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Electric Vehicles in Michigan

Michigan Transportation Planning Association Conference

August 1, 2012

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Introduction

Pike Research, a part of Navigant's Energy Practice, provides in-depth analysis of global clean technology markets.

The team's research methodology combines supply-side industry analysis, end-user primary research and demand assessment, and deep examination of technology trends to provide a comprehensive view of the Smart Energy ecosystem.

Sector Focus:

Smart Energy

Smart Grid

Smart Transportation

Smart Industry

Smart Buildings

Research Services:

Research Reports

Subscription Advisory Services

Consulting & Custom Research

- Go-To-Market Strategy
- Custom Market Analysis
- Market Sizing & Forecasts
- Primary Research
- Technology Evaluation
- Commercial Due Diligence
- Competitive Benchmarking
- Strategic Advisory Sessions

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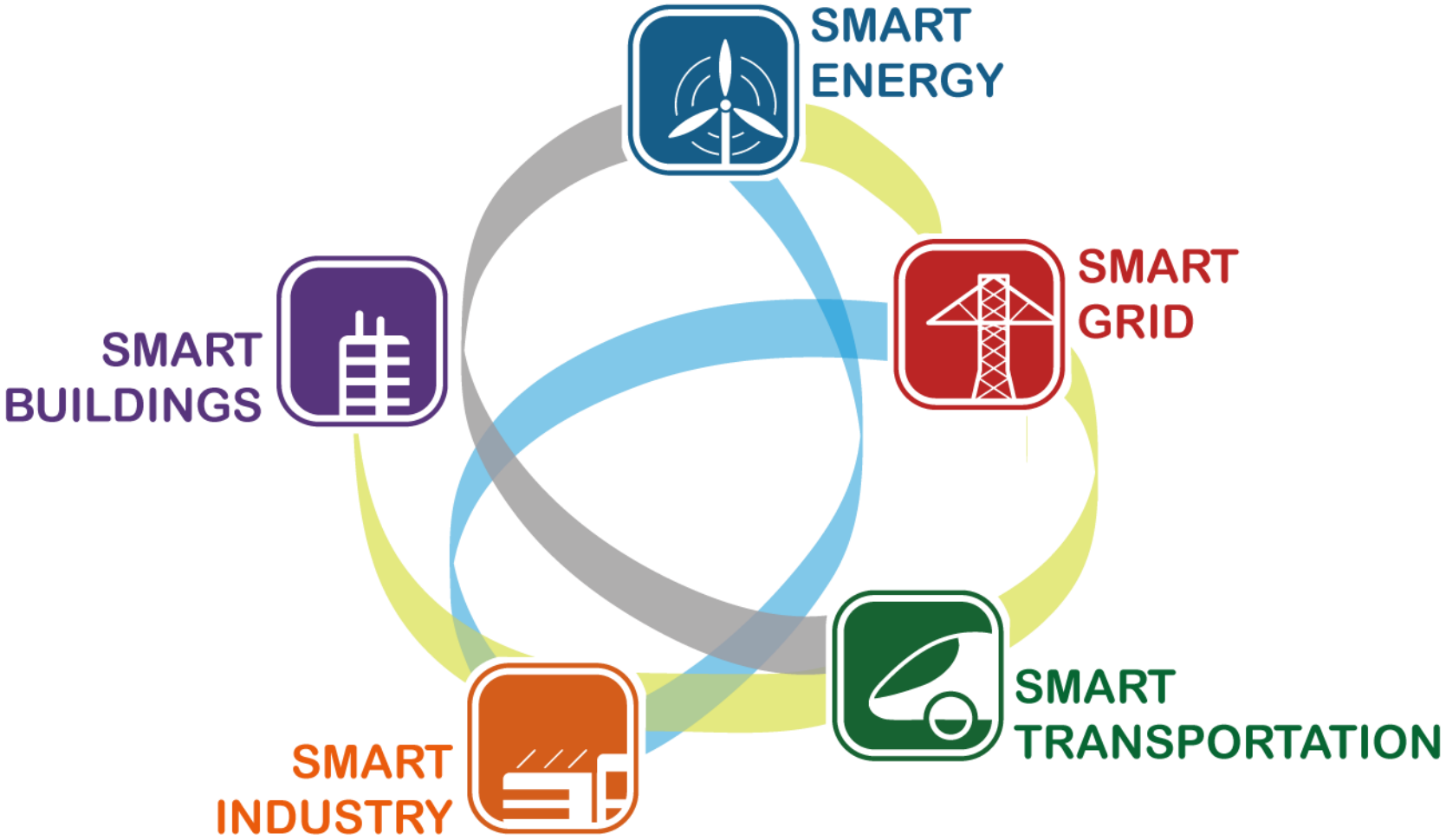
Smart Energy Ecosystem



Electric Vehicles

- Plug-in Hybrid Electric Vehicles
- Battery Electric Vehicles
- Hybrid Electric Vehicles
- Electric Vehicle Battery Technologies
- Electric Vehicle Charging Infrastructure
- Consumer Attitudes, Preferences, and Behavior

Reports Published:

