One Million Electric Drive Vehicles by 2015

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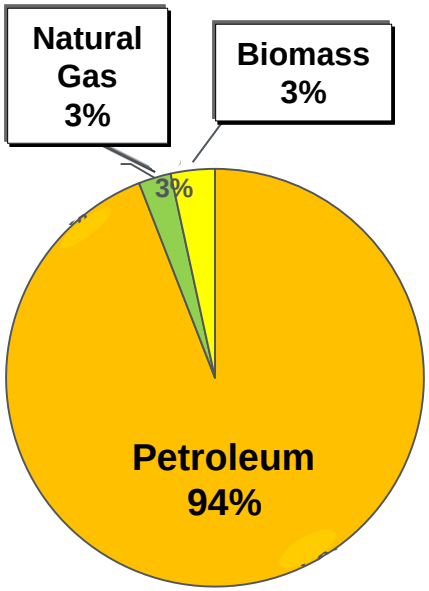
United States Department of Energy

April, 2011

Vehicle Technologies Program

Patrick B. Davis, Program Manager

We are Highly Dependent on Oil



U.S. Transportation Fuel Share (2009)

- Transportation is responsible for 2/3 of our petroleum usage
- On-Road vehicles responsible for ~80% of transportation petroleum usage

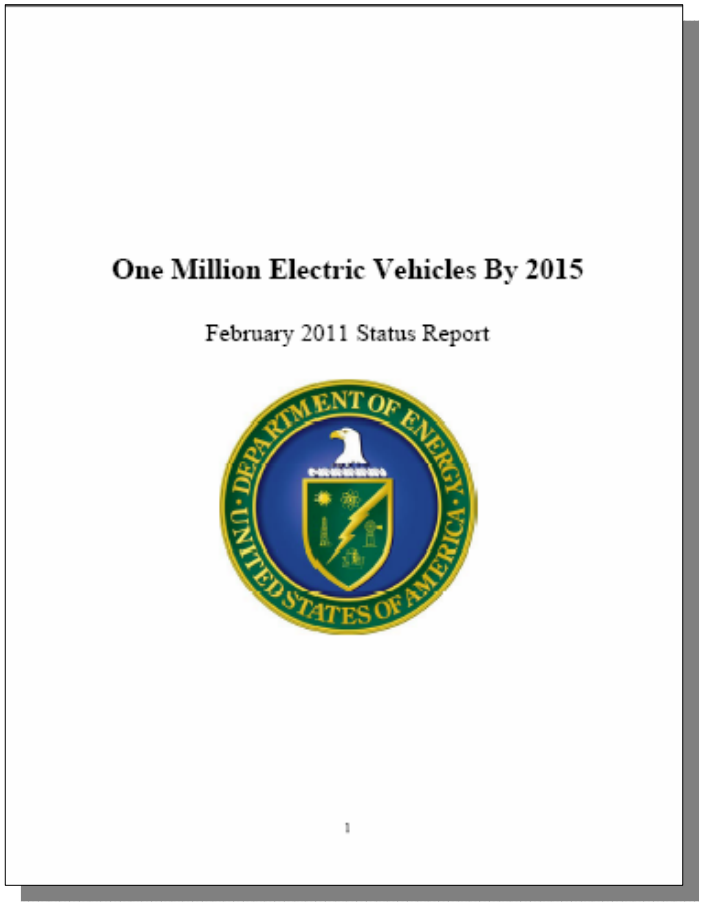
Goal: 1 Million Electric Vehicles by 2015

"With more research and incentives, we can break our dependence on oil with biofuels, and become the first country to have a million electric vehicles on the road by 2015"

- President Barack Obama, 2011 State of the Union

Goal: 1 Million Electric Vehicles by 2015

- DOE Report on capacity to reach one million vehicles by 2015 released February 8, 2011.
- Key findings
  - Manufacturers already have plans for cumulative U.S. production capacity in the range of 1.2 million electric vehicles by 2015
  - This doesn't include vehicles from at least half a dozen manufacturers who have not announced production capacities
  - Consumer acceptance, existing R&D and policy measures are important to reaching the goal


