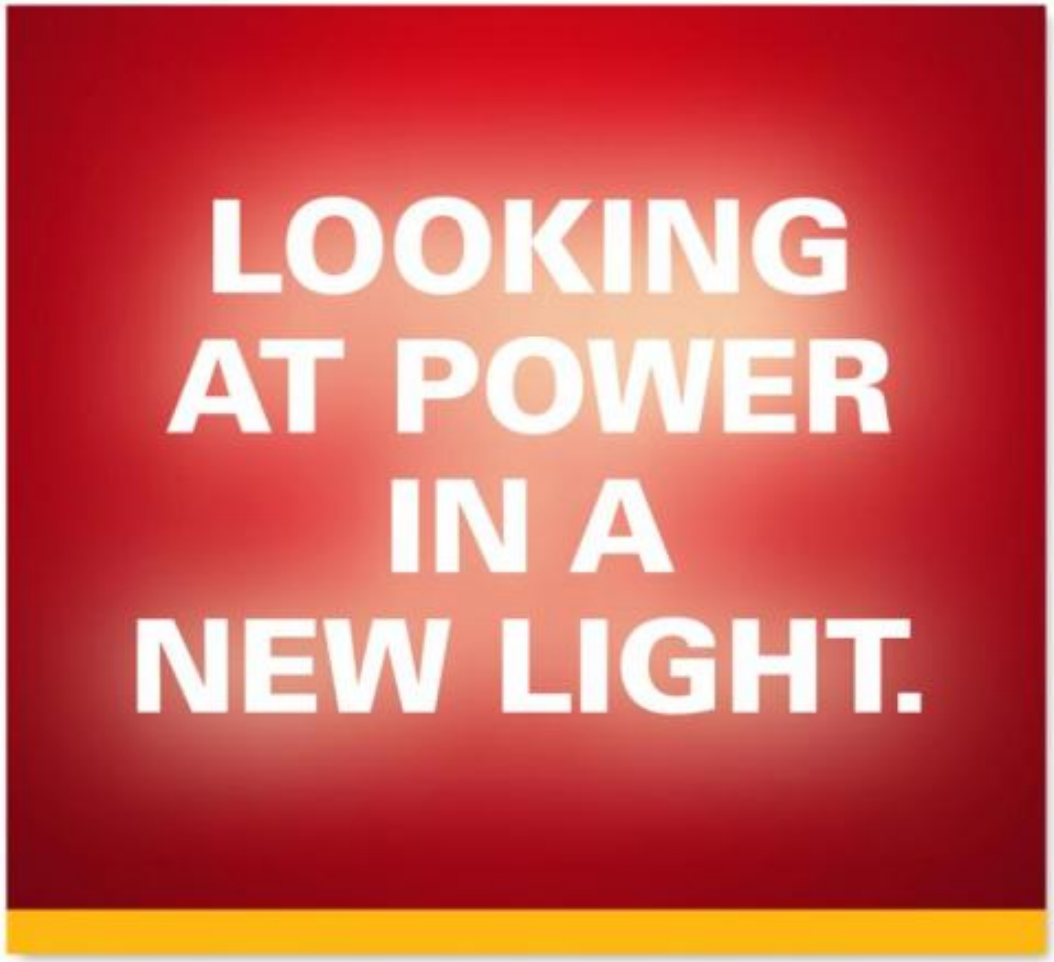
Electric Transportation

Mike Waters

November 2009

Progress Energy

Progress Energy



A BALANCED SOLUTION
FOR THE FUTURE.

