Progress Update on Maryland Electric Vehicle Infrastructure Study

Presentation to the
Electric Vehicle Infrastructure Council
August, 2012

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Electric Vehicles by the Numbers

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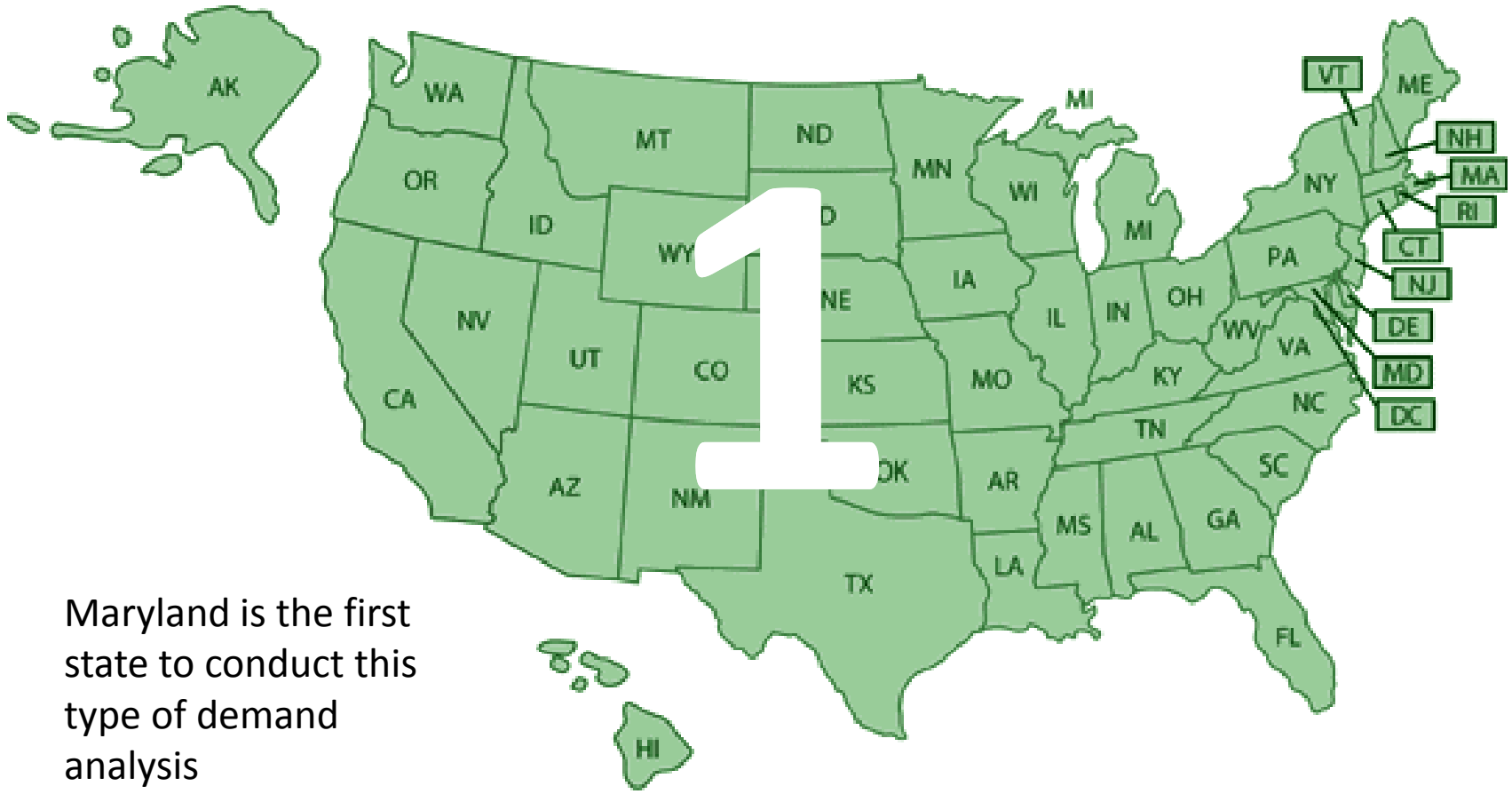
Reference for Consideration



Maryland is the first state to conduct this type of demand analysis

Project Timeline

Task	Activity	March	April	May	June	July	August	September
1	Project Management							
2	Support of Electric Vehicle Infrastructure Committee							
2.1	Data Collection			✓				
2.2	Demand Analysis				✓			
2.3	Determination of Charging Station Demand Areas				✓			
2.4	Draft Infrastructure Plan						✓	
2.5	Final Infrastructure Plan							
3	Communications and Outreach							
3.1	Plan Development							

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Estimating Demand

- Questions Addressed
  - Technical Analysis
    - What is the Potential Market (given in a range) for Electric Vehicles?
    - Given that market, how many and what type of chargers will be needed to satisfy needs?
  - Intuitive Assessment
    - What opportunities exist to provide for through/visitor trips?
    - Where are potential locations for fast-chargers to accommodate these trips?

