

# Electric Vehicle Policy for the Midwest A Scoping Report for RE-AMP



Electric Vehicle Policy for the Midwest – presentation to RE-AMP Network

John Bailey, Institute for Local Self-Reliance – [www.newrules.org/energy](http://www.newrules.org/energy)

January 12, 2009

# Presentation Outline

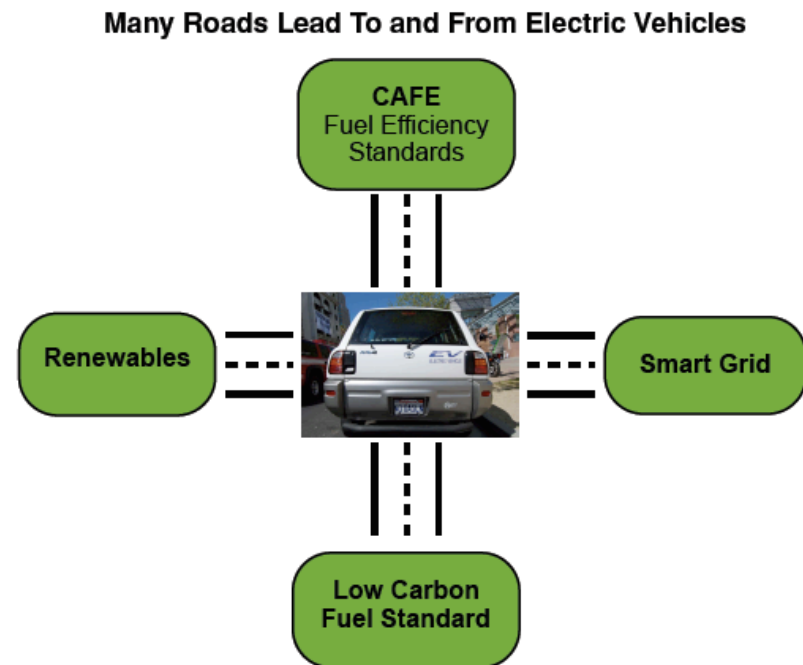
- ▶ Very Brief Recent History of Electric Vehicles
- ▶ Electric Vehicle Developments in RE-AMP States
- ▶ GHG Implications of EVs and Other Policies
- ▶ Electric Vehicle Economic Issues
- ▶ EV Policy Options
- ▶ Recommendations for RE-AMP
- ▶ Q&A



BMW – MINI E

# Before We Start – Two things...

- ▶ EVs are important for other policies and developments
  - Renewable Energy Storage
  - Smart Grid
  - Vehicle Efficiency
  - Low Carbon Fuel Standards
- ▶ EVs direct impact on GHG emissions will be tiny in the next 10 years. Other benefits must be considered (energy security, efficiency, clean energy jobs)



# Very Brief Recent History of Electric Vehicles

- ▶ 1990 to 2000: The EV Tide Rises
- ▶ 2000 to 2005: The EV Tide Goes Out
- ▶ 2005 to 2007: The EV Waters Rise Again
- ▶ 2007 to 2009: The EV Tsunami Rolls In



## 1990 – 2000: The EV Tide Rises

- ▶ California's Zero Emissions Vehicle (ZEV) regulations bring some 5,500 electric vehicles onto the road.
- ▶ Gulf War-dependence on imported oil.
- ▶ Partnership for a New Generation of Vehicles (PNGV), a 7-year \$1 billion effort to get vehicles that could achieve 80 mpg.



GM - EV1

## 2000 to 2005: The EV Tide Goes Out

- ▶ SUVs generate enormous profits for U.S. car manufacturers.
- ▶ EV efforts fade. The Honda Insight becomes the first hybrid electric vehicle (HEV) sold into the U.S and in 2001, Toyota introduces the Prius.
- ▶ Auto companies sue against ZEV mandate. Most car companies end their EV programs.
- ▶ GM announces it will not renew leases for its EV1 cars and will reclaim them by the end of 2004. Ford and Toyota follow suit.

## 2005 to 2007: The EV Waters Rise Again

- ▶ The movie, *Who Killed the Electric Car?*, is released to wide distribution.
- ▶ Grassroots activists try to stop car companies from crushing the electric vehicles leased under California's ZEV program. More than 800 vehicles saved.
- ▶ Toyota introduces its 2nd generation Prius. Japanese drivers can put the car into an all-electric driving mode for 1-2 miles. The device is invisible to U.S. customers.
- ▶ The price of oil begins to climb, from \$25 per barrel in 2003 to \$40 in 2004, \$60 in 2005, \$75 in 2006 and \$90 in 2007.

