



Plugin Electric Vehicles

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History of Plug-in Electric Vehicles

1834: First electric car

1908: Henry Ford introduces the Model T



1904 Baker EV

1920's: Electric cars are no longer a viable consumer product

1968-1978: Congress passes safety and emissions regulatory statutes

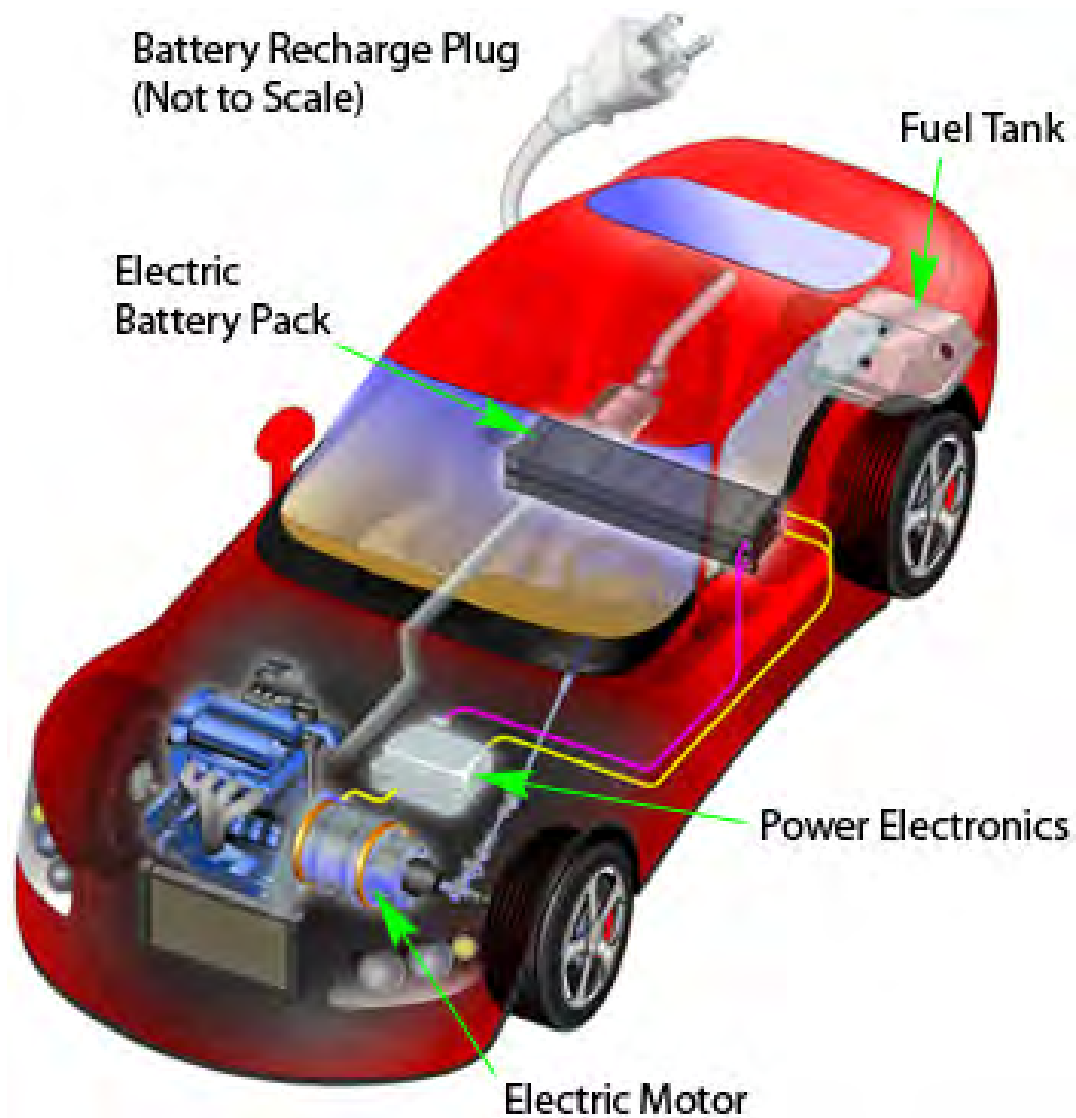
1996 - 1999: GM EV-1

2010-12: Launch of Plug-in Electric Vehicles

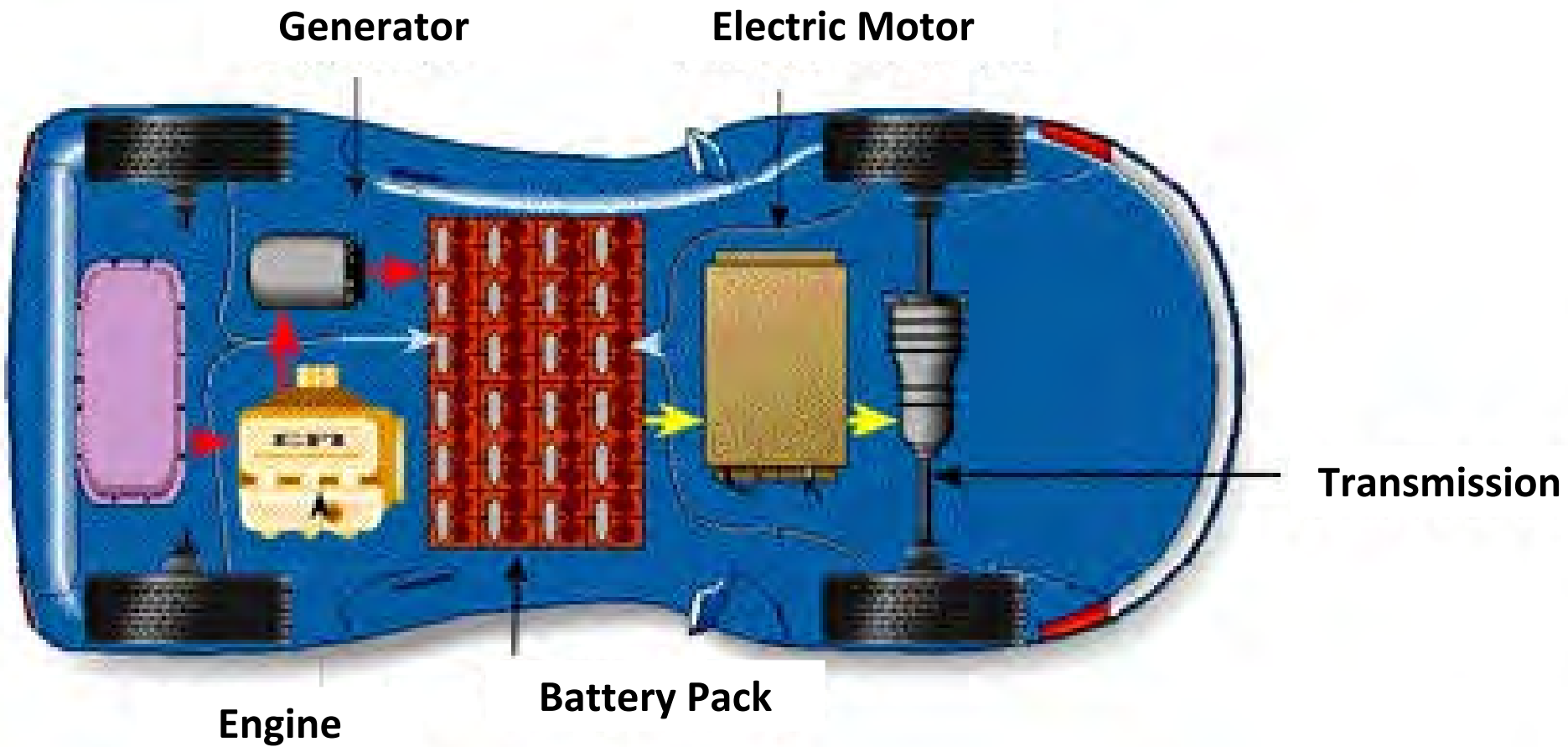
Electric Drive Vehicles

	Hybrid (HEV)	Plug-in Electric Vehicles (PEVs)		
		PHEV		All Electric
		Parallel	Series (EREV)	
Primary Fuel	Gasoline	Electricity	Electricity	Electricity
Secondary Fuel	N/A	Gasoline	Gasoline	N/A
Wheels Driven by	Gas engine with electric motor assist	Gas engine and electric motor	Electric motor	Electric motor
Range (miles)	Electric: Minimal Gas: 300+	Electric: ~40 Gas: 300+	Electric: ~40 Gas: 300+	Electric: ~100+

Parallel PHEV



Series (EREV)