ENERGY EFFICIENCY

ALTERNATIVE ENERGY

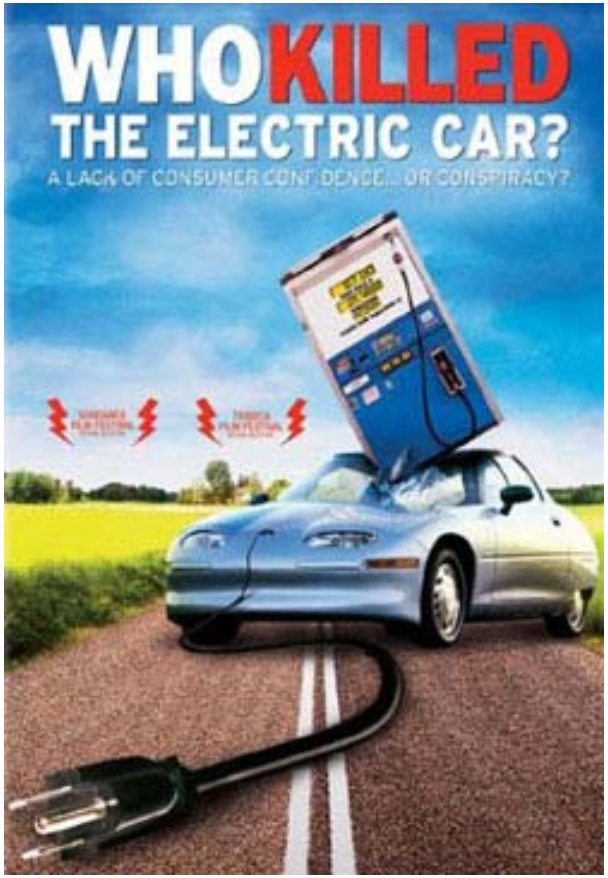
STATE-OF-THE-ART PLANTS

Progress Energy

Progress Energy

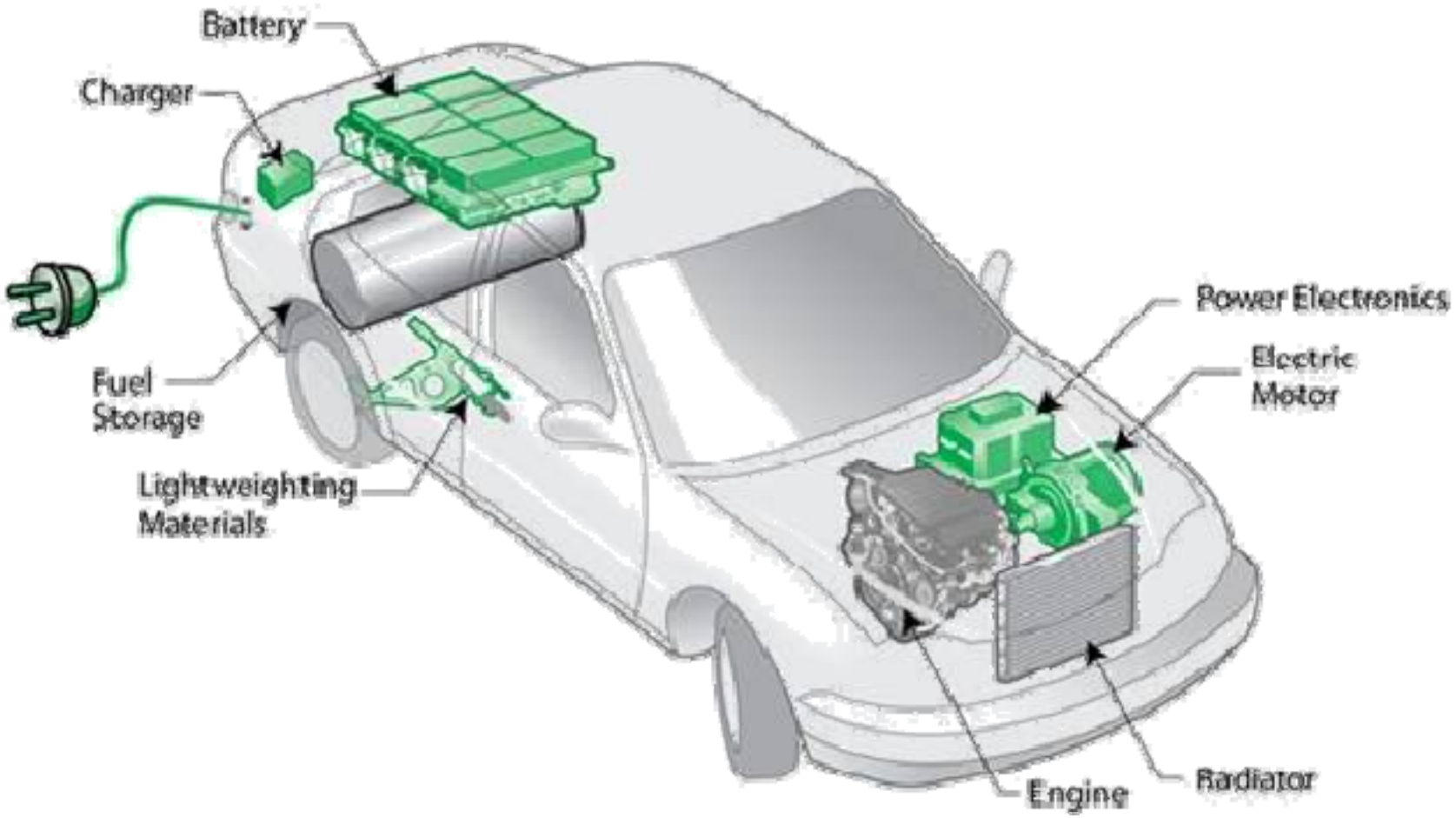
Didn't we see EVs before… and it didn't end well?