Estimating Demand -Actual Market Factors

Enablers

- Federal and state incentives
- Non monetary incentives (HOV lanes, Parking)
- Higher Gas price (or tax)
- Emission regulation
- International market

Barriers

- Price and cost of ownership
  - Battery cost
  - Electricity cost
- Charging infrastructure
  - MDUs
  - Old homes
- Range needs
- Industry slow change (EV supply)

Estimating Demand - Market Forecasts

Forecast	Geography	Forecast Year	Market share PHEV	Market share BEV	Market share Combined	Unit sales (million) PHEV	Unit sales (million) BEV	Unit sales (million) Combined
Pike Research	United States	2015				0.2	0.06	0.26
Deloitte Consulitng	United States	2015 2020			2015: 0.3-0.5% 2020: 1.9-5.3%			2015: 0.05-0.08 2020: 0.3-0.8
BCG	North America	2020	0-5%	0-5%	0-10%	0-1.35	0-1.35	2.7
JD Power and Associates	Worldwide and United States	2020		World: 1.8% US: <1%			World: 1.3 US: 0.1	
Bain & Company	Worldwide	2020	2-20%	5-30%	7-50%			
McKinsey & Company	Worldwide	2020 2030	2020: 0-6% 2030: 0-24%	2020: 0-2% 2030: 0-8%	2020: 0-8% 2030: 0-32%	2020: 0-4.5 2030: 0-22	2020: 0-1.5 2030: 0-7	2020: 0-6 2030: 0-29

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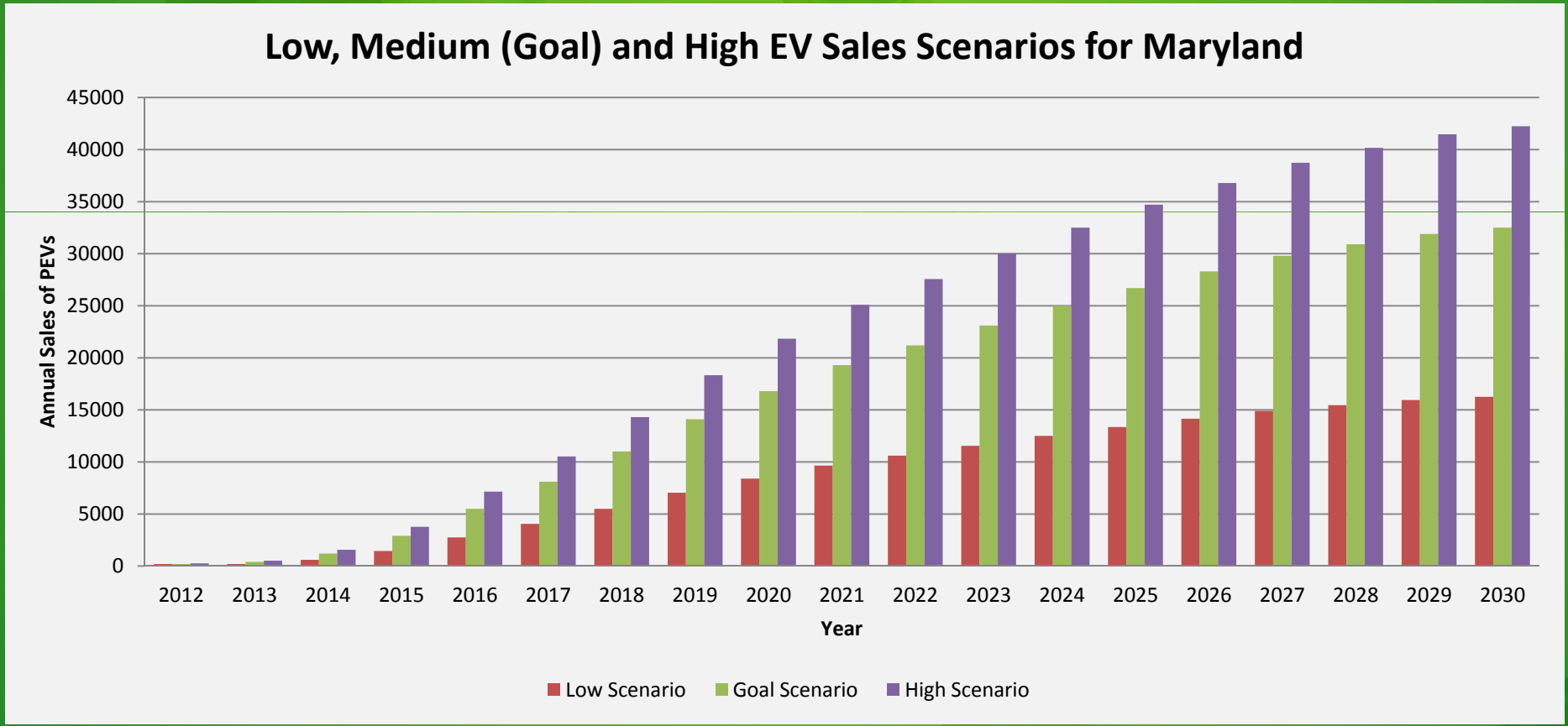
EV Market from BEV Dominant to PHEV Dominant