3Q12	Electric Vehicles in China
3Q12	Electric Vehicle Charging Equipment in Europe
2Q12	Plug-in Electric Vehicles
2Q12	Total Cost of Ownership of Alternative Fuel Vehicles for Fleet Operators
1Q12	Pike Pulse: Electric Vehicle Batteries
4Q11	Electric Vehicle Consumer Survey
4Q11	Electric Vehicle Telematics
4Q11	White Paper: Electric Vehicle Predictions for 2012
4Q11	Vehicle to Grid Technologies
4Q11	Electric Vehicle Batteries
3Q11	Hybrid Medium and Heavy Duty Trucks
3Q11	Electric Vehicle Charging Equipment
3Q11	Electric Vehicle Market Forecasts
2Q11	Neighborhood Electric Vehicles
2Q11	Pike Pulse: Electric Vehicle Charging Equipment

Future Reports (Subject to Change):

3Q12	Electric Vehicle Charging Equipment
3Q12	Vehicle to Building Technologies
3Q12	Electric Buses
3Q12	Pike Pulse: Plug-in Electric Vehicles
3Q12	Electric Vehicle Geographic Forecasts
3Q12	Electric Vehicle Market Forecasts
3Q12	Pike Pulse: Electric Buses
4Q12	Pike Pulse: Electric Vehicle Charging Equipment
4Q12	Vehicle to Grid Technologies
4Q12	Electric Vehicle Consumer Survey
4Q12	Electric Vehicles: 10 Predictions for 2013
4Q12	Electric Vehicles: Europe

Key Factors Contributing to PEV Forecasts

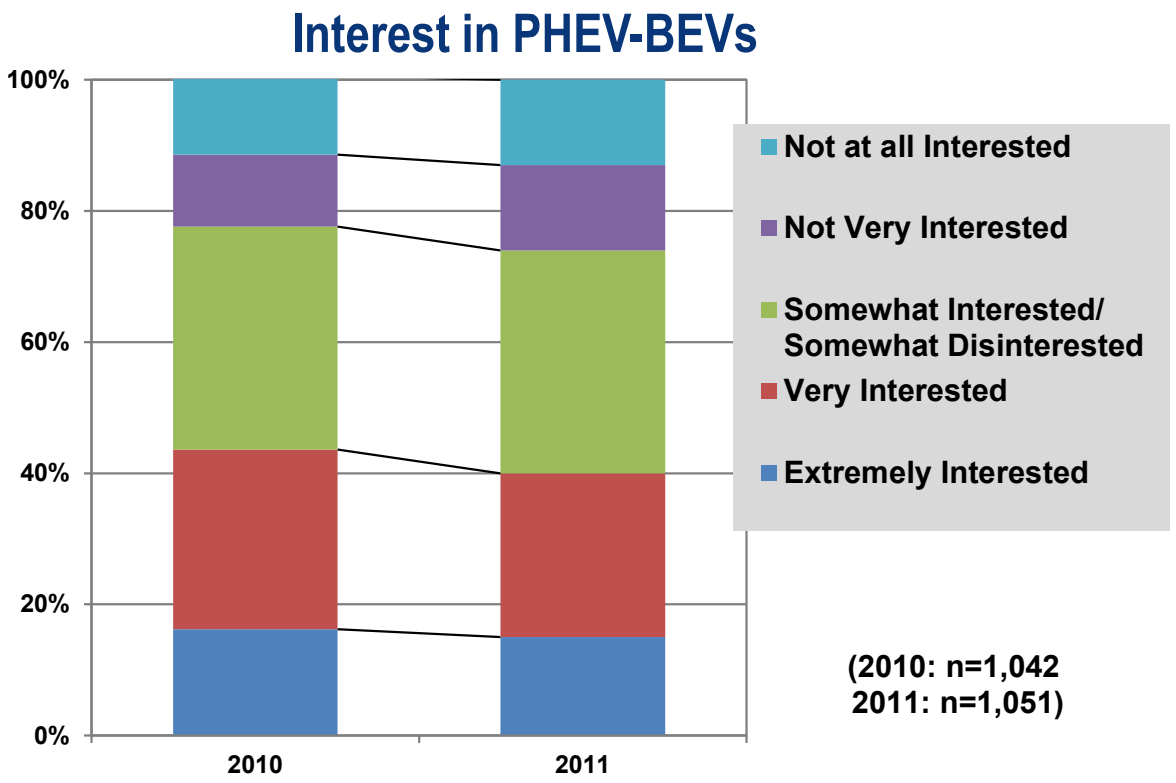
- Plug-in electric vehicles (PEVs) includes both battery electric vehicles (BEVs) and plug-in hybrid electric vehicles (PHEVs)
- The factors that are included in our forecast model vary between national and state level forecasts depending on the data available
- National forecasts include:
  - Government policies, including federal purchase incentives and anticipated fuel economy rules
  - Product rollout plans and availability
  - Ownership and interest in hybrid vehicles
  - Economic growth
  - Average gasoline costs

Key Factors Contributing to State Forecasts

- State forecasts include:
  - State population and vehicle ownership
  - State demographics compared to hybrid owner demographics
  - State government policies, including incentives
  - Number of electric vehicle charging equipment (EVCE) installed
  - Manufacturer's PEV rollout plans and availability
  - Opinion of plug-in electric vehicles, including number and activity of advocacy groups
  - Statewide gasoline prices

