



# *Infrastructure Matters*

*Lessons Learned from EV Demonstration Programs*  
Presentation to California Public Utilities Commission  
Electric Vehicle Workshop

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# Residential Installation Costs

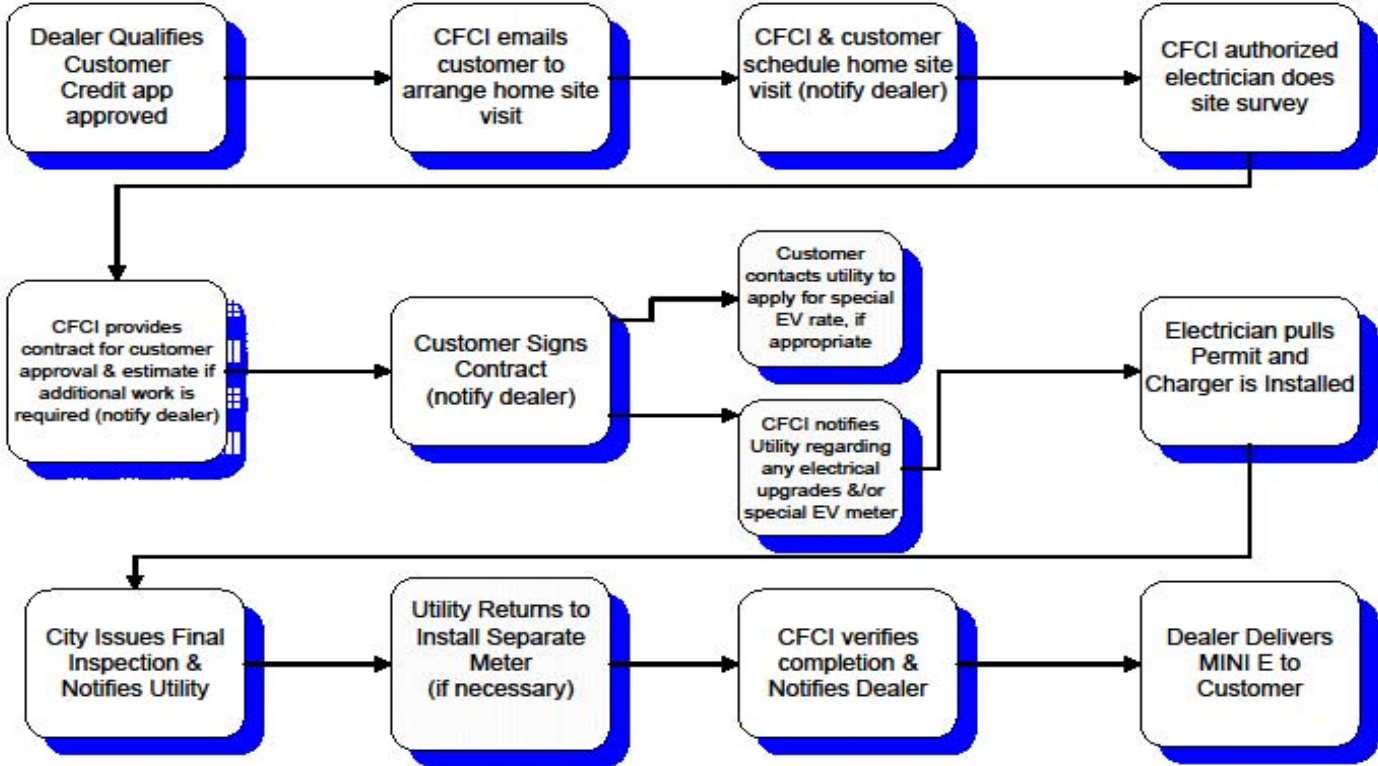
- ▶ CFCI has been installing residential and commercial EV charging infrastructure since 1996
- ▶ Thirteen years of installation records (Edison EV and CFCI)
- ▶ Sample of approx. 200 historical estimates--No. and So. CA
- ▶ Cost Components Analyzed
  - Labor, materials, sales tax and permit
  - EVSE Excluded
- ▶ Historical Results (not adjusted for inflation)
  - Average installation cost \$1,588
  - Median installation cost \$1,371
- ▶ 2009 Results—lower than historical costs when adjusted for inflation
  - Average installation cost \$1,671
  - Median installation cost \$1,494
- ▶ Cost Drivers
  - Panel Upgrades
  - Conduit Length (<36 feet vs. > 36 feet)
  - Size of Panel (under 100 amps)
  - Attached vs. Detached Garage
  - Indoor vs. Outdoor Installation
  - Wall vs. Pedestal Mounted Chargers
  - Special Work—coring, boring and trenching
  - Time-of-use Meter



# Residential Installation Process

## Residential Installation Process

MINI E Program





# Time to Install

- ▶ 35 to 45 days total
- ▶ Includes time from initial customer contact to final inspection
- ▶ Delays are primarily due to multiple hand-offs and customer schedules
- ▶ Actually installation time is usually 4 hours
- ▶ Waiting time for inspector is 4+ hour window
- ▶ Streamlining opportunities:
  - AHJ and utility coordination
  - Time to install dual meter adapter
  - Reduce multiple customer contacts
  - AHJ inspection prior to energizing EVSE (minor work permit)



# Lessons Learned

- ▶ Installation costs range from few hundred to over \$4,000 for installation
  - Installation cost will inhibit vehicle sales
- ▶ Time to install is unacceptable
  - Need EVSE process that allows customer to drive new EV home on day of purchase
- ▶ TOU Meters are a good interim solution
  - avoid panel upgrades but add time to installation
- ▶ Multi-family dwellings have been excluded due to difficult of installation
  - Require innovative solutions such as new electrical service or installation at house meter or installation at nearby public parking facility or workplace installation or pay as you go model
- ▶ Approx 18% of customers required panel upgrades
  - Probably underestimated
- ▶ Muni utilities have greater potential to streamline installation time than IOUs if can get buy-in from Building Dept.



# Recommendations for Streamlining Installation Process

## ▶ Action

- ▶ Pre-Inspection and Pre-Installation of EVSE for potential PEV buyers
  - public sponsorship
  - OEM neutral
- ▶ Minor Work Permit Waiver or streamlined permitting for dual meter adapters (LADWP)
- ▶ Smart Meters to manage load so don't need panel upgrades
- ▶ Dual meter adapters and TOU rates as interim solution (explore allowing diversity factor or A/B switch as an option in the interim where TOU meters not available)
- ▶ Reduce individual and system load impact by combining PEV installations with energy efficiency efforts
  - Package EV/PV incentives
- ▶ Promote inspection alternatives
- ▶ Educate building officials on Article 625 and allowable options (ie., 220v plug)
- ▶ Develop and test an on-line installation cost calculator by correlating housing characteristics to installation cost
- ▶ Develop PEV "Bill of Rights" similar to PV Bill of Rights
- ▶ Support local land-use and development policies that facilitate EVSE infrastructure (ie., SB 375 compliance)

## ▶ Implementers

- ▶ CPUC/CEC/Utilities/EPRI/OEMs
- ▶ Local AHJs and CALBO/ICC
- ▶ CPUC/Utilities
- ▶ CPUC/Utilities
- ▶ CPUC/CEC/Utilities
- ▶ Local AHJs and CALBO/ICC
- ▶ CPUC/CEC/Utilities/EPRI/OEMs in conjunction with Local AHJs and CALBO/ICC
- ▶ EPRI/Utilities/OEMs
- ▶ CPUC/CEC/ARB/Legislature
- ▶ CPUC/CEC/ARB/Legislature