Total PEVs in use and Major PEV Models Sold in US				
Models	2010	2011	2012 (to-May)	Total 2012 (to-May)
Chevrolet Volt	326	7,671	7,057	15,054
Nissan Leaf	19	9,674	2,613	12,306
Smart ED	3	388	2	393
Mitsubishi I		80	300	380
Prius PHV			3,638	3,638
BMW Active E			594	594
Ford Focus			8	8
PHEV share		41%	75%	58%

Source: Hybrid Cars Market-Dashboard and DOE's Alterative Fuel Vehicle Center

Scenarios for EV Growth in Maryland



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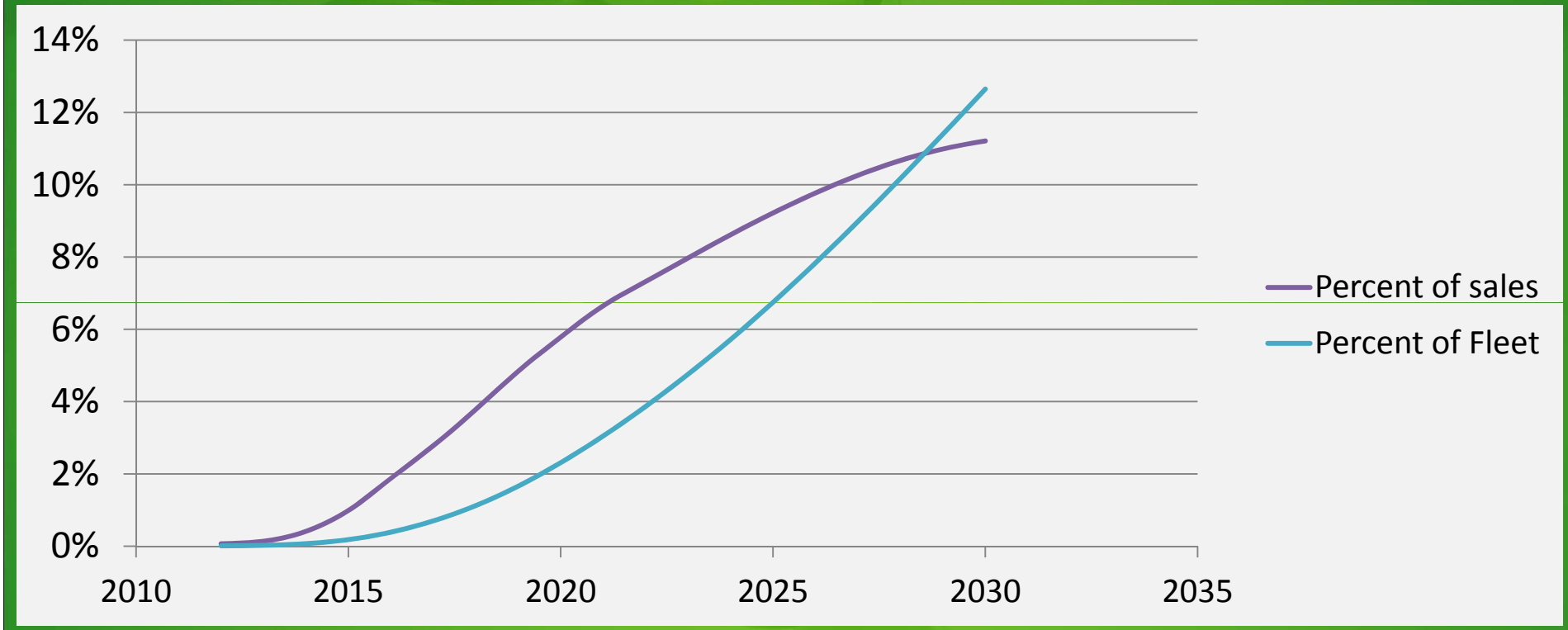
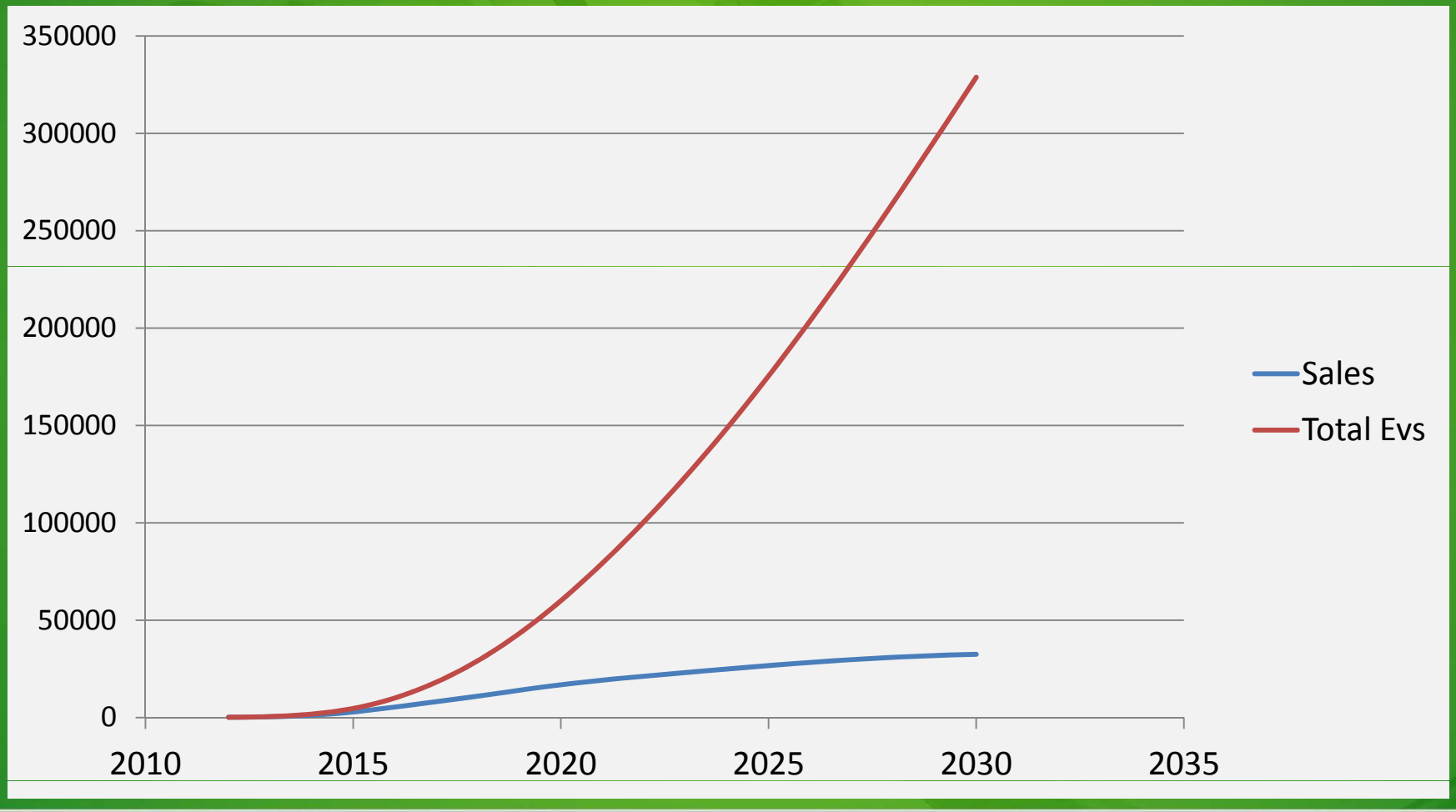
Demand – Plug-in Vehicle Medium Scenario



- 60,000 vehicles by 2020 will be 2.3% of the state passenger vehicle fleet
- Sales will grow up to 6% of the new vehicles in 8 years.
- To Reach 300,000 by 2030 sales will grow up to 10% of the market.