## 2007 to 2009: The EV Tsunami Rolls In

- ▶ The price of oil peaks at \$140 per barrel in July 2008.
- ▶ GM, Ford, Toyota and Nissan, and new car companies like BYD Auto, Fisker, Tesla and Th!nk, announce they will begin selling EVs or PHEVs in the U.S. in 2010 or 2011.
- ▶ In 2009, California all but mandates the introduction of more than 50,000 PHEVs in the 2012–2014 timeframe.
- ▶ Obama elected. American Recovery and Reinvestment Act of 2009 (ARRA) is enacted. Bailout of automakers – focus on retooling for efficiency. Tax credits for purchasing EVs including for conversion kits. Billions for advanced battery development, smart grids, renewables, EV manufacturing.
- ▶ Director Chris Paine begins production of a new documentary movie, "Revenge of the Electric Car!"



## EV Developments in RE-AMP States

- ▶ What's Going On? Not too much in most RE-AMP states. Some studies underway, some policy in place.
- ▶ Michigan has most aggressive initiatives to date. About \$1 billion in state incentives for attracting EV and battery manufacturing.
- ▶ Budget woes throughout region make for tough sells at legislatures for any policy that needs \$\$



## EV Developments Michigan-Style

- ▶ "Thanks to the most aggressive economic strategy of any state in the country, Michigan, the global center of automotive research and development, is positioned to lessen the nation's dependence on foreign oil and become the advanced battery capital of the world."

*Michigan Governor Jennifer Granholm*



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# EV Initiatives in Michigan – Some Details

## ▶ Research

- Michigan Impact Studies of EVs
- Smart Grid Initiatives

## ▶ Financial Incentives

- R&D and Vehicle Manufacturing Tax Credits
- Property Tax Exemptions
- Michigan Business Tax Credit
- Tax Credits for Battery Research and Development

## ▶ Non-Financial Incentives

- Emissions Inspection Exemption
- Advanced Vehicle Acquisition and Alternative Fuel Use
- Neighborhood Electric Vehicle Access Rules
- Michigan Academy for Green Mobility



## EV Initiatives in Michigan – Results

- ▶ Michigan projects were awarded \$1.35 billion in DOE grants (**more than half the total \$\$ nationwide**) for advanced battery and electric vehicle manufacturing and R&D.
  - Cell, Battery and Materials Manufacturing Facilities
  - Electric Drive Component Manufacturing Facilities
  - Advanced Vehicle Electrification
  - Transportation Sector Electrification Demonstration and Utility Integration
- ▶ Automakers creating facilities for greener vehicle production including EVs



LG Chem



CHRYSLER



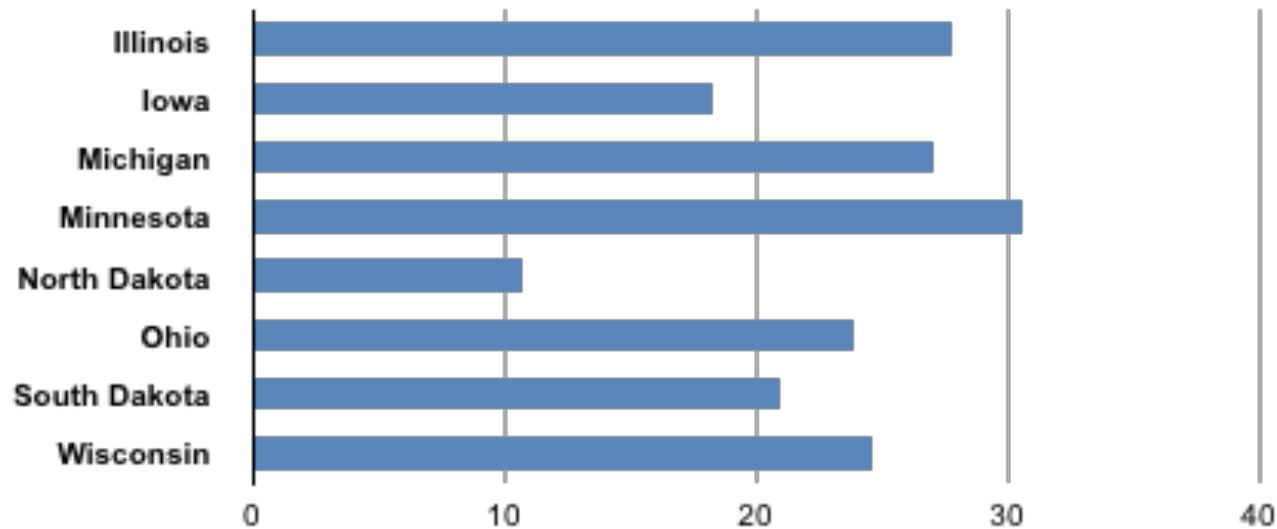
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# Reducing GHG Emissions from Transportation