Interest in Plug-in Electric Vehicles

- 40% express interest in plug-in vehicles, while 26% are not interested
- Interest has declined, but still strong

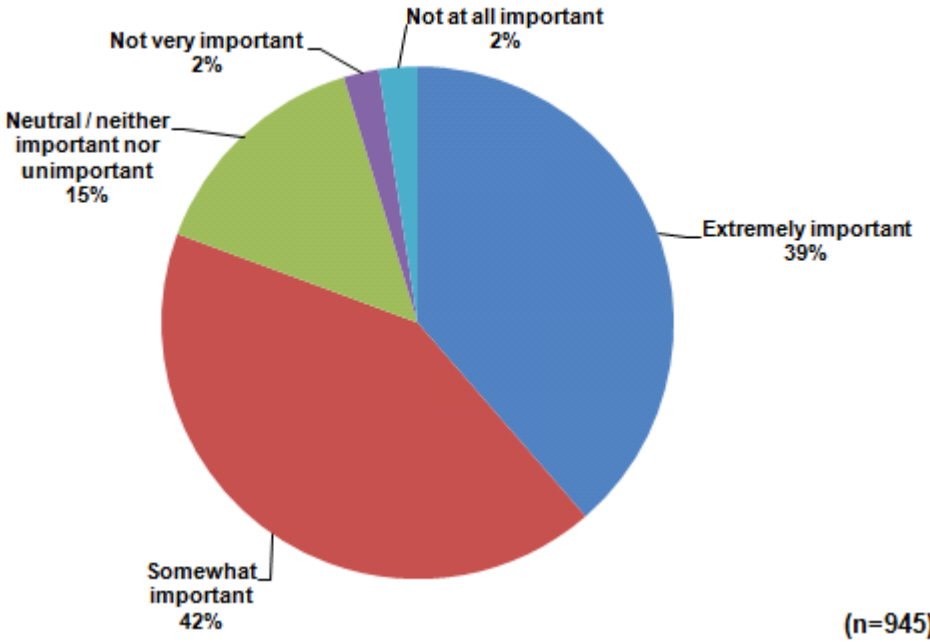


(Source: Pike Research)

Interest in Plug-in Electric Vehicles

- 81% view fuel efficiency as “Extremely” or “Somewhat important” in purchase decision
- Gasoline prices expected to increase about 5% annually to an average $4.81/gallon in 2017 (versus 2011 average price of $3.61)

Importance of Fuel Efficiency in Vehicle Purchase Decisions



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(Source: Pike Research)

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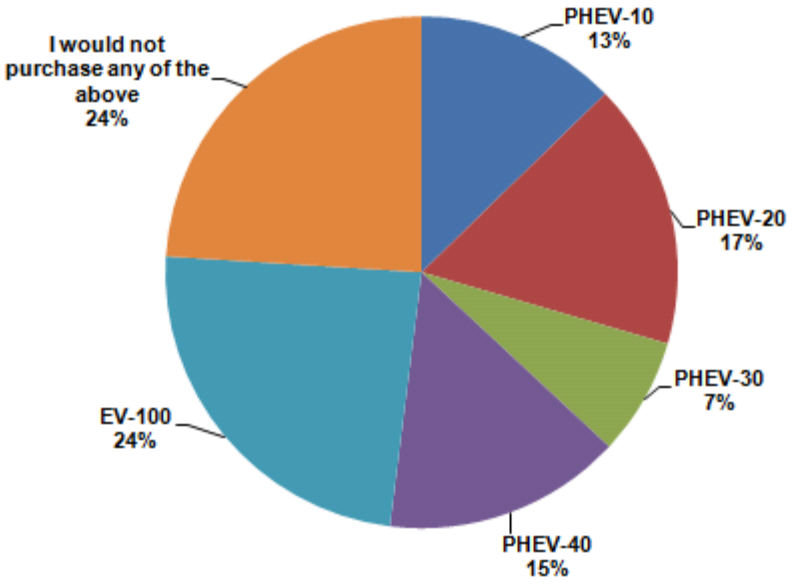
Interest in Plug-in Electric Vehicles

- 24% are interested in a $29,000 BEV, up 9 points from 2010
  - 2010 BEV was priced at $32,000
- A quarter of consumers are not interested in EVs, down 13% from 2010
- Optimal PEV Price: $23,750

PHEV-10	**$26,000**
PHEV-20	**$29,000**
PHEV-30	**$32,000**
PHEV-40	**$35,000**
EV-100	**$29,000**

Interest in Hypothetical PHEV-EVs



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(Source: Pike Research)