Demand: Total Numbers of PEVs – Medium Scenario



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Estimating Demand – Medium Scenario

2020

60,000 vehicles

- 24,000 Plug-in Priuses with 10 miles all electric range (PHEV 10) – 40%
- 18,000 Chevy Volts with 35 miles all electric range (PHEV35) – 30%
- 18,000 Nissan Leafs with 73 miles all electric range (BEV 73) – 30%

2030

- 10% of the passenger vehicles will be plugin (about 300,000 vehicles)

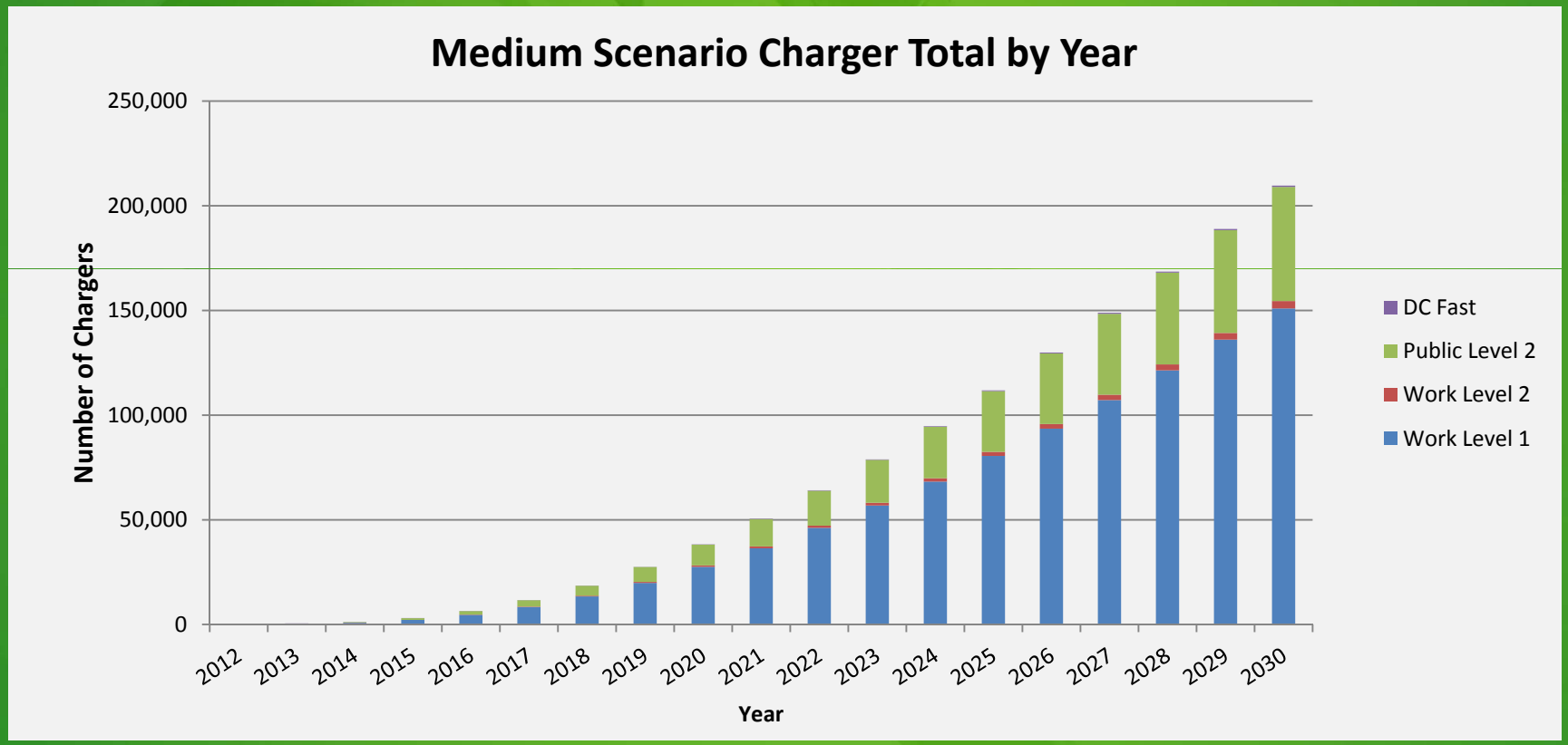
Workplace Charging Speed. L1 or L2?

- Level 1 is sufficient for 80% of BEVs with 73 miles range. 20% Level 2 is needed for longer commutes with shorter parking times
- Level 1 is sufficient for PHEV 10s and PHEV 35s. Level 2 only provides one percentage point difference in electric vehicle miles traveled (eVMT)
- However, level 1 causes more electric load later in the day vs level 2

Workplace Charging Benefit and Need

- Workplace (WP) charging (Initial estimates based on census commuting distance)
  - 80% of Priuses could benefit from WP charging
  - 25% of Volts could benefit from WP charging
  - 15% of Leafs could benefit from WP charging