- ▶ Vehicle and Fuel Efficiency (CAFE)
- ▶ Low Carbon Fuel Standards (LCFS)
- ▶ Vehicle Miles Traveled Reductions
- ▶ Electric Vehicle Expansion

Percentage of State GHG Emissions from Transportation 2005 – RE-AMP States

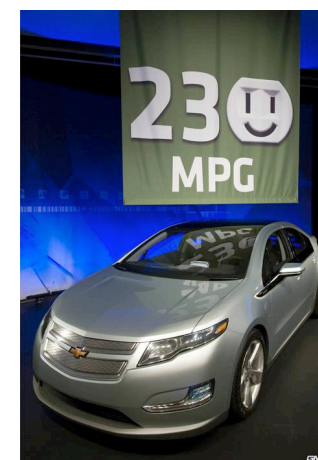


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## Federal CAFE Standards - MPG and CO2

- ▶ In place – final rules coming 2010
- ▶ Fleet-wide – 34.1 MPG by model year 2016
- ▶ Different MPG standards for different vehicle classes– minimum standards in place for each class
- ▶ Fleet-wide – 250 grams CO2 per mile tailpipe emission standard
- ▶ Credits for overachievers, \$\$ penalties for underachievers
- ▶ EVs sales could generate credits for MPG and emissions requirements



## CAFE Standards – Impact in RE-AMP States

- ▶ Range of 5 – 9 percent GHG reductions by 2020

|                             | 2005 GHG Transportation Emissions (MMtCO <sub>2</sub> e) | 2020 CAFE GHG Reductions as % of 2005 Transportation GHG Emissions | 2020 CAFE GHG Reductions (MMtCO <sub>2</sub> e) |
|-----------------------------|--|--|---|
| Illinois                    | 78   | 6.2%   | 4.8   |
| Iowa                        | 21   | 6.6%   | 1.4   |
| Michigan                    | 58   | 8.1%   | 4.7   |
| Minnesota                   | 37   | 6.9%   | 2.6   |
| North Dakota                | 6  | 5.3%   | 0.3   |
| Ohio                        | 73   | 6.8%   | 5.0   |
| South Dakota                | 6  | 6.1%   | 0.4   |
| Wisconsin                   | 31   | 8.6%   | 2.7   |
| <b>Total (REAMP states)</b> | <b>310</b>   | <b>7.1%</b>  | <b>21.9</b>                                     |

# Low Carbon Fuel Standard (LCFS)

- ▶ Not yet in place anywhere in Midwest
- ▶ LCFS seeks 10 percent reduction in CO2 emissions in most transportation fuels
- ▶ California closest to implementation – now being sued by ethanol industry
- ▶ Advanced Biofuels are a solution
- ▶ By 2020, potential 8.5% GHG reduction in transportation sector emissions
- ▶ EVs could be very important for meeting LCFS requirements. But electricity must continue to get cleaner in Midwest.