One Million Electric Vehicles By 2015

February 2011 Status Report

Reaching 1 Million EVs by 2015

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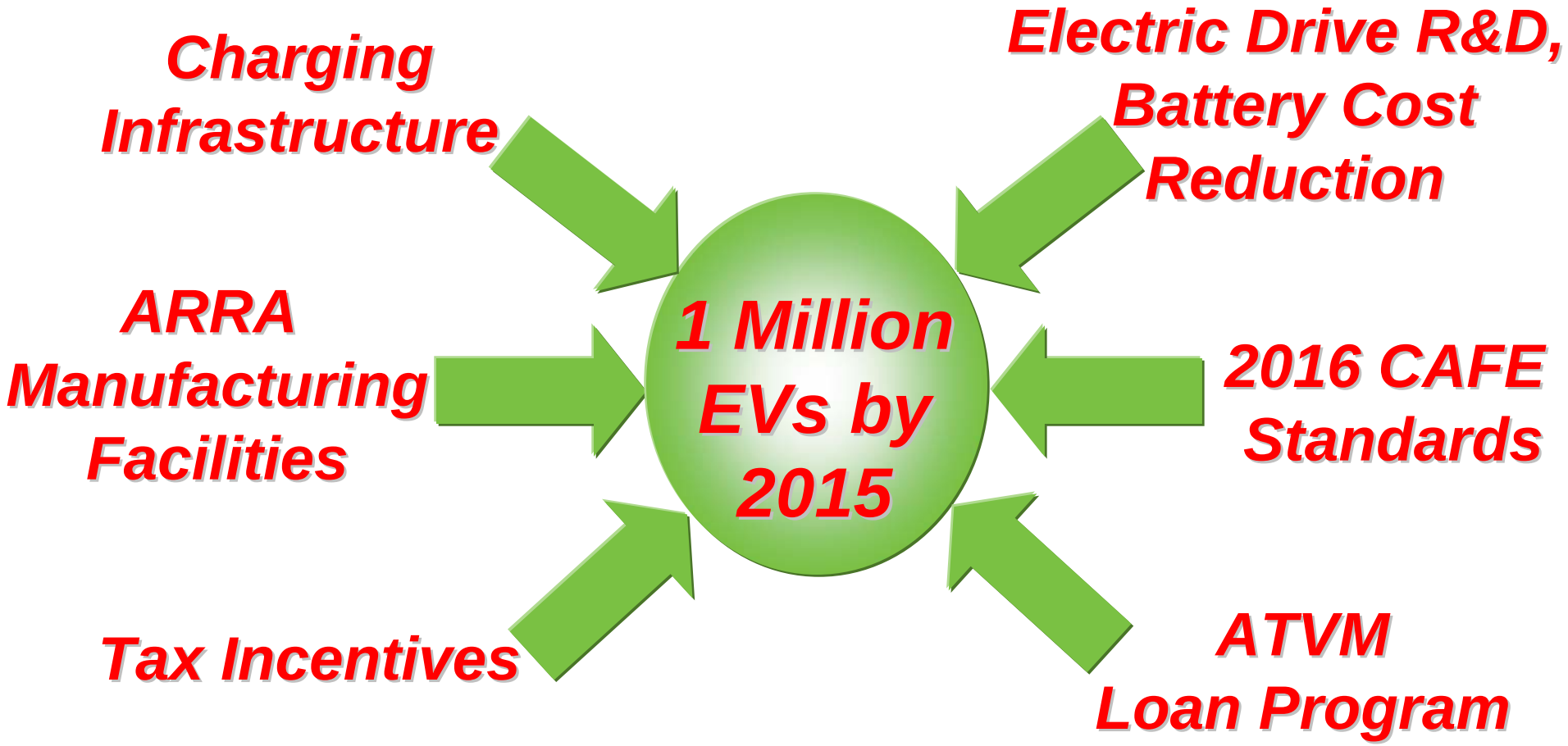

What's Different This Time?