Estimating Demand - Non-Home Chargers by Year



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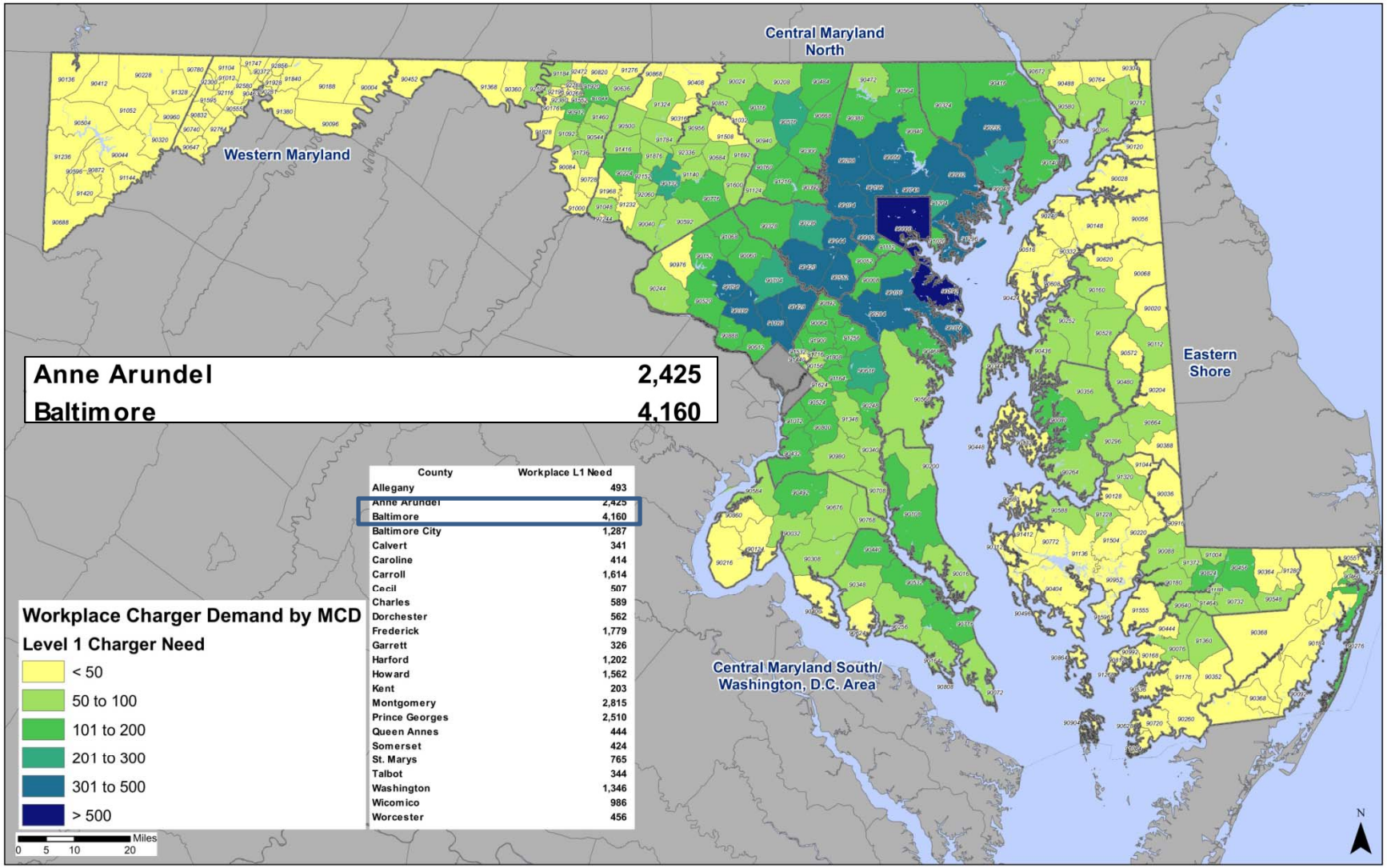
Estimating Demand – Identifying Where Chargers are Needed

- 2007 Household survey covers the DC and Baltimore metro regions
- 25,000+ respondents
- Provides linked trips to estimate range needed for daily travel
- Can use charger location scenarios to investigate public charging needs
- Accurately estimates dwell time
- Build up of this data to all trips in regions

