Projecting EV Distribution and Charging Demand: DVRPC/UC
Davis's EV Planning Toolkit

Adam Beam
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Delaware Valley Regional Planning Commission

The Delaware Valley Regional Planning Commission (DVRPC)

- Metropolitan Planning Organization (MPO) for the Philadelphia region, created in 1965
- Bi-state (PA/NJ), nine counties
- Board made up of representatives of the counties, major cities, key state agencies, Governors’ representatives
- Staff of over 120
Main EV Types

- **PEV**: Plug-In Electric Vehicle
  - **BEV**: Battery Electric Vehicle
    - Also known as All Electric Vehicle (AEV)
  - **PHEV**: Plug-In Hybrid Electric Vehicle
- **HEV**: Hybrid Electric Vehicle
EV Charging Technologies

- **Level 1 Charging: 120V / 1400W**
  - About what a powerful hair dryer uses
  - Adds 2-5 miles of range in an hour
- **Level 2 Charging: 240V / 7700W**
  - Like an electric stove with all burners and oven on
  - Adds 10-20 miles of range in an hour
- **DC Fast Charging: 480+V / 50,000 to 120,000W or more**
  - Like a commercial building
  - Adds 60 to 80 miles of range in 20 minutes

EV Planning Questions

- How do we address tomorrow’s – not yesterday’s – needs?
- How do we:
  - Determine where EV owners will live, work, and charge?
  - Make sure we install the right kind of EV charging infrastructure in the right places and charge the right price?
  - Provide infrastructure that people want, but that they are likely to use only very rarely?
UC Davis Plug-In Hybrid & Electric Vehicle Research Center

PEV Owners
- Surveys
- Interviews
- Focus groups

Consumers
- Surveys
- Interviews
- Focus groups

Infrastructure
- Toolkit
- DC Fast
- Grid

Policy Analysis
- Modeling Impacts
- Incentives

Driving and Charging Behaviors
- Long Trips
- eVMT

Electricity
- eVMT

Worldwide PEV Market Analysis

Not yet PEV Owners

Source: UC Davis, 2017

Market Analysis

Workplace Charging

EV Planning Toolbox for MPOS

ArcGIS Interface Allows User to Test Scenarios

Fast Charging - Estimates Take into Account Existing Chargers

Source: UC Davis, 2017
Market Analysis Tool

- Predicts spatial location of PEV owner households at census block group level
- Inputs include ACS and PEV Sales/Ownership
- Received vehicle level data from both PennDOT and NJ DMV, with tremendous assistance from NJ DEP
- PEV penetration rate

Workplace Charging Tool