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Early 1900s

1970s

1990s

2011

Answer:

- Urgency of Energy and Environmental Challenges
- Battery Technology
- CAFE standards post 2016

DOE Battery Innovation, Market Acceptance and Cost Reduction

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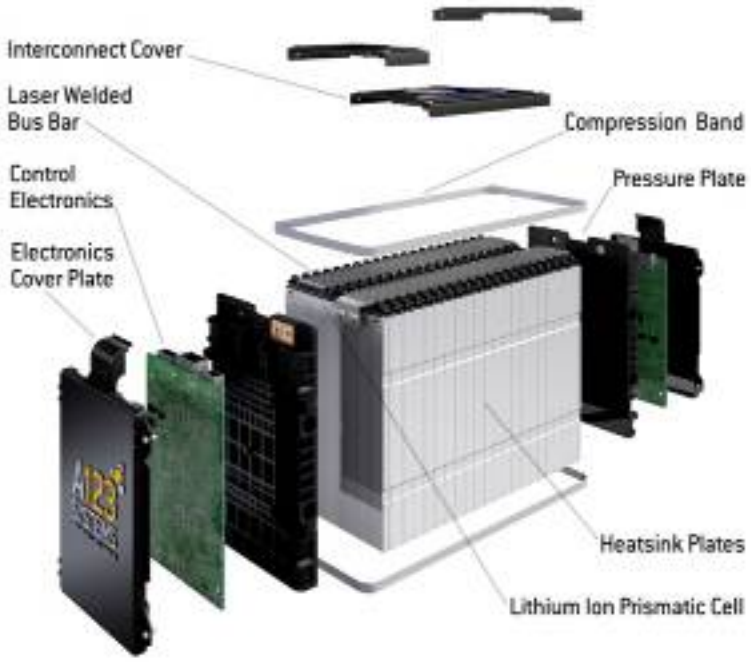
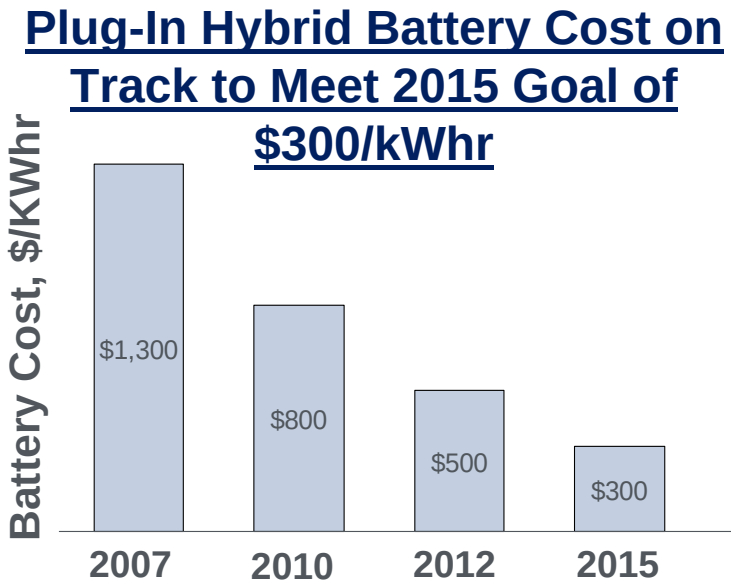
- 1990's → Nickel Metal Hydride (NiMH) batteries enable commercial introduction of HEVs
- 2000 – 2010's → Li-ion batteries enable next generation HEVs, PHEVs and EVs (Volt)
- Future → Next Generation Chemistry with 3x energy density: Li(metal) battery



Battery Module Construction



Recovery Act : $2.0 Billion Manufacturing Supporting Electric Drive

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$1.5 Billion in funding to accelerate the manufacturing and deployment of the next generation of U.S. batteries

