

DOE Workplace Charging Summit

Automakers and Workplace Charging

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Britta K. Gross

Director, Advanced Vehicle Commercialization Policy



Infrastructure

Charging is more convenient than ever before

- 120V outlets (overnight or during the work day)
- 240V hardwired (several hours)
- DC fast-charging (20-30 minutes)



Clear charging patterns are emerging

- Home charging – 60-80% of all charging is at home
- Workplace charging – proving to be the most helpful promoter of PEVs through awareness and incentive
- Public charging – least used, but most visible



Workplace Charging

- 1. Provides daily charging for those without a convenient home charging solution**
- 2. Doubles the potential for daily electric miles driven**
- 3. Provides a visible showcase of PEVs available in the market to potential new car buyers (employees, execs, fleet managers)**

Actions Needed:

1. Need IRS to clearly state EV charging in the workplace is defined as “de minimus” and not a taxable benefit to employees
 - As are \$125/mo employee-provided transit passes and \$240/mo parking privileges
2. Need Architect of the Capitol to clearly state Government facilities can provide employee/visitor EV charging
 - Define a fee mechanism for employee charger use (credit card, monthly deduction, ...) and give project go-ahead
3. Promote the DOE’s Workplace Charging Challenge Initiative

Arguably the most important infrastructure strategy to accelerate adoption of PEVs.

Why are we doing Workplace Charging?

- **PEV Market Growth**

- Critical now to grow the PEV market – and workplace charging is the highest priority strategy throughout US companies
- Provides incentive to would-be or on-the-fence PEV purchasers
- Lead by example (and learn by doing)

- **Employee morale and “workplace of choice” initiative**

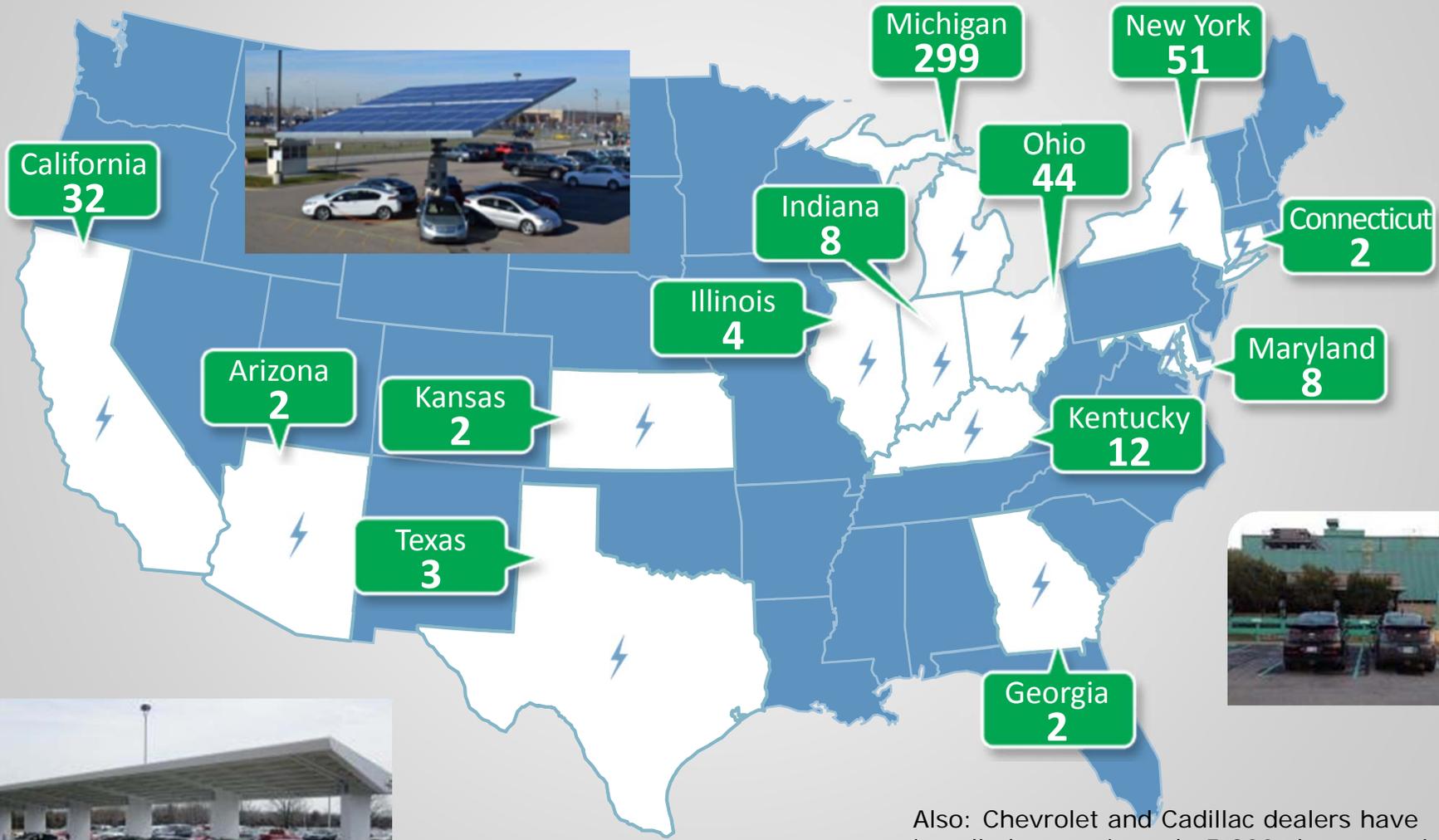
- Employees who most want workplace charging are some of our most ambitious, most energetic employees

