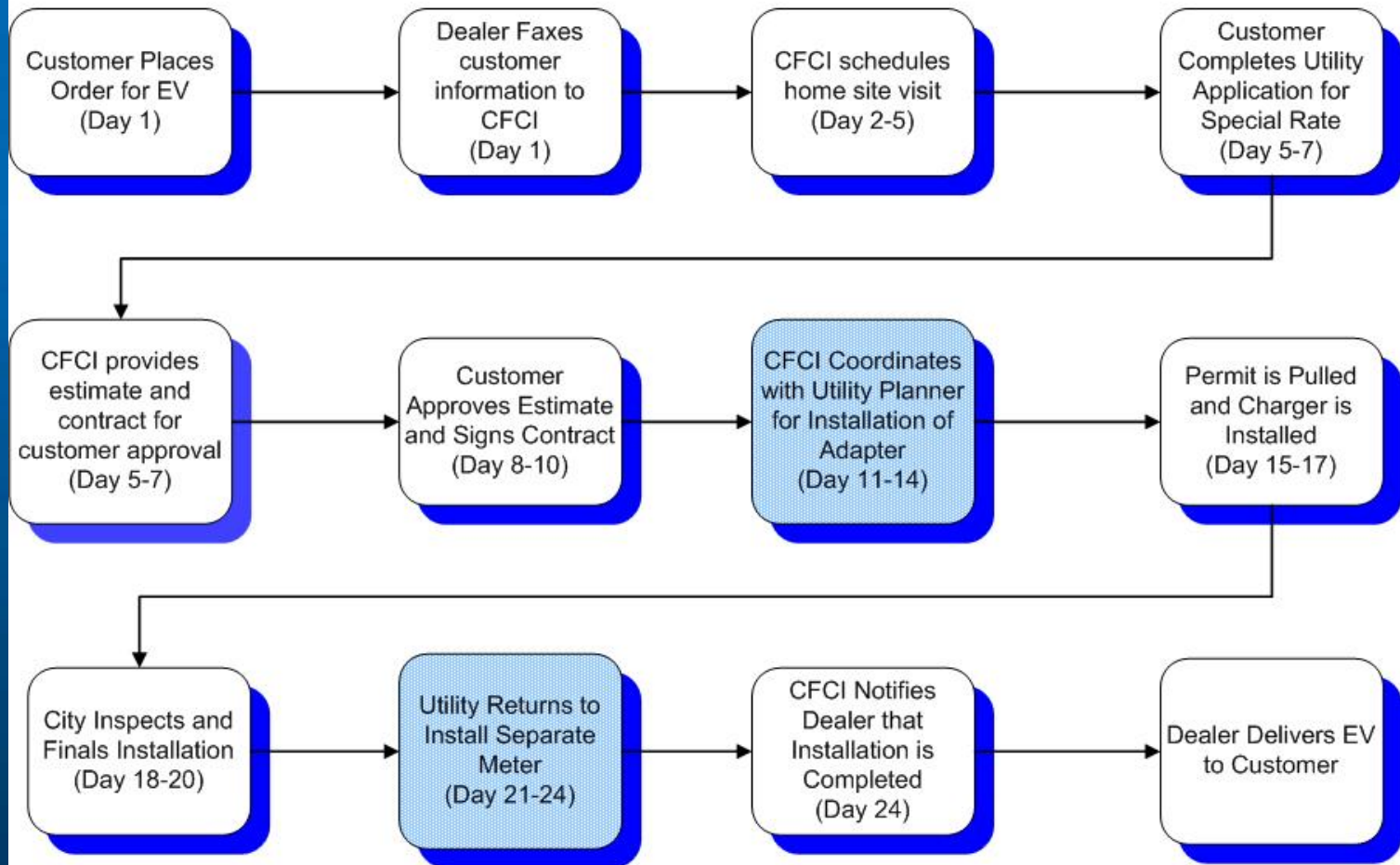
- **Home**
 - By far largest amount of charging occurs at home at night
- **Work**
 - Can extend commuting range, reduce range anxiety
 - Plug-in can be primary vehicle
- **Fleet**
 - Centralized fueling
- **Public**
 - Extend range so can be primary vehicle
 - Reduce range anxiety
 - Reward for driving green



Lessons Learned—Installation Process

Residential Installation Process

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Criteria for Selecting Fleet or Workplace Charging Location

- 208 or 240 volt service available
- 40 or 60 amp breaker available
- Minimize distance from electrical panel
- Keep on same floor as electrical room
- Disabled access



Criteria for Selecting Public Charging Locations

- At periphery of vehicle range
- Locations that require minimum 30 minutes stay
- High visibility—ie., curbside to reduce range anxiety
- Easily identified chain locations ie., Costco
- Create a network of chargers so drivers are comfortable driving within the area
- Multimodal transit hubs and park and ride lots
- Handicapped Access

Do We Need Charging for Plug-in Hybrid Vehicles

- **YES!**
- Increase zero emission range
- Reduce greenhouse gas emission and gasoline use
- Maximize benefit of plug-in technology
- Transition to full BEV or FCEV

How Do We Streamline Infrastructure Process—Near Term

- Sell car with 110v cable
- Make 220v charging an aftermarket item
- Build up 220v work place and public charging infrastructure
- Upgrade existing charging infrastructure
- Use solar chargeports to reduce impact of on-peak charging



How do we Streamline Infrastructure Process—Long Term

- Qualify charger as appliance
- Reduce time between handoffs—make estimating and contracting process more efficient
- Streamline permitting/inspection process—allow for self certification
- Utilities finance and own infrastructure



How Many Chargers Should I Install

- **Fleet**
 - 1 per vehicle if possible
 - Multiple fleet locations to extend range
- **Public**
 - **Depends on location**
 - Minimum of 2 to 4
 - LEED points—3% of parking spaces
 - Airports and other high traffic locations—dozen or more
 - **Wire for more than currently needed**



Making Communities EV Ready—Local Policies that Facilitate EVs

- Condition of approval for new construction**
- LEED requirement for construction**
- In lieu of parking requirements (Pasadena)**
- Free public parking**
- Combine parking meters and charging**
- Make EVs part of urban land use planning**
- Linkages to transit—”last mile”**
- Local conditions of approval (ie., reduce parking requirements if charging is installed)**



Incentives and Tax Breaks

- **50% tax credit until 12/31/10**
- **Accelerated depreciation**
- **Total buydown as high as 67%**
- **Not available to nonprofit or gov't agencies *but***
- **Private seller can take tax credit on behalf of public agency buyer**



Possible Funding

- **Federal ARRA or Clean Cities**
 - \$99 awarded to San Diego area
- **California Energy Commission AB 118**
- **BAAQMD—TFCA**



THANK YOU!

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