$500 Million in funding for electric-drive components manufacturing

President Obama at Compact Power in Holland, MI

Vice-President Biden at Dow-Kokam

Creating an Electric Drive Vehicle Manufacturing Base

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10 Awards

Electric Drive Component

Integrated Supply Chain

Material Suppliers → Cell Manufacturer → Battery Assembler → End User

12 Awards

9 Awards

Outlook for Battery Cost and EV Production Capacity

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On Track to Meet Administration's Goal of 1 Million EVs by 2015

	Battery Cost ($ per kWh)	Battery Production Capacity (10 kWh packs) ARRA	Battery Production Capacity (10 kWh packs) ATVM	Vehicle Production Capacity (announced,cumulative)
2008 2009	$1,000-$1,200	0	0	0
2010 2011	$700-$950	50,000		45,600
2012	Goal = $500	150,000	144,000	223,200
2013				486,200
2014	Goal = $300			854,200
2015		500,000	488,000	1,222,200

9.88 MkWh per year production capacity in 2015

>7.7 MkWh per year capacity demand in 2015

Build out of Charging Infrastructure

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Key Today: Home Charging

- Need to get the cost and installation process right. Currently a significant barrier

Public Charging

- Expensive if not well utilized
- Expansive to fully cover full driving patterns

Ideally need market pull to determine public infrastructure build out

- PHEV's are key to help initiate market pull for public infrastructure

Recovery Act – Infrastructure Activities

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Transportation Electrification Demonstration Projects

The largest-ever U.S. deployment of electric-drive vehicles and charging infrastructure

- Deployment of 13,000 electric-drive vehicles, including light-duty, medium-duty, and heavy-duty passenger and commercial vehicles
- Installation of over 22,000 Level 2 charging sites at residential, commercial, and public locations and 350 (500VDC) Fast Chargers
- Collection of detailed operational data from vehicles and charging infrastructure

10 Grants to establish comprehensive educational and outreach programs focused on electric-drive vehicles

- Funding of the first programs to educate first responders and emergency personnel in how to deal with accidents involving EVs and PHEVs