- **GM Sustainability Initiative**

- Along with Zero Landfill Sites; Solar PV; Leed Buildings ...

473 GM WORKPLACE CHARGING STATIONS Including 24 Assembly Plants

(21% Solar; 2 ADA friendly; 400 add'l private; 66% 240V and 34% 120V)



Also: Chevrolet and Cadillac dealers have installed approximately 5,900 charge stations at their locations for owner use – 17 of these dealerships use solar charging canopies.

Milford Proving Grounds: Lot A

8:45am Friday August 16, 2013



- ▶ 6 chargers, 19 charging-capable employee vehicles.

Strategy and Learnings

- **How did we get started?**
 - All 240V; various EVSE manufacturers
 - Since added much 120V; now 35% 120V
- **Always build in extra growth capacity (in-ground conduit, ...)**
- **Always design more parking spots than chargers**
- **Currently all free to use**
 - But can imagine a time in the (distant) future when it might make sense to charge for charging
 - Critical now to grow the PEV market and drive the transition
 - Once demand established (solid market growth with no possibility to go back to the way we were), may want to better manage use of limited charge stations
- **Engineering/Business Sites – vehicle demand growing quickly, and exceeds charge station supply**
- **Manufacturing Plants – charge station supply exceeds vehicle demand (generally)**
 - Charger usage peak is during shift-change when both shifts are charging

More Learnings

- We installed 100-200 chargers in 2010-2011
- We installed 45 this year (2014)
- We're planning at least 100 in 2015 (if we can confirm budget)
 - Continuing to fill employee requests; better satisfy high-demand sites
- Some issues we deal with:
 - folks with short commutes still want to top-off and “hog” a spot
 - some illegal parking as folks converge around a charger and try to reach it
 - 240V done by noon (if not 10am) and more pressure to see these cars move on
 - 120V – fewer issues (reliable, all-day charging, can be much cheaper...), but some folks don't want to use their own charge cords
- **The Good? It's working – over 600 Volt-driving employees**
 - enthusiastic employees forming loose networks to communicate availability and manage cord-swapping
- **How to get started?**
 - Just start (an outlet, a marked parking spot, and a sign)

GM Workplace Charging Etiquette: Ten Rules of Electric Vehicle Charging

Thank you for using the vehicle charge stations at GM locations. We support your decision to drive electrically and ask that you follow a few simple rules while charging in order to make the most of this GM-employee initiative.