Estimating Demand – Charger Demand by MCD

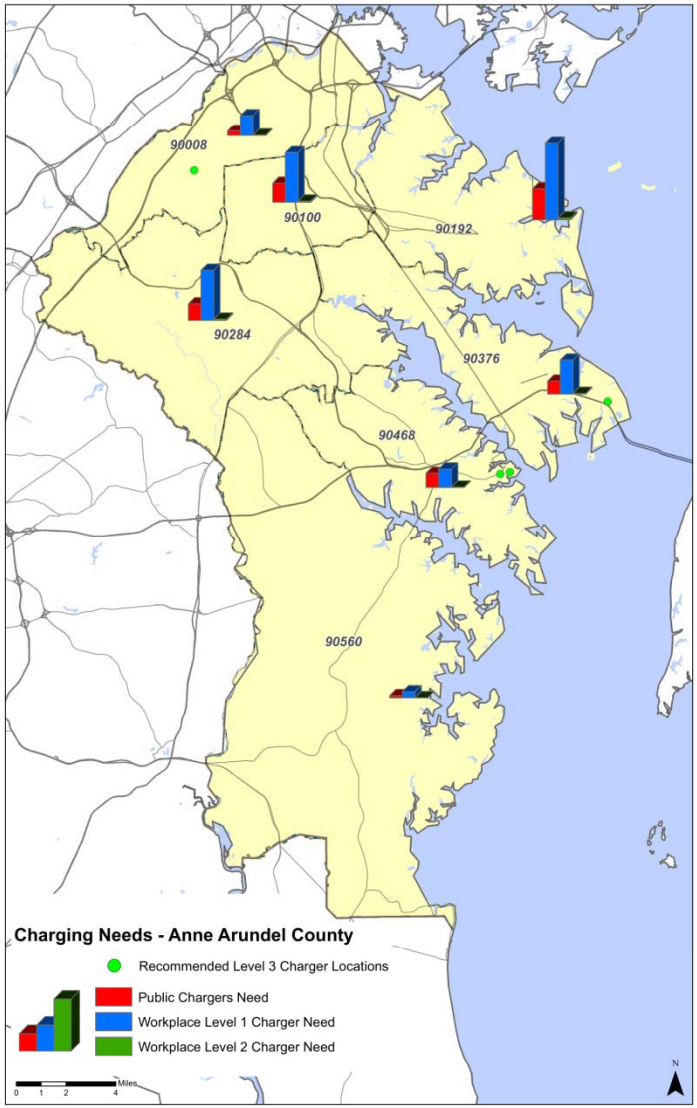
- Minor Civil Division is a census classification which divides up counties/cities into smaller geography
- Used to provide statistical validity to demand estimates
- Summary of demand by charger type (Level 1 and 2) by work and non-work trip provided for each MCD in the state
- DC Fast-charge estimates developed at the countywide level

Demand by MCD – Level 1 Statewide



County	Workplace L1 Need
Allegany	493
Anne Arundel	2,425
Baltimore	4,160
Baltimore City	1,287
Calvert	341
Caroline	414
Carroll	1,614
Cecil	507
Charles	589
Dorchester	562
Frederick	1,779
Garrett	326
Harford	1,202
Howard	1,562
Kent	203
Montgomery	2,815
Prince Georges	2,510
Queen Annes	444
Somerset	424
St. Marys	765
Talbot	344
Washington	1,346
Wicomico	986
Worcester	456

Example of Demand – Anne Arundel County

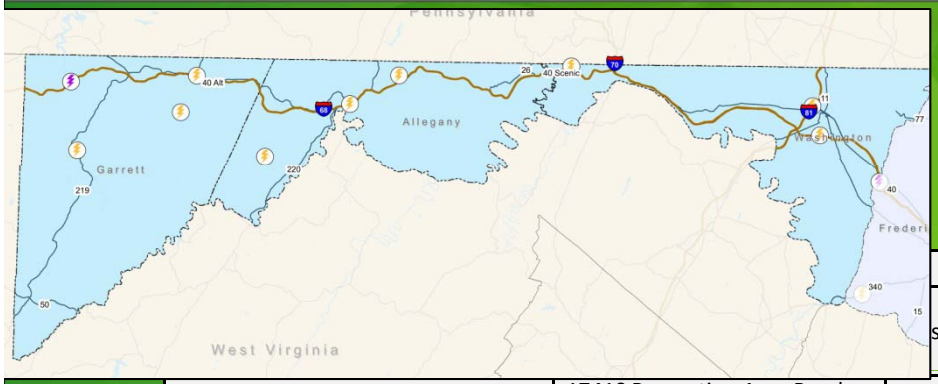


- Demand by Charger Type
  - Level 1 (work place)
  - Level (work place)
  - Public Charging
- Identified Locations for Through / Visitor Fastcharge Placement

Locations for FastChargers for Through / Visitor Trips

- Assessment of Trip Destinations in Maryland and Through Travel
- 48 Locations Identified
- Methods for Placement
  - 40-60 miles apart maximum (30 miles in mountainous areas)
  - Along Major Roadways
    - Rest Areas
    - Major Tourism Destinations (500K+ visitors per year)
    - Regional Shopping Plazas
    - State Parks / Refuges / Activity Centers