Many Makes and Models

2009



Commuter, Tango T600; EV



Tesla Roadster; EV



Balqon Natilus E20 / E30



Electrorides ZeroTruck; EV



IC Bus CE 10AHJ ; PHEV

2010



Nissan Leaf; EV



Chevy Volt, EREV



CODA Sedan; EV



Mitsubishi iMiEV, EV



BYD F3DM; PHEV

2011



Audi A1 Sportback; PHEV



Audi C30; EV



Ford Focus; EV



Toyota Prius, PHEV



Tesla Model S; EV

2012



Bright Auto Idea; PHEV



Velozzi SOLO; PHEV



Daimler Smart ED; EV



Ford Escape; PHEV



Hyundai Blue-Will; EV



Nissan Leaf - Coming soon to the Triangle Area



Benefits of PEVs

Lower Cost



\$0.50 – \$0.70 per
gallon equivalent

Energy Security



Reduced oil imports,
Distributed
Infrastructure,
Diversified Fuel
Sources

Fewer Emissions



Reduced Mobile
source emissions
Increased benefit
with greening of
generation

Better Performance



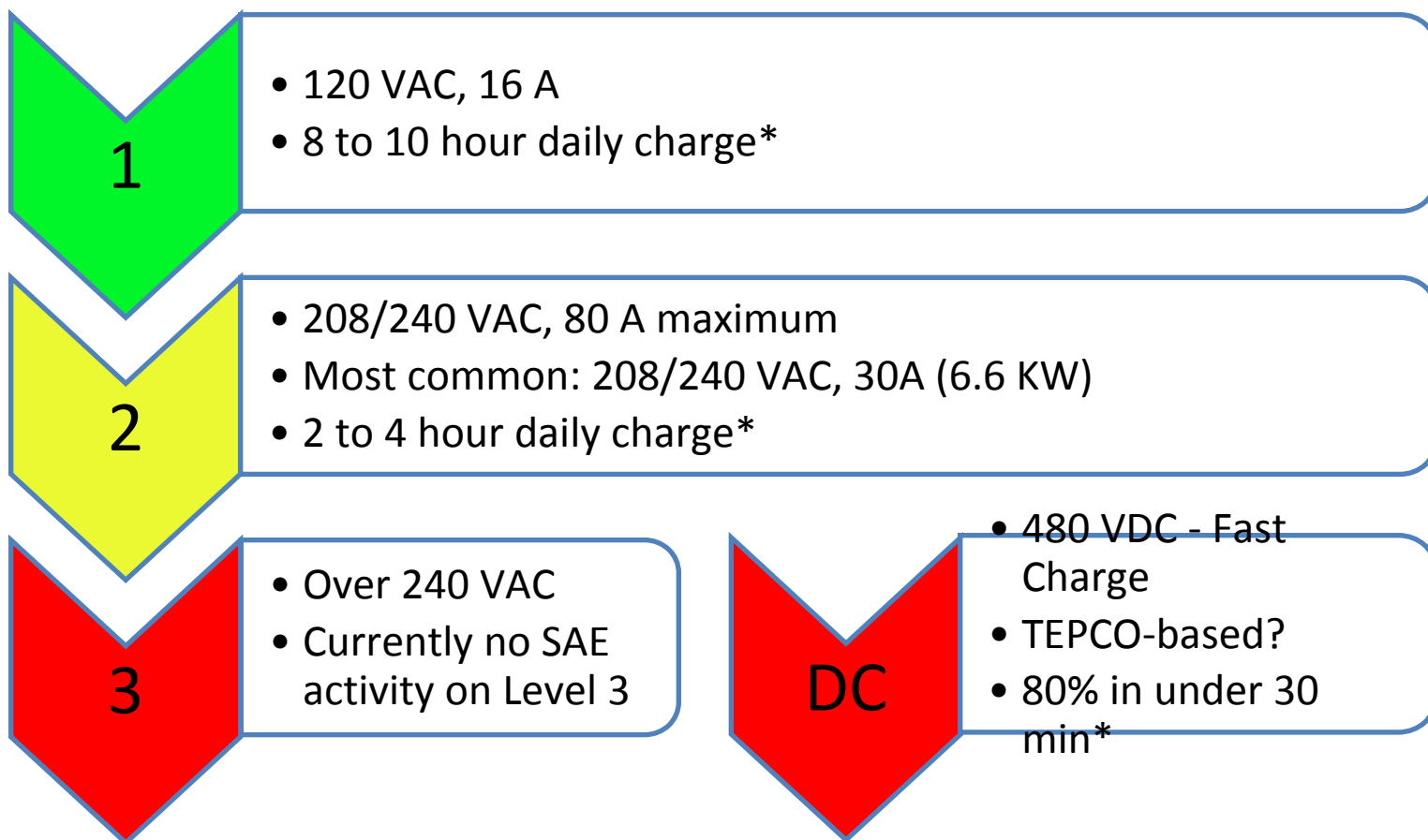
PEVs will meet the
performance
expectations of
Americans

Fuel that is cheaper, cleaner and made in America

- Planning and Implementation
- Charging Stations (EVSE)
- Codes and Standards
- Incentives, Policies and Drivers
- Electrical Load Management
- Technical Support & Maintenance
- PEV Workforce Training
- Education and Outreach



Charging Levels



* Estimated charge times are based on a vehicle utilizing 40 miles of electric only driving between charges.

1919 Charging Station



Charging Components



Level 1

- Separate Cord Set
- Standardized Connector at Vehicle End
- Standard three-prong plug connects with receptacle