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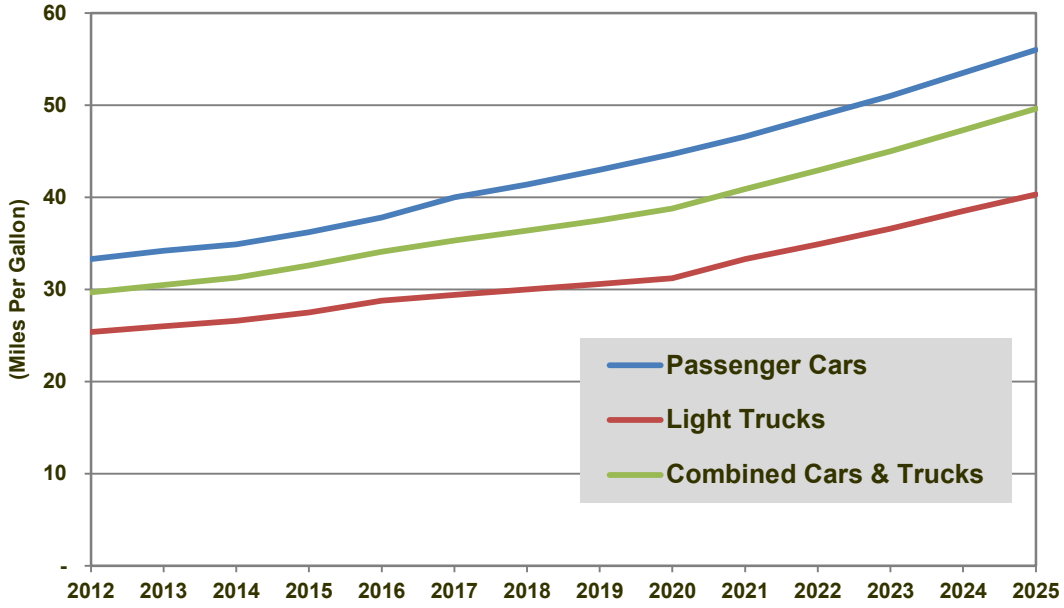
Factors Impacting National Demand

- Federal purchase incentives (between $2,500 and $7,500 per vehicle) are anticipated to remain in place throughout the forecast period
  - Elimination or reduction of incentives would have a negative impact on demand at the national level
- Increasing traditional internal combustion engine vehicle fuel economy has a negative impact on PEV sales due to decreasing cost of operation for higher fuel economy vehicles
  - This is much more difficult to quantify and is more likely to have an impact in the latter years of the forecast

Fuel Economy Requirements

- U.S. fuel economy rules: 49.6 miles per gallon combined car and truck by 2025
- Electrification will be required to meet some requirements

Corporate Average Fuel Economy, United States: 2012-2025



(Source: EPA)

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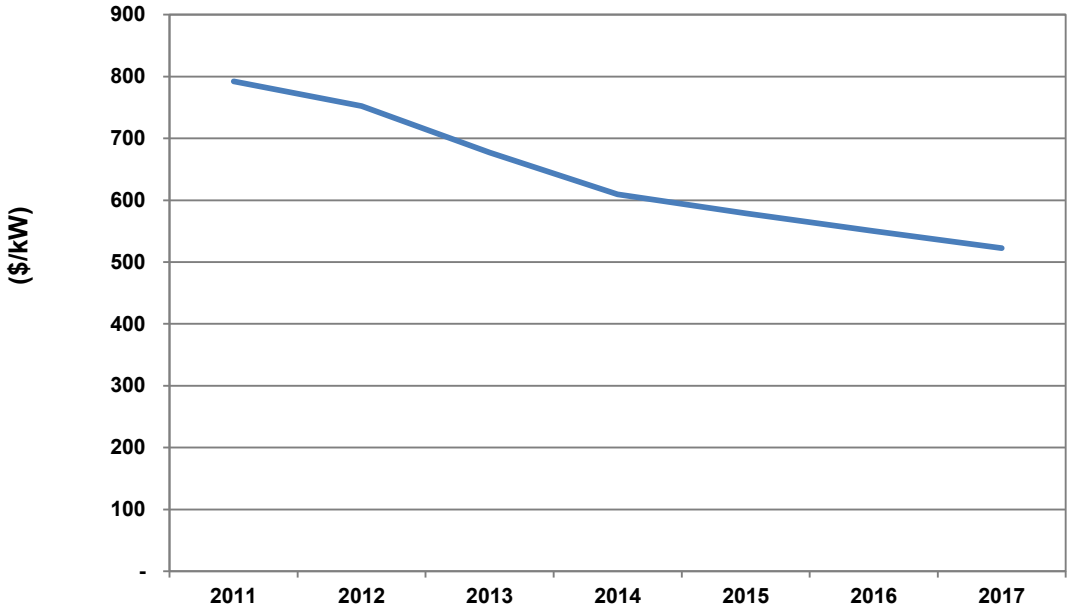
Factors Impacting National Demand

- Battery pack costs are anticipated to fall 34% by 2017
  - For several years this is not anticipated to impact the cost of vehicles as manufacturers increase the battery pack size
  - Manufacturers are expected to use cost decreases in 2012-2014 as a way to increase the range of vehicles while maintaining relatively steady pricing
  - After 2014, Pike Research anticipates lower battery costs will be reflected in pricing of the vehicles

Li-ion Prices

- Batteries will remain the cost drivers in PEVs
  - Battery costs expected to fall to $523/kWh by 2017
- Cost reductions are expected mostly from manufacturing efficiencies
  - Cathodes and labor are anticipated to remain main cost drivers over next several years

Lithium Ion Battery Selling Price, World Markets: 2011-2017



(Source: Pike Research)