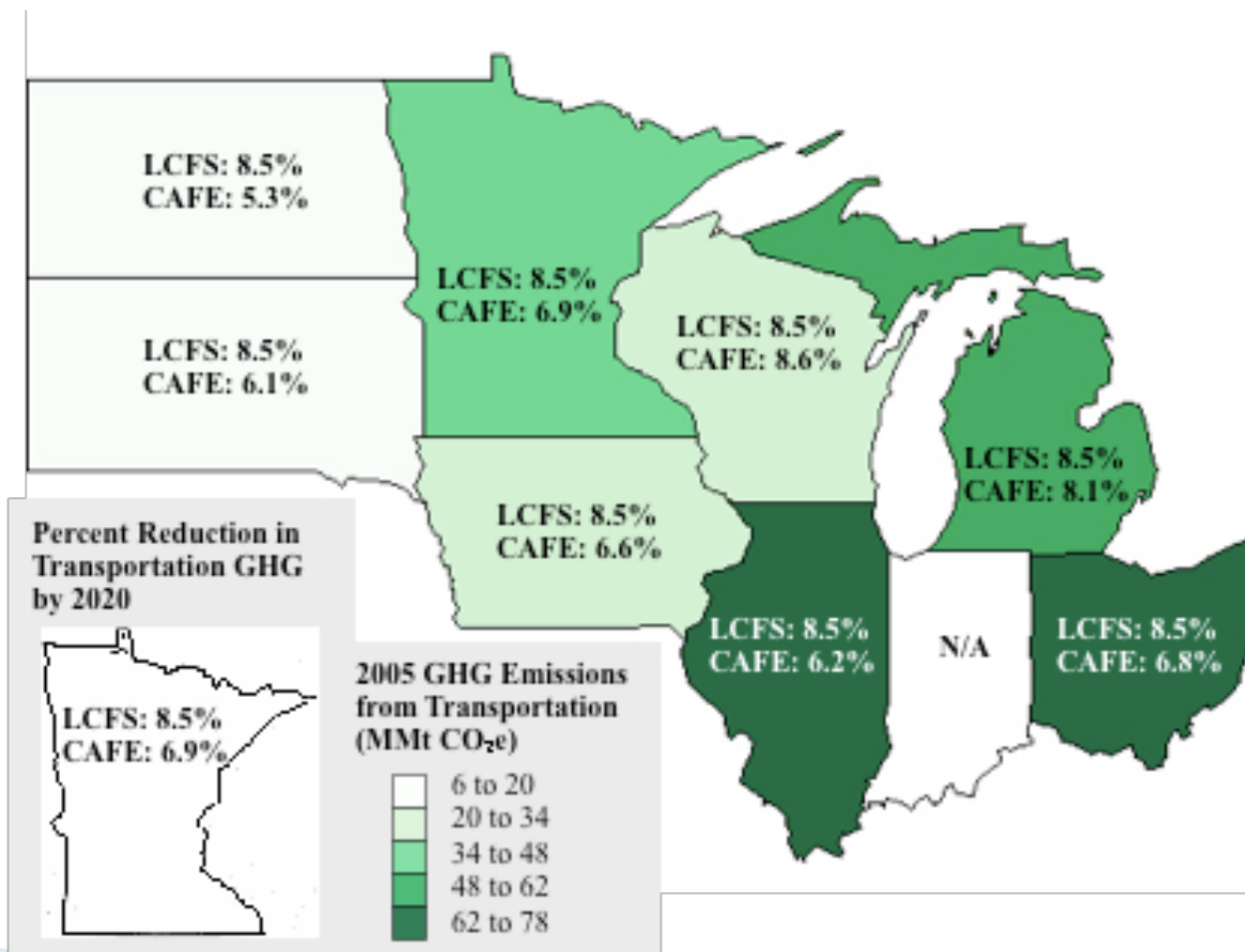
## EVs Are Important Pathway for Meeting LCFS (CA)

| Fuel Pathway  | Carbon Content - gCO <sub>2</sub> e/MJ | % change from standard baseline of 95.86 gCO <sub>2</sub> e/MJ | Meets LCFS until Year |
|---|--|--|-----------------------|
| CARBOB with 10% Midwest average ethanol   | 96.21                                  | 0.37%  | NA                    |
| CARBOB with 10% Midwest ethanol; Dry Mill, Dry DGS, NG  | 96.11                                  | 0.26%  | NA                    |
| CARBOB with 10% Midwest ethanol; Dry Mill; Wet DGS; 80% NG; 20% Biomass                       | 94.95                                  | -0.95%   | 2012                  |
| CARBOB with 10% California Ethanol; Dry Mill; Wet DGS; NG                                     | 94.34                                  | -1.58%   | 2014                  |
| CARBOB with 10% California Ethanol; Dry Mill; Wet DGS; 80% NG; 20% Biomass                    | 94.02                                  | -1.92%   | 2014                  |
| CARBOB with 85% Midwest ethanol; Dry Mill; Wet DGS; 80% NG; 20% Biomass                       | 88.16                                  | -8.03%   | 2019                  |
| CARBOB with 85% California Ethanol; Dry Mill; Wet DGS; 80% NG; 20% Biomass                    | 80.20                                  | -16.33%  | 2020                  |
| CARBOB with 10% Brazilian Sugarcane Ethanol using average production processes                | 93.61                                  | -2.34%   | 2014                  |
| 50% Electricity California Avg. and CARBOB with 10% California Ethanol; Dry Mill; Wet DGS; NG | 67.10                                  | -30.00%  | 2020                  |
| 100% Electricity California Avg.  | 41.37                                  | -56.84%  | 2020                  |

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# 2005 Transportation GHG Emissions and Potential Reductions from CAFE and LCFS by 2002