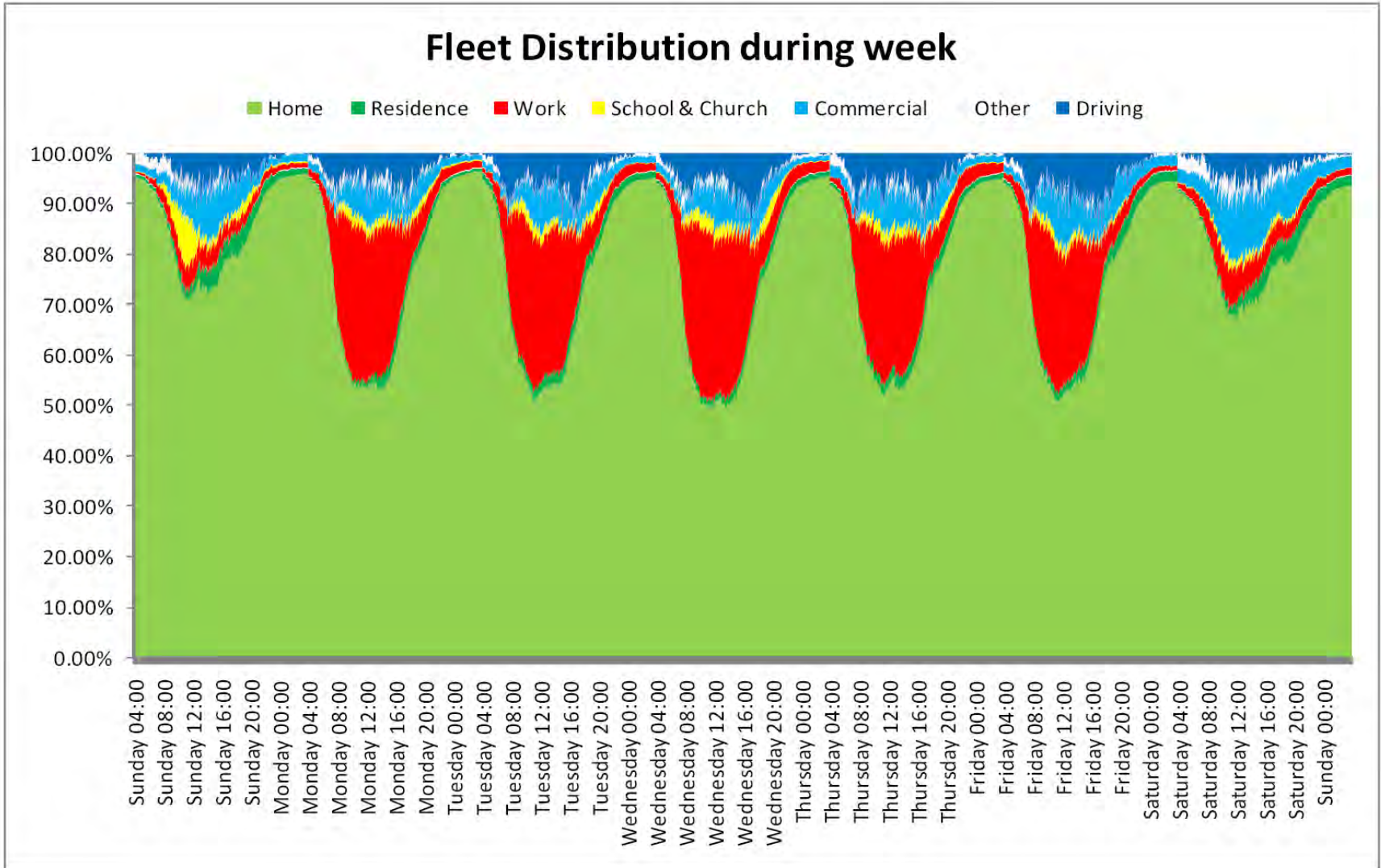
Level 2

- Cord set is part of charging station
- Standardized Connector at Vehicle End
- Hard-wired connection at charging station
- GFI included
- Multiple Communication Options