- Situation today is very different than the 1990s
- Technology
  - Plug-in *hybrid* electric technology eliminates range anxiety
  - Improved batteries and longer range
- Marketplace
  - Gas prices, energy security, GHG
  - Not just driven by California
  - Broad support and incentives



Progress Energy

Plug-in hybrids are an extension of today's standard hybrid technology



Progress Energy

Why Plug-in Vehicles?

CLEANER

- Fewer emissions and more easily mitigated

CHEAPER

- Fuel costs much less than gas
  - Electricity: ~$0.75/gal$_e$

DOMESTIC

- Reduces dependence on foreign oil

Multiple studies confirm air quality benefits

Pacific NW National Lab Study

- CO_2 emissions reduced by 27%
- NO_x emissions reduced by 31%
- Urban air quality emissions greatly reduced:
  - VOCs/NOx/CO reduced > 90%
  - PM by 40%
  - SO_2 by 80%

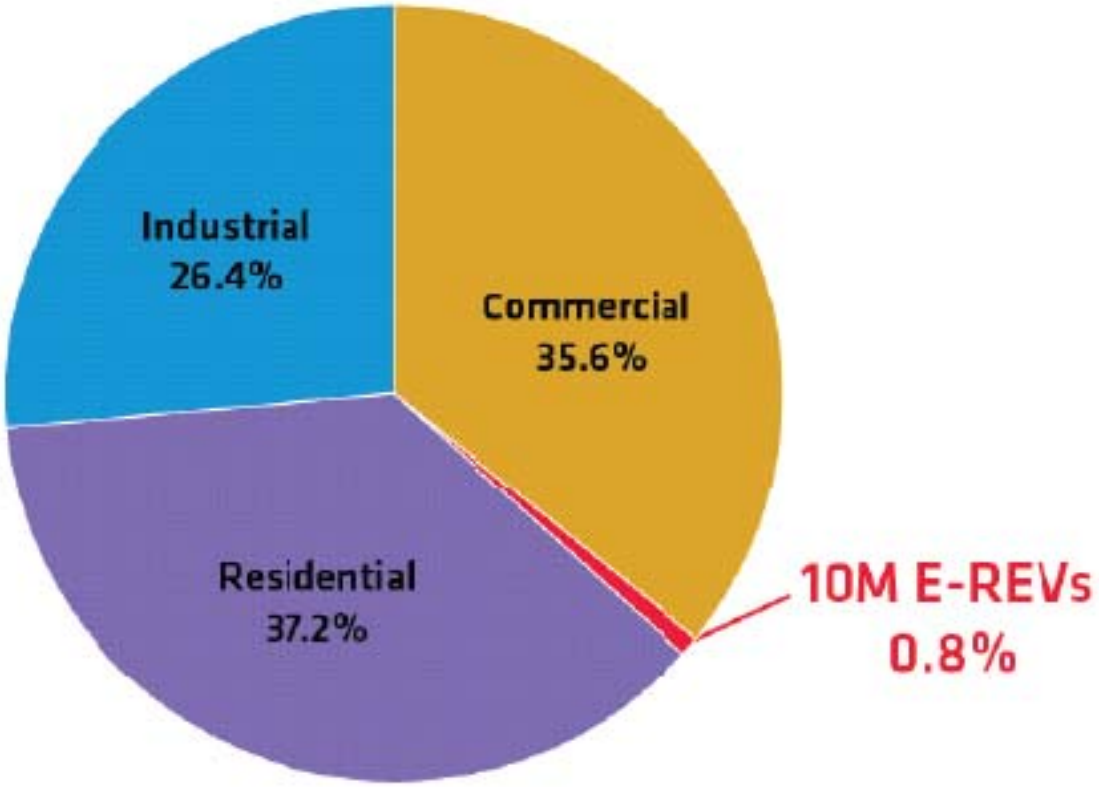
NRDC/EPRI Study

- CO_2 reduced by 470 million tons annually by 2050
- Total emissions of NO_x, SO_2, ozone, and VOC decrease

Charging of Vehicles

- SAE J1772 standards under modification
  - Level 1: 120 V 20 A breaker, separate cord
  - Level 2: 240 V up to 100 A breaker, attached cord
  - Level 3: Direct DC, high voltage (~50-200 kW)
- Charging at home will be the default, but opportunity charging will also be in demand
- Public access stations at key locations leading the market will be important to enable PEV adoption
- Access and payment models still in flux
  - Important to have open and fair access early on
- “Smart Charging” will help avoid peak load