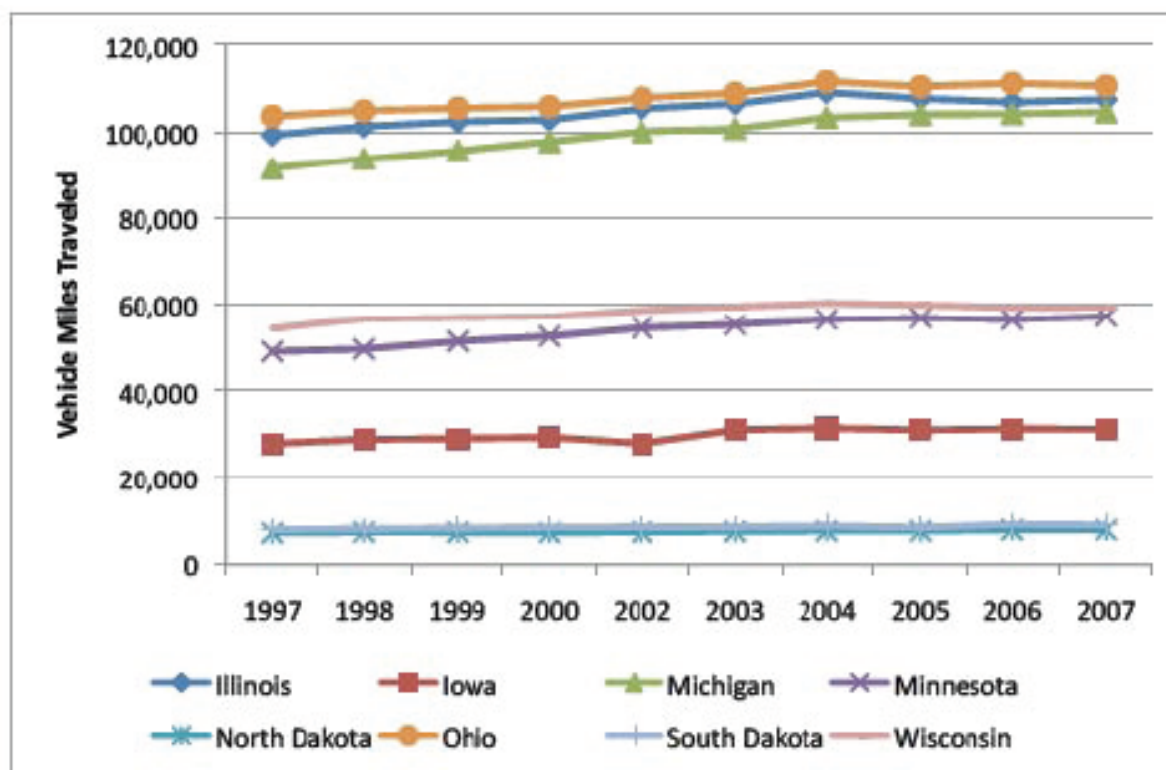


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## Reducing Vehicle Miles Traveled

- ▶ GHG reductions longer term – efforts need to begin now.
- ▶ Multiple strategies – PAYD, land use policy, transit, taxes, etc.