Variety of Options

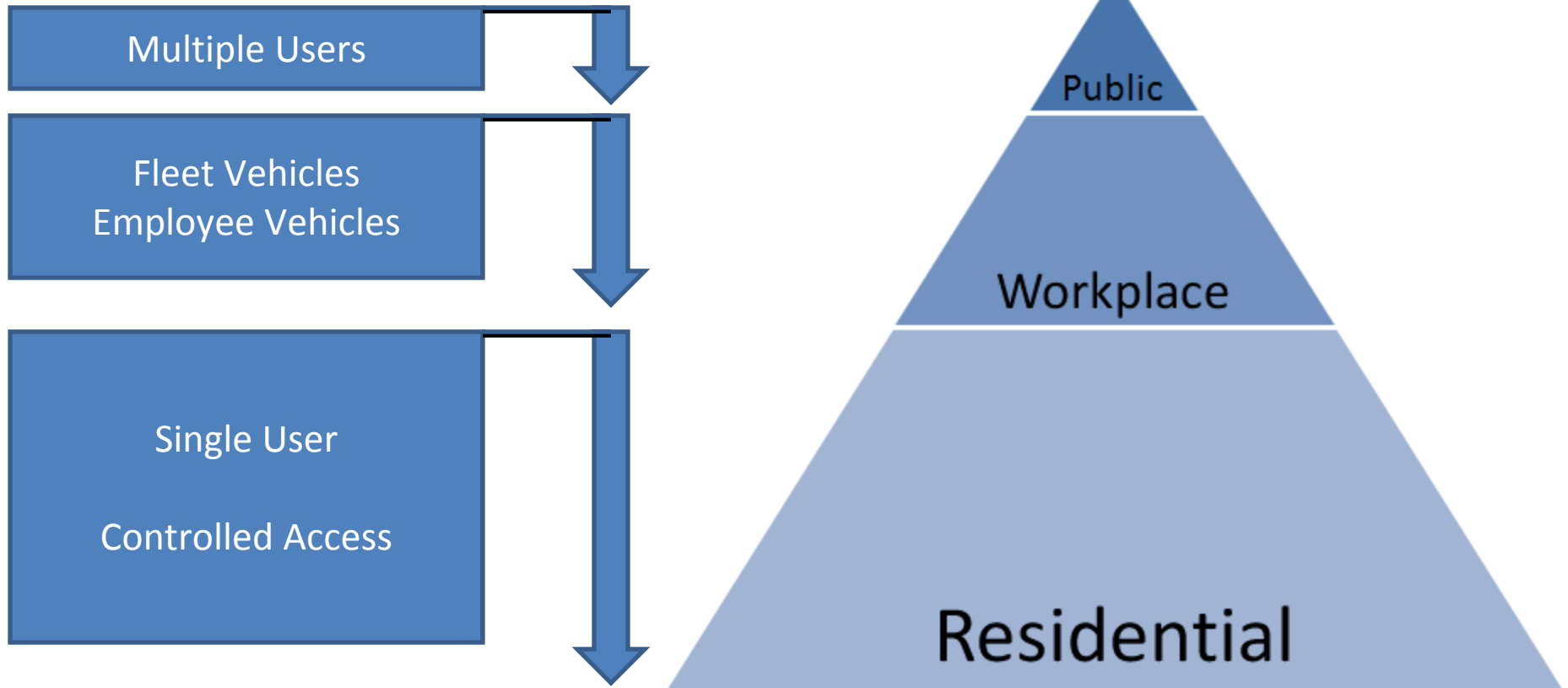


Projected Charging Locations