Impact to the Grid



Projected 2010 U.S. Electrical Consumption plus
10 million Plug-in Hybrids (~ 8 kWh charge/day)

Source: EPRI

Progress Energy

Nearly every OEM has a plug-in vehicle planned by 2012…

	PHEV or EREV	ALL ELECTRIC
Production	 Saturn VUE  Chevrolet Volt  Volvo PHEV  Chrysler: Jeep or Minivan  BYD 3DFM  Fisker Karma	 Nissan Leaf  Smart  Mitsubishi iMIEV  Ford Focus  Ford Van  Tesla
Demo/Concept	 Ford Escape PHEV  Ford/Eaton Trouble Truck  VW Golf TwinDrive  Toyota Prius PHEV  Chrysler 200C  Cadillac Converj	 Dodge Circuit  Mini-E  Subaru R1e  Mercedes BlueCell  Chrysler Minivan

Progress Energy

Collaborative Approach

- The challenge is significant
- It will take a collaborative approach
  - Automakers, utilities, government, academia, NGOs, equipments providers, builders, consumers, etc.
- Everybody has a role to play
- “Project Get Ready” is one model of cooperation

Progress Energy

Strategy to Achieve a Plug-in Ready City

Required Stakeholders:	Required Enablers:
• Dedicated Project Leader	Establish a public charging infrastructure plan; Establish a local/state incentives plan; Establish a marketing and educational outreach plan
• State Government	Provide state tax credit for vehicles (>$2,500/16kWh vehicle) and charging equipment and installation at home/multi-family home/workplace/public (up to $3,000/home; $30,000/other site with 10 charge ports) Eliminate state sales tax on vehicle purchase; Commit/fund government fleet purchases (200 vehicles) Note: Point-of-sale consumer incentives more effective than end-of-year tax credits
• City/County Government • Clean Cities Orgs / AQMD	Provide incentives for vehicle purchasers (see above - work with state) and charging equipment and installation (see above - work with state) Install public charging spots in key locations (30 distributed locations; meeting SAE J1772 level 2 (240V) and J2836 standards); refurbish existing charge sites; Establish free parking; Commit/fund government fleet purchases (25 high-profile vehicles)
• DOT	Provide HOV lane access for plug-in vehicles; Eliminate vehicle registration and license fees
• Permitting and Code Officials	Prepare for eased/fast/self-permitting of home/public charging installation; Ensure new home/building codes/major renovations provide for vehicle 240V charging
• Utilities (municipal & regional) • Regulators/Public Utility Commissions	Provide rebate for vehicle purchasers (add'l $2,500/16kWh vehicle); Provide and incentivize home/building charging installation electrical service (i.e. provide no/low cost installation financed thru monthly utility bill); Provide free charging or compelling low-cost EV rates (3-4 cents/kWh); Provide "green" electricity options; Commit/fund commercial fleet purchases (25 high-profile vehicles)
• Large Local Employers (as Early Adopters)	Employers (3 major corporations) provide work-place charging (25 park/charge spots) and employee vehicle purchase incentives (add'l $2,500/vehicle); Commit/fund corporate fleet purchases (25 vehicles)
• Local Universities	Provide campus charging and free parking (10 distributed charging locations); Commit/fund university fleet purchases (5 high-profile vehicles)

Slide courtesy of GM

Opportunities Available

- Plug-in vehicle are the hot topic in the past year
- Obama has set a target of 1 million by 2015
- Significant tax credits exist *today*
  - Up to $7,500 for light duty vehicle
  - 10% credits for conversions, NEVs, 2/3 wheeled vehicles
  - Up to 50% for infrastructure
- Stimulus grant money is potentially available
  - Clean Cities, FOA28
  - State and local block grants

Progress Energy is actively engaged in supporting PEVs

- Plug-in Vehicle demonstrations
  - 7 converted Prius, 2 Ford Escape, Bucket Truck
  - UF Prius conversion
  - City of St. Pete Ford Escape conversion
- Significant public outreach and education
- Technical consultant
- Research and development
- Evaluating business models for charging solutions and relationship to renewable energy
- Partnering with OEMs, cities, and non-profits

Summary

- Plug-in vehicles are coming (again)
- Improved technologies reduce the barriers
- Electric transportation can improve air quality while reducing GHG and petroleum use
- Load is manageable
- Must be a collaborative effort
- Regions that are proactive will have vehicles earlier than others and realize the benefits
  - Focus on process now, consider infrastructure later in 2010
  - Resource: www.ProjectGetReady.com

Progress Energy

Questions?

Ford Escape PHEV Prototype