Transportation Electrification: EVSE/Vehicle Demonstration Activities

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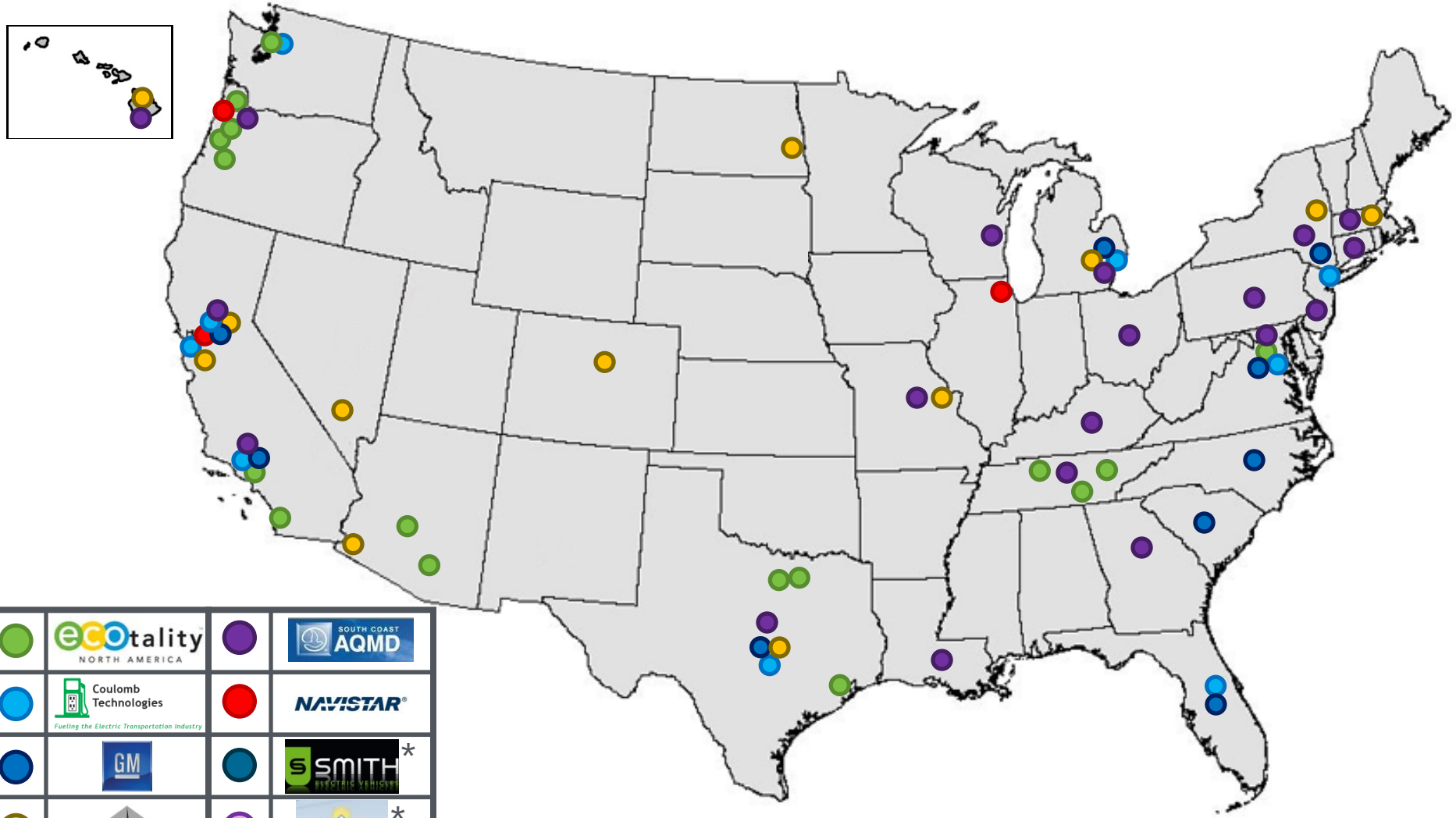

* tbd

Transportation Electrification Data Collection

- Charge event data:
  - Connect, start charge, end charge, and disconnect times
  - Average power (kW), max peak power (kW), total energy (kWh), and rolling 15 minute average peak power (kW)
  - Charger ID, event ID, and date/time stamp

- Driving event data:
  - Data recorded for each key on/key off event
  - Event Type (key on/off), date/time stamp
  - Vehicle ID, Odometer, GPS location
  - Battery SOC, Liquid Fuel consumption

Data Collection Plan

- Data will be collected by INL and NREL
- Data Analysis and Reporting will focus on:
  - Vehicle and charger performance, efficiency, and utilization
  - Charging patterns and public charging use
  - Impact of various rate structures on charging habits
  - Impact of vehicle charging on electric grid
- Report dissemination:
  - Internet based starting this spring
  - Fact Sheet reporting will commence end Q2 FY 2011
  - Annual Utilization / impacts reports beginning late 2011
- Raw vehicle and infrastructure data will not be available
  - Considered “Generated Data with Delivery Restrictions”
  - Raw data will not be delivered to DOE in any format

Working with Cities to Install Infrastructure

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- On January 26, 2011 Vice-President Biden announced a $200M program to help cities establish charging infrastructure (FY12 Budget Request):
  - Establish a comprehensive infrastructure plan
  - Encourage locally-based public and private sector collaboration
  - Leverage federal resources
  - Streamline building permit approval and installation procedures.
  - Initial build-out of the infrastructure.

President Announces Clean Fleets Partnership

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- The Clean Fleets Partnership - working with national vehicle fleet operators to reduce petroleum consumption.
- Charter members: AT&T, FedEx, PepsiCo, UPS and Verizon -- five of the nation's 10 largest national fleets operating more than 275,000 vehicles.

Contact Information

U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

www.vehicles.energy.gov

Patrick Davis, Program Manager
202-586-8061
patrick.davis@ee.doe.gov