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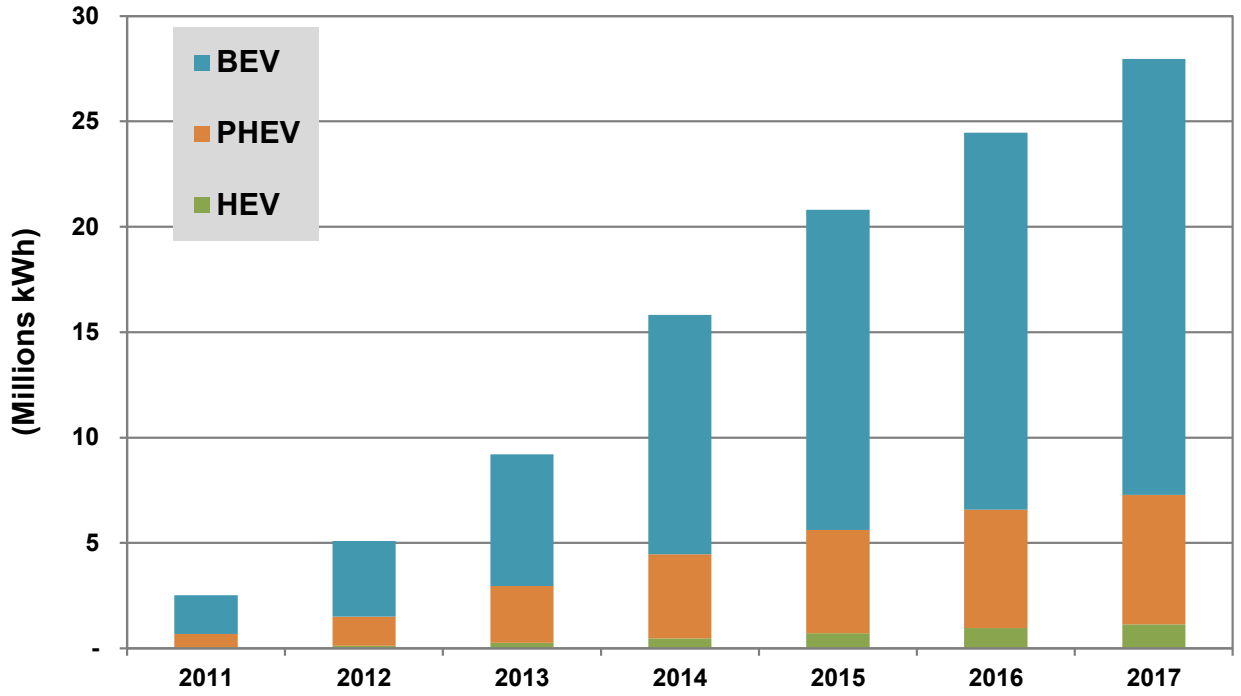
Li-ion Capacity in Transportation

- Large pack size of BEVs will account for 74% of capacity
- Battery manufacturers are expected to look outside transportation industry for early production volume

Lithium Ion Transportation Battery Capacity, World Markets: 2011-2017



(Source: Pike Research)

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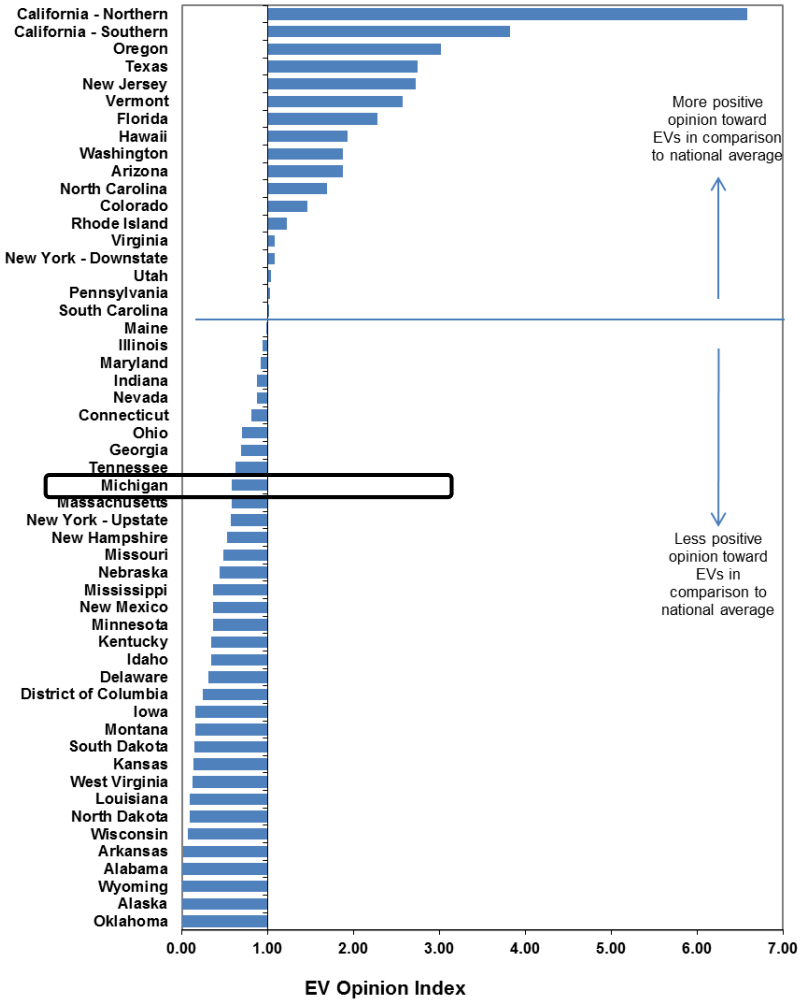
PEV Opinion Index