Locations for FastChargers for Through / Vistior Trips



Western Maryland Example

		County	Region	Notes
		shington	Western	Located at the I-81/US 40 interchange in Hagerstown. Large outdoor shopping plaza with retail shopping and sit-down as well as fast-food restaurants. Ample parking.
Dan's Mountain State Park	17410 Recreation Area Road SW, Lonaconing	Allegany	Western	Swimming, fishing, hiking, playground, pool, picnic areas, historic interest, Open sunrise to sunset
Deep Creek Lake Visitors Center	15 Visitors Center Drive, McHenry	Garrett	Western	Deep Creek Lake Area/Garrett County Chamber of Commerce
I-68 Sideling Hill Rest Area	I-68 in Hancock	Washington	Western	MDSHA Welcome Center. Restroom facilities closed January through April.
I-68 Youghiogheny Overlook Welcome Center	I-68 East, near Friendsville	Garrett	Western	MD SHA Welcome Center
New Germany State Park	349 Headquarters Lane, Grantsville	Garrett	Western	Boating, swimming, fishing, picnic areas, snow shoeing, cross country skiing, nature center, hiking trails, lodging, Open 8am to sunset
Pilot Travel Center	3000 Chestnut Ridge Road, Grantsville	Garrett	Western	Showers, Arby's, Game room, Open 24hrs/day
Premium Outlets - Hagerstown, MD	Premium Outlets Boulevard, Hagerstown	Washington	Western	Outdoor regional shopping center with restaurants, stores, and ample parking
Rocky Gap Lodge & Golf Resort	16701 Lakeview Road NE, Flintstone	Allegany	Western	Lodging, golf, state park, swimming, hiking, biking, nature center, interactive programs, amphitheater, boating, fishing, hunting, camping, aviary
Western Maryland Railway Station/C&O Canal	13 Canal Street, Cumberland	Allegany	Western	Entrance to the C&O Canal Trail/Cumberland Trail Connection/Canal Place Heritage Area and the historic Paw Paw Tunnel

Noted Technical Issues to Overcome

- Battery heating/degredation with DC Fastcharge
- Individual Charge card for various charge station vendors
- Full charge / vehicle connection time frames for long parking periods
- Retrofitting of existing parking facilities to handle chargers

EVIC Outreach and Communications Plan

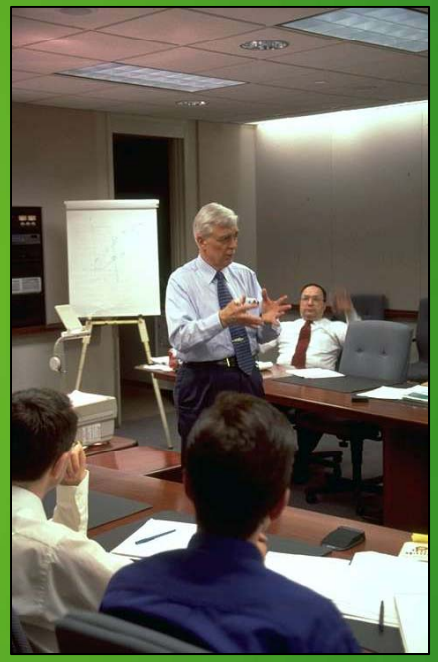
- Target Audiences Identified
  - Consumers
  - Employers
  - Businesses
    - Fleet owners
    - Businesses that can provide EV infrastructure or incentives
  - EV Related Industries
  - Elected Officials, State and Local Government Agencies

EVIC Outreach and Communications Plan

- Communication and Outreach Methods
  - Branding for Maryland EV
    - Logo that symbolizes Maryland EV
      - Utilized on website, traditional printed materials, logo for State EV fleet vehicles, any EV related registration sticker or license plate, directional signage on roadways to EV charging, etc. "The Nike swoosh for Maryland EV"
  - Electronic/Internet Outreach
    - Website - one stop shop for Maryland EV Information, with links to other sites with pertinent and trusted EV information
    - E-Newsletters to electronic subscribers
    - Twitter/Facebook/Pinterest or other social media site pertinent to target audience
    - QR Code
      - Quick response code, a two dimensional code when scanned by smart phone links back to detailed information such as a website

EVIC Outreach and Communications Plan

- Communication and Outreach Methods continued
  - Traditional Outreach
    - Speakers Bureaus
      - Trade schools and unions, colleges and universities AAA seminars, etc.
    - Media Events with elected and government officials
    - Hard copy brochures for use at events and speaking engagements
    - Display booths at key events
      - Auto Show, State & Counties' Fairs, MAACO, MML



Still to Come

- Reach Consensus on Demand Approach/Findings
- Identify Selected Scenarios for Implementation
- Finalize EVIC Infrastructure Plan
- Create Draft and Final Outreach Plans