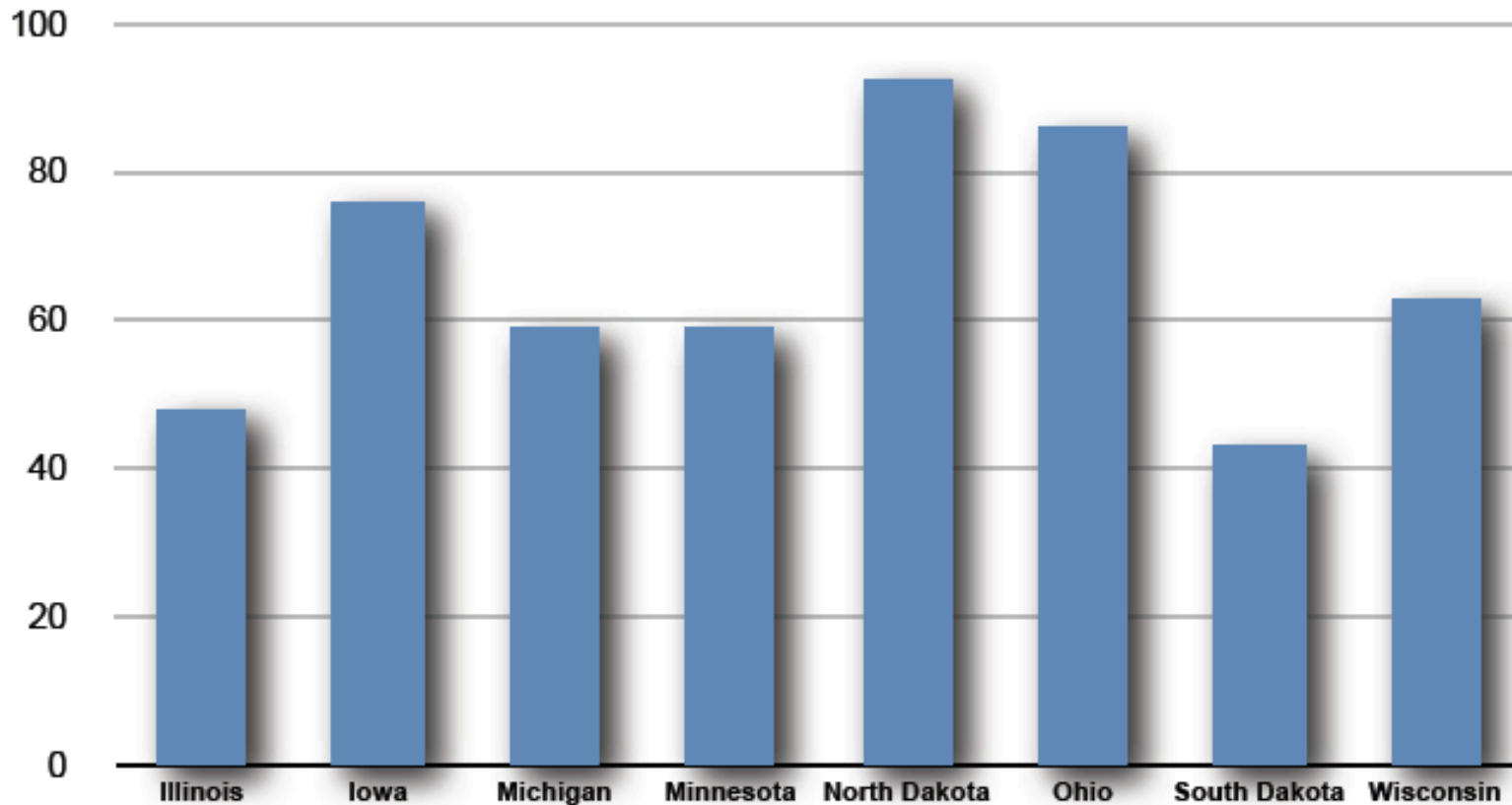


# Reducing GHG Emissions By Electrifying Vehicles

- ▶ GHG Reductions from EVs depend on
  - GHG impact of individual vehicles (electricity used for charging vehicles)
  - Speed at which EVs enter and replace the current fleet of vehicles
- ▶ 100 percent coal-fired EVs generate less CO<sub>2</sub> than similar ICE vehicles
- ▶ By 2020, EVs will have only minimum impact on GHG emissions in RE-AMP region