- Based on consumer survey data and qualitative interviews, an index is calculated to indicate which states have the most positive attitudes towards PEVs
- Top 5 in this index are California, Oregon, Texas, New Jersey, and Vermont
- Most negative states are Oklahoma, Alaska, Wyoming, Alabama, and Arkansas

Index of Positive Opinion Toward Plug-In Electric Vehicles: 2012



(Source: Pike Research)

Light Duty PEV Availability

Plug-in Electric Vehicle Availability: 2011-2014

	2011	2012	2013	2014+
North America	10 Models	21 Models	30 Models	32+ Models
Western Europe	6 Models	21 Models	32 Models	40+ Models
Asia Pacific	12 Models	34 Models	45 Models	50+ Models

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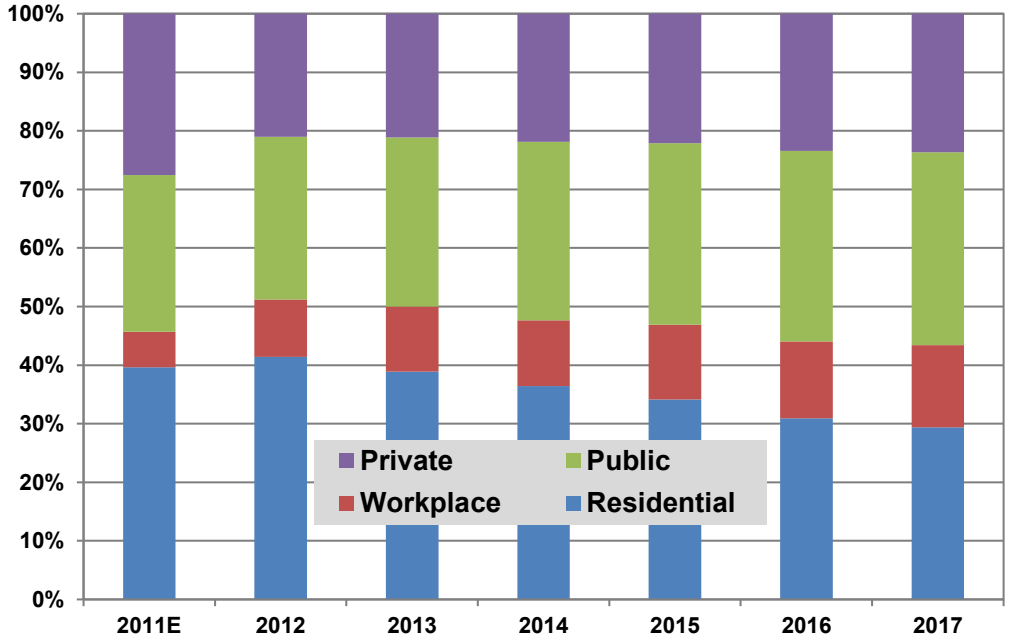
EVSE Trends

- Residential charging equipment will be the leading segment in the United States, with 67% of unit sales by 2015
- In 2015, U.S. residential charging station unit sales will reach 452,000 units
  - Public and workplace charging unit sales will be the fastest growing

EVSE Sales by Segment, World Markets: 2011-2017



(Source: Pike Research)

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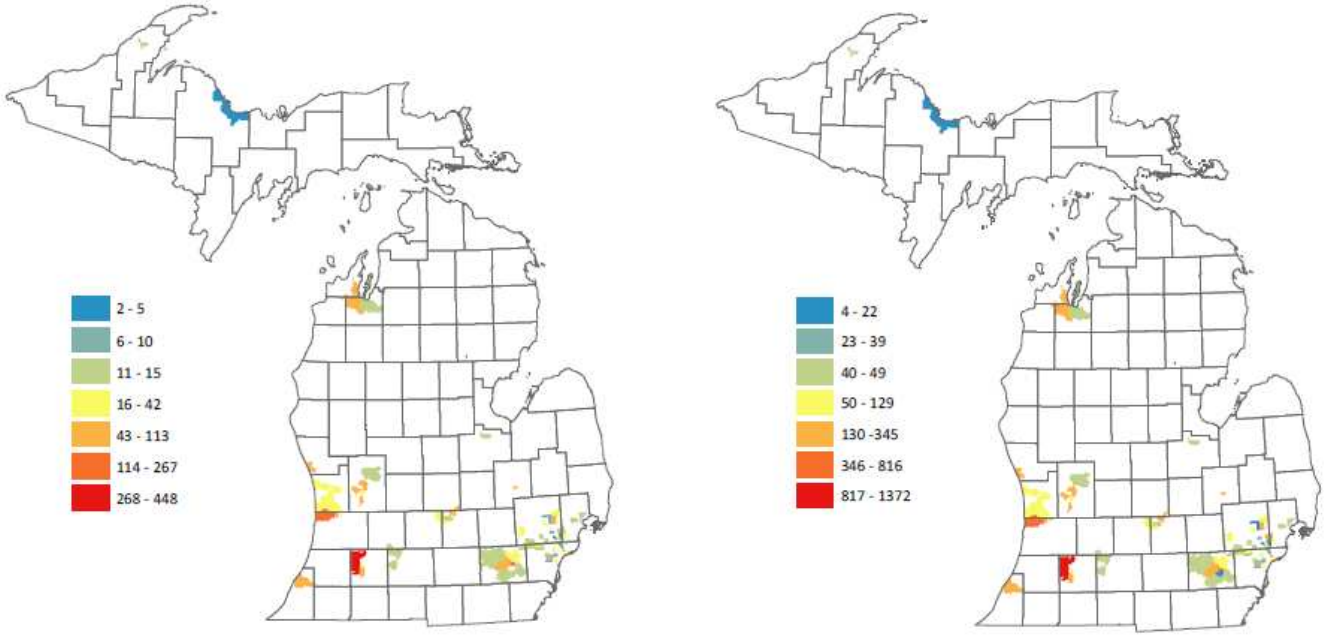
Michigan EVSE Trends