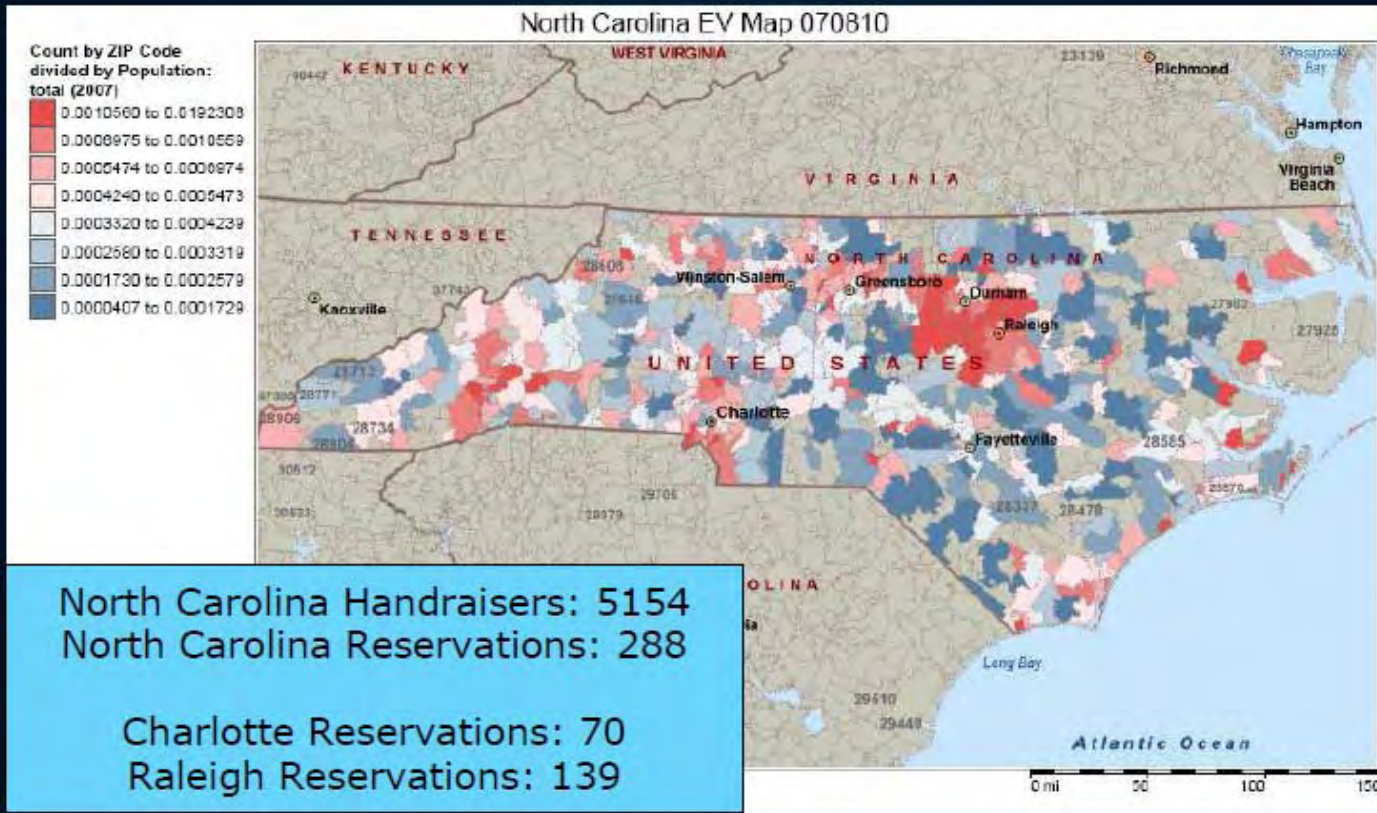
Source: Tate and Savagian (GM) SAE 2009-01-1311