# Percentage Coal Electricity in RE-AMP States

CLEAN EVs MEAN THESE BARS SHOULD DISAPPEAR

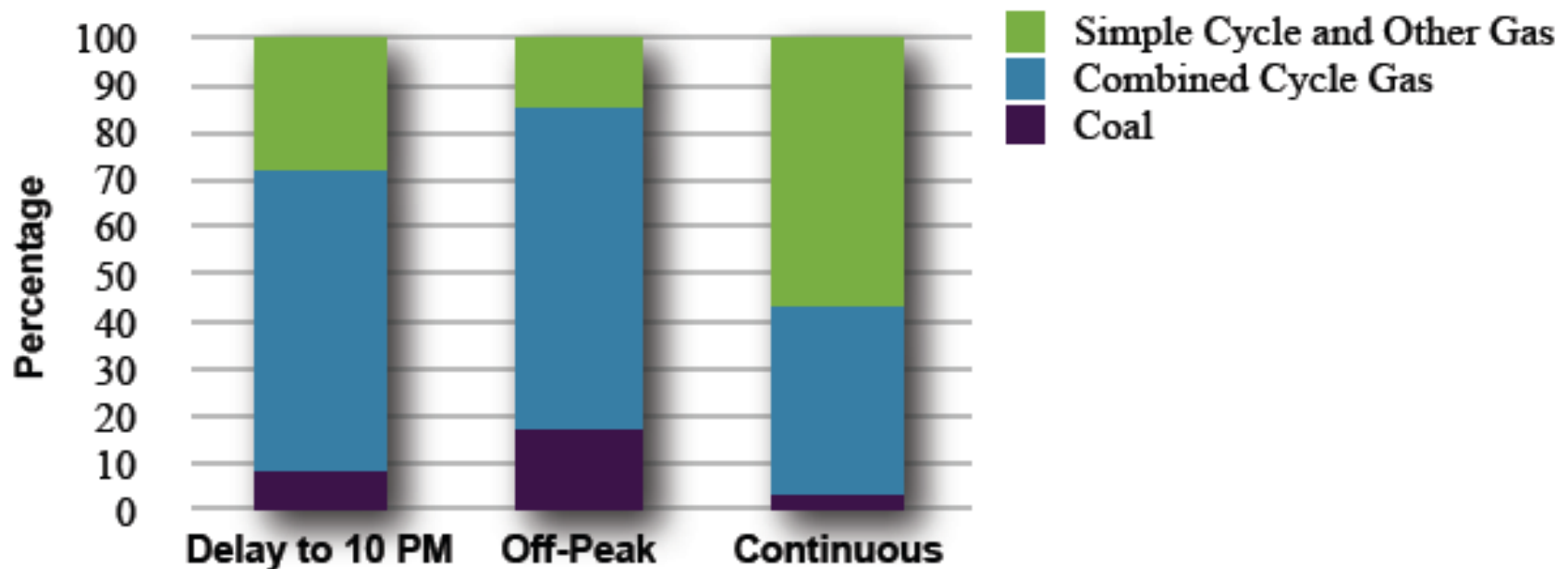


## Regional Studies of EV Impacts

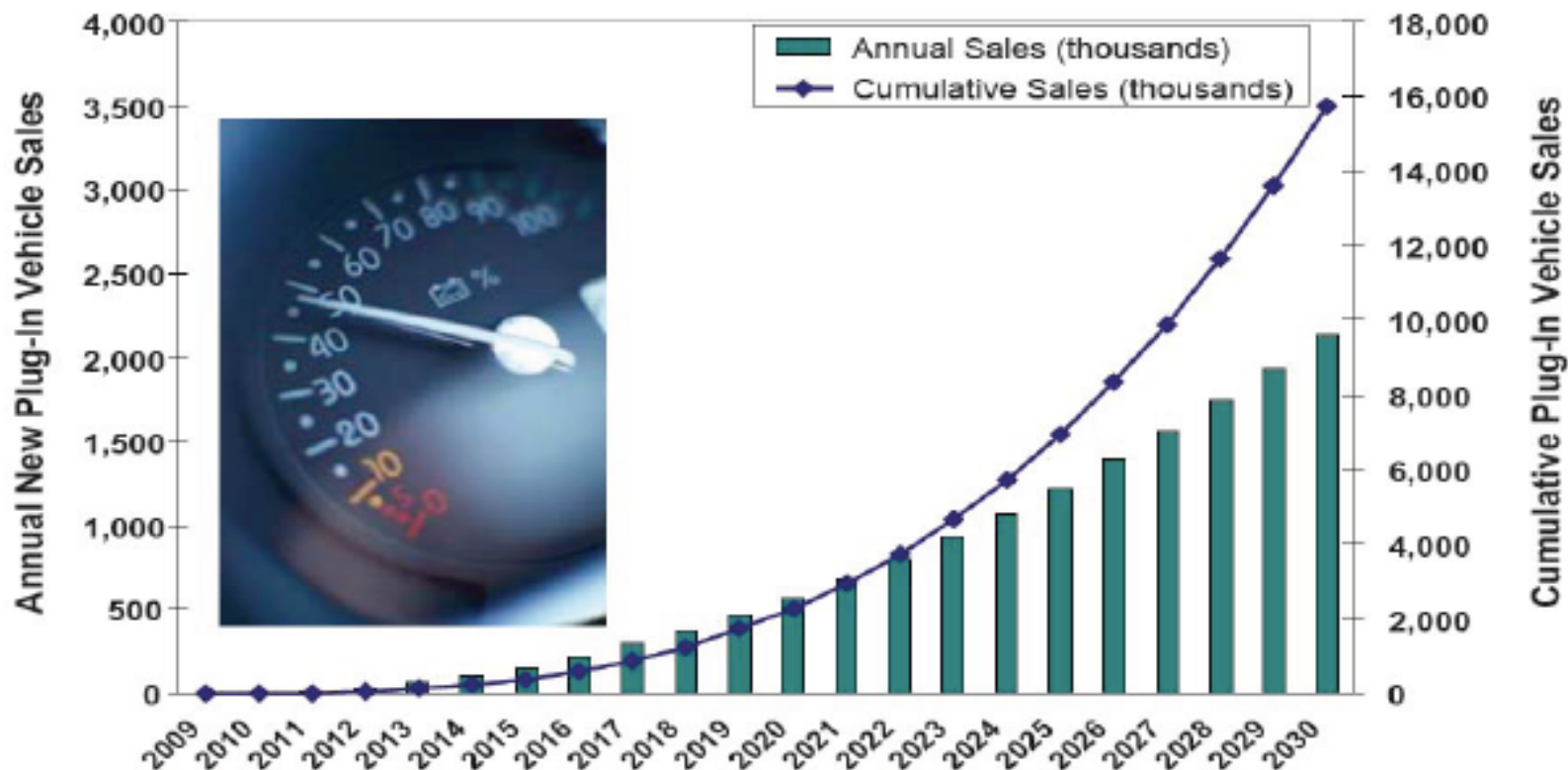
- ▶ Minnesota Study with 60% coal, 40% renewables/nukes – HEVs, PHEVs, and full EVs better than conventional vehicles
- ▶ Smog pollution lowered and relocated from street level to power plant stacks
- ▶ Argonne National Lab Study of Illinois – clustering of vehicles in wealthy areas may strain distribution system
- ▶ Additional impact studies ongoing Michigan, Ohio, Illinois