- The Clean Energy Coalition developed maps of Pike Research's zip code forecast data for Michigan, highlighting pockets of growth
  - Part of the Plug-In Ready Michigan program

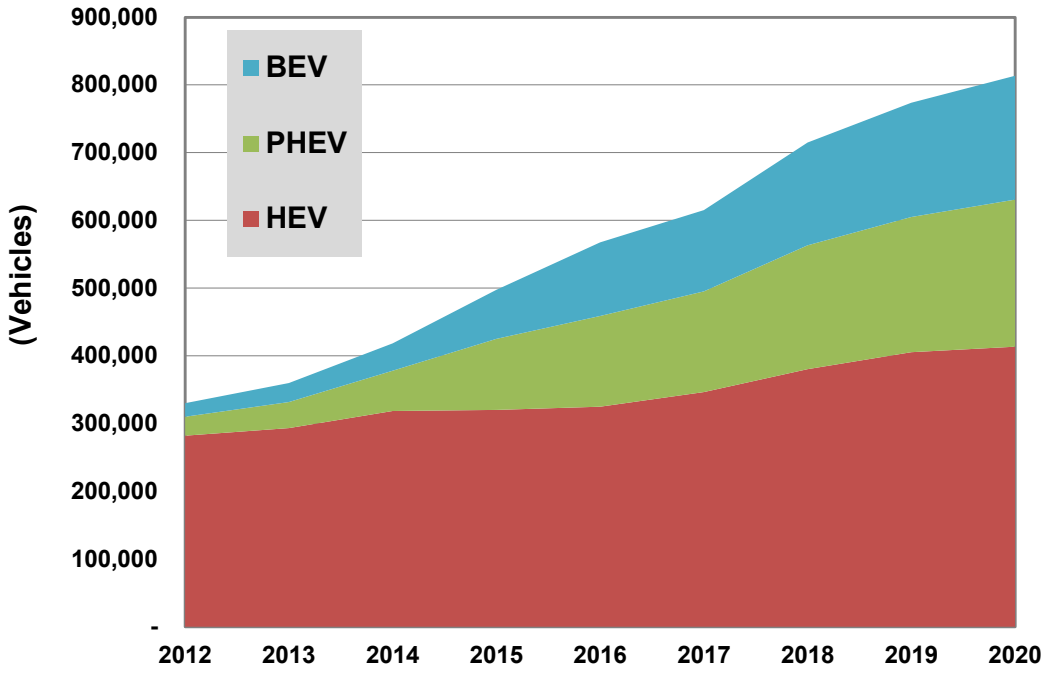
Charging Equipment Sales, Michigan: 2016, 2020



Annual Plug-In Electric Vehicle Sales Forecast

- North America will lead the world in PHEV sales
  - In the United States, PHEVs will outsell BEVs by about 1.5 to 1 this year
- Asia Pacific will lead in BEV sales followed by North America and Europe

Annual Electric Vehicle Sales by Drivetrain, United States: 2012-2020



(Source: Pike Research)