- 1. Safety First**
- 2. EV Spots are for EVs**
- 3. EV Drivers must Adhere to Posted Signs**
- 4. Charge Only When Necessary**
- 5. First Come, First Served**
- 6. All Electric Vehicles are Created Equal**
- 7. It's Okay to Ask for a Charge**
- 8. Don't Unplug Someone Else's EV... Except When They Are Done Charging**
- 9. Charge Up and Move On ... Or Expect to be Cord-Swapped**
- 10. Workplace Charging is a Privilege, not a Right**

Acknowledgement: We gratefully acknowledge Brad Berman's, "Eight Rules of Electric Vehicle Charging Etiquette" as a model for GM's ten rules of workplace electric vehicle charging etiquette.



21 April, 2014

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Thank you for using the vehicle charge stations at GM locations. We support your decision to drive electrically and ask that you follow a few simple rules while charging in order to make the most of this GM-employee initiative.

1. Safety First

Practice safe charging. This means properly managing the cord during and after charging. During charging tuck the cord under your car so people will not trip on any excess length, or drive over it. After charging, neatly wind the cord on its holder and tuck in any excess length. Avoid overstretching the cord to help ensure it can be used for years to come and do not place the cord such that it comes in contact with the paint of another vehicle.

2. EV Spots are for EVs

It's not acceptable for an internal combustion car to park in a spot designated for a plug-in car. That's a firm rule, no matter how crowded a parking lot is, and no matter how infrequently the charging location is used. Contact security if such a situation occurs.

3. EV Drivers must Adhere to Posted Signs

It is never acceptable for an electric vehicle to even if the handicapped parking space is next to a "Spark EV CTF" were installed to support special charging available for these drivers. EREVs and PHEVs are removed if/when testing is deemed complete.

4. Charge Only When Necessary

Don't charge if you don't need a charge. Leave the charge to complete his or her daily travel. We encourage charging to employees and campus visitors to the most of GM's investment, please utilize your home as your primary charging location and use workplace charging as needed to augment your home charge.

5. First Come, First Served

Company vehicles and personal vehicles have the same right to access workplace chargers - there is no special treatment for either.

6. All Electric Vehicles are Created Equal

An owner of a pure battery electric vehicle (BEV) does not have the right to unplug an extended-range electric vehicle (EREV), such as a Chevy Volt, or a plug-in hybrid electric vehicle (PHEV) just because that car has a back-up gas engine. Our goal is for every EV driver to maximize his/her daily electric commute.

7. It's Okay to Ask for a Charge

If a charging spot you need is being used, and you are able to park next to the car that is currently charging, open your charge port door as a signal to the other EV driver to plug you in when he/she is finished charging.

Happy to share this
and make it
available to anyone.