Expected Charging Locations



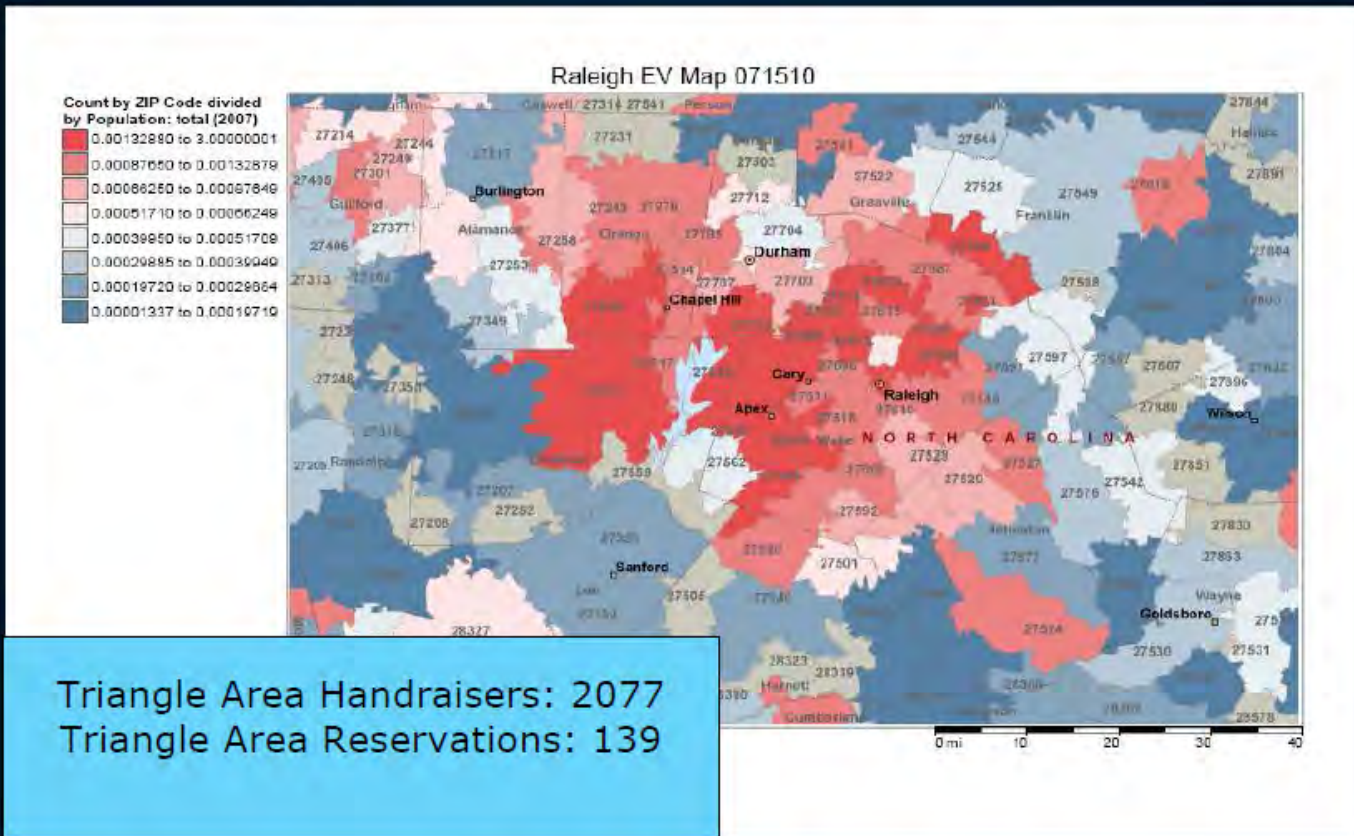
Nissan Leaf NC Heat Map

LEAF Handraiser Density – North Carolina



Nissan Leaf Tirangle Heat Map

LEAF Handraiser Density – North Carolina



Why Now?

- The technology is ready
 - Improved batteries with higher energy density/longer range
 - Standardization in charging infrastructure (SAE J1772)
- Marketplace
 - Driving factors include gas/oil prices, energy security, GHGs
 - Consumers are more familiar with hybrids and other alt fuel vehicles
 - Broad nationwide support and incentives
- Customer Features
 - Instant torque
 - Preconditioning the cabin
 - Internet connected

- Federal rebates
 - Vehicles: up to \$7,500 for PEVs, up to \$2,000 for NEVs
 - Stations: 50% up to \$2,000 residential, up to \$50,000 commercial
- State & local incentives available nationally
 - Up to \$5,000 vehicle & conversion rebates
 - Charging station rebates
 - Reductions in sales taxes and/or registration fees
 - Access to High Occupancy Lanes (HOL)
 - Reduced permit fees for charging stations
 - Free/preferential parking
 - Free public charging

- **Triangle**
 - Regional effort helping municipalities get ready for PEVs
 - Community Planning, education forums, installations
- **Asheville**
 - Clean Cities - Land-of-Sky: Early stages
 - Early stage of community planning
- **Charlotte**
 - Clean Cities – Centralina
 - Regional effort helping Charlotte area prepare for PEVs
- **Charging Station installations**
 - Blue Skies Initiative / CFAT
 - Municipalities / attractions / businesses
- **EPRI Plug-in 2011 Conference**
 - Raleigh, 7/18/2011 – 7/21/2011



Thank You!

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