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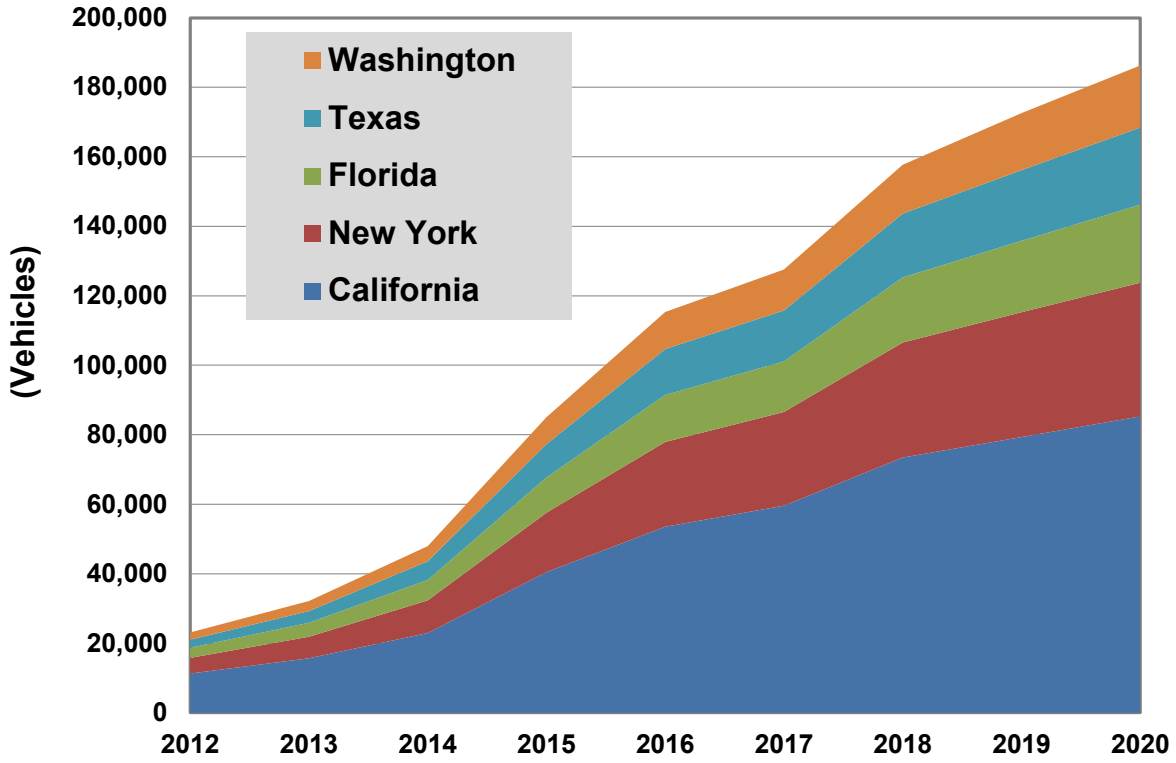
Annual Plug-In Electric Vehicle Sales Forecast

- Highest concentration of vehicle sales will be on West and East coasts
- Michigan expected to rank 11th with 11,041 PEV sales in 2020

Annual Light Duty Plug-In Electric Vehicle Sales, Top Five States: 2012-2020



(Source: Pike Research)

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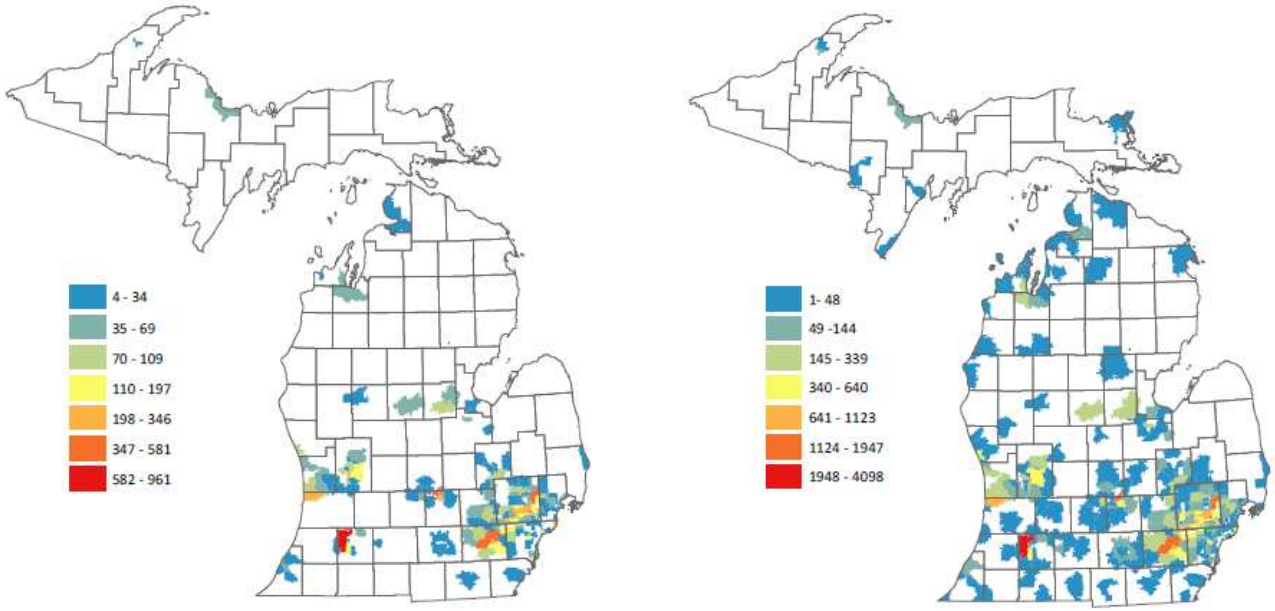
Michigan PEV Trends

- Initially, PEVs will be centered in population centers and university towns
- By 2020, it is anticipated that PEVs will be located in many smaller regional areas
- Maps are part of the Plug-In Ready Michigan program from the Clean Energy Coalition

Cumulative Plug-in Electric Vehicle Sales, Michigan: 2016, 2020



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