EV Barriers and Opportunities

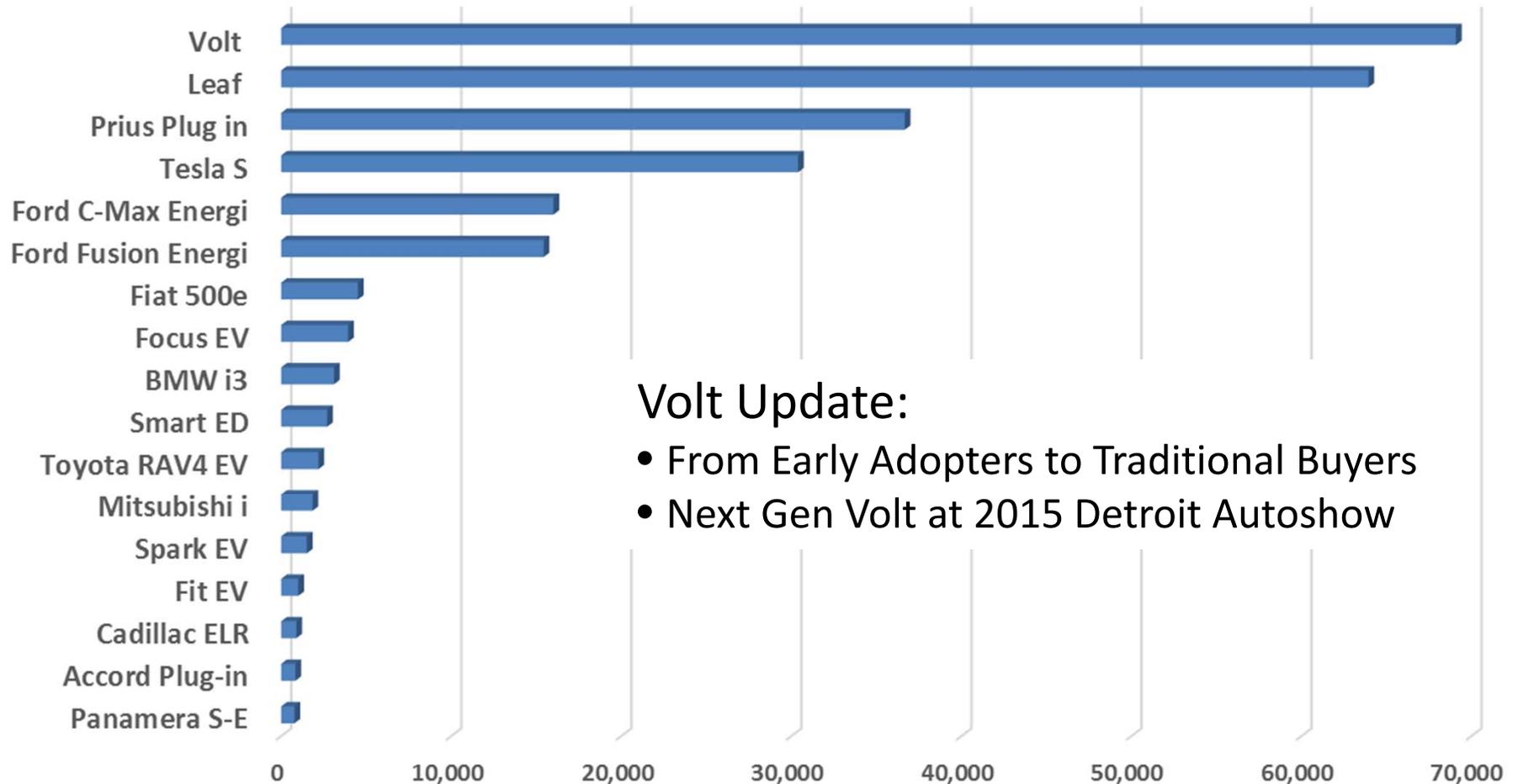
- **Consumer demand is the key barrier to market growth**
 - Overcoming this barrier requires major education and awareness efforts
 - At all levels - from personal and local, to state, regional, and national.
 - Direct experience with these vehicle technologies (“butts-in-seats”) is the surest path to growing awareness and driving adoption.
 - Consumers need to sense a compelling value proposition
 - Early Adopters vs. Traditional buyers (i.e. what’s in it for me?)
 - Clear advantages and messaging
 - Sustained incentives (because consumers don’t buy a new car every year)
- **The right charging infrastructure can be a key enabler**
 - Consumers must feel that the alternative fueling infrastructure is more than adequate to meet their daily/routine driving needs.
 - Hype is all about public and fast charging, but this reinforces weaknesses, not strengths:
 - Home charging provides the critical backbone of all EV charging.
 - Workplace charging is the single-most valuable charging solution that directly engages corporations, executives, employees, and fleet managers, which in turn directly impacts market growth.



Total PEV Sales: Launch to Date

(Source: www.insideevs.com)

As of: End of Sept 2014

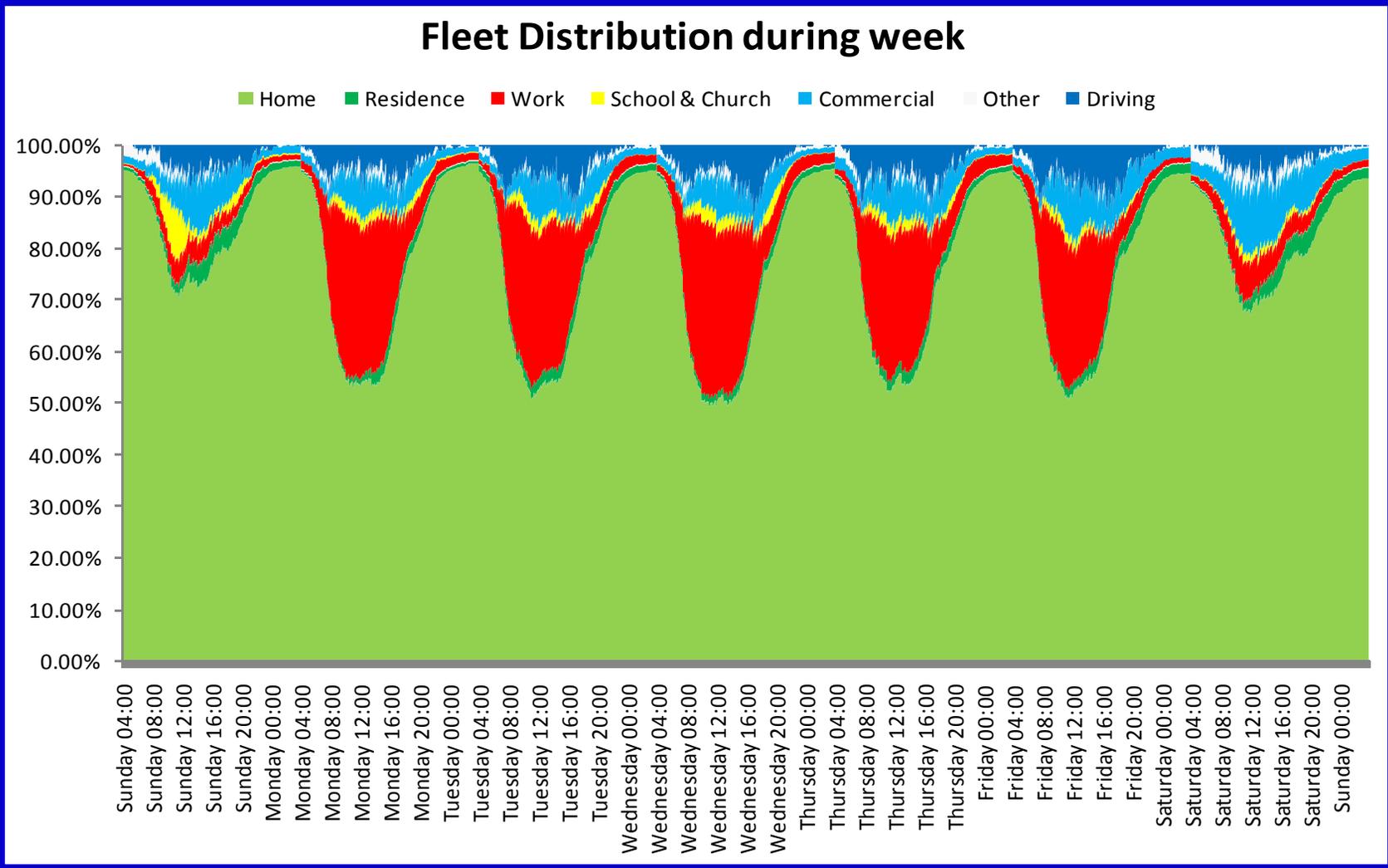


Volt Update:

- From Early Adopters to Traditional Buyers
- Next Gen Volt at 2015 Detroit Autoshow

Total Industry Sales of PEVs currently 255,000

Where are the Cars?



Source of Data - 2001 National Household Travel Survey ; GM Data Analysis (Tate/Savagian) - SAE paper 2009-01-1311

Charging Infrastructure: Home ... Work ... Public

- Public charging
 - High Visibility
 - Destination
 - Public education and outreach

- Workplace
 - Corporate Parking Lots,
Municipal Parking Lots

- Residential (majority)
 - Satisfying consumer-driven
home installation process
 - Permits, electricians,
inspections, meters, rates