# Timing of EV Charging Matters – Both Time of Day, Time of Year

Sources for Charging PHEVs in Xcel Energy's Colorado Territory



# How Fast Will EVs Enter the Market?



Source: graphic and data from EPRI

In 2007, there were 43.5 million registered vehicles in the RE-AMP region



## Electric Vehicle Economic Issues – A Sketch

- ▶ EVs more expensive upfront due to advanced batteries and limited production
- ▶ Batteries – \$1,000/kWh today –> goal of \$250/kWh in 2020
- ▶ EV and PHEV's fuel costs (gas+ electricity) are half of 45-mpg HEV
- ▶ EV charging: \$1,500 – \$2,200 for Level 2 system 3-4 hour charge
- ▶ Higher gas prices and lower electricity prices make economics better.



Nissan Leaf's battery pack



SAE J1772 Standard Connector and Receptacle

## EV Policy Options - Survey

- ▶ Dozens and dozens of ideas across 3 categories
  - Enhancing Consumer Acceptance
  - EV Infrastructure and Integration
  - Expanding EV & Related Industrial Manufacturing



Fisker's Karma

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# Enhancing Consumer Acceptance – Policy Ideas

## ▶ Financial Incentives

- Tax Credits, Rebates, Lease Buy Downs, Free Electricity, 3<sup>rd</sup> Party Battery Ownership

## ▶ Non-Financial Incentives and Programs

- Preferential Treatment: Parking, HOV Lane Access, and Other Discounts
- Fast Tracking Permitting And Installation Of EV Charging Systems
- Government Purchasing and Leadership by Example
- Break Out Electricity Costs on Bills for EV Charging



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## EV Infrastructure and Integration – Policy Ideas

- ▶ Requiring EV Infrastructure Planning
- ▶ Connecting Renewable Energy Increases To EV Sales
- ▶ Coordinating Vehicle Purchase and Home Charging Station Installation
- ▶ Allowing Municipal Energy Financing to Cover Level 2 EV Charging Systems
- ▶ Cost Recovery Authority for Distribution System Upgrades Needed for EVs.
- ▶ Developing a State–Level EV Charging Installation Manual

## EV Infrastructure and Integration – Policy Ideas

- ▶ Installing Public Charging Stations Along Visible Corridors
- ▶ Adopting Electric Vehicle Charging Rates
- ▶ Requiring EV Charging Systems Under Building Code (Brit. Columbia)
- ▶ Developing a Statewide Charging Network
- ▶ Offering a Utility Subsidy For Charging Station In Exchange For Smart Charging Requirement
- ▶ Creating a “Battery Guarantee Corporation” to Insure Battery Life for 10 years.
- ▶ Incentives for Vehicle-to-Grid (V2G) – net metering

## Expanding EV & Related Manufacturing

- ▶ Increasing gas taxes to fund EV development
- ▶ Enacting Investment Tax Credits For Domestic Battery Production Facilities
- ▶ Implementing a Cash for EVs Program or Cash for EV Conversions
- ▶ Increasing Federal Funding of Expanded EV and Battery Manufacturing Capacities and Technology Improvements



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## Recommendations for RE-AMP – Near Term

- ▶ Create a RE-AMP Electric Vehicle Readiness (RE-AMP-EVR) Adhoc Group
- ▶ Enact Legislation That Opens a Regulatory Proceeding Covering Electric Utility Related EV Issues
- ▶ Require a Performance Standard for New Construction to be EV and Renewable Energy Ready or Capable
- ▶ Allow Municipal Energy Financing to Cover Level 2 EV Charging Systems
- ▶ Initiate Government Fleet Conversions to EVs
- ▶ Begin Smart Grid Deployments
- ▶ Fast Track or Simplify Permitting And Installation Of EV Charging Systems
- ▶ Allow Utilities Cost Recovery for Any Distribution System Upgrades Needed to Facilitate EVs

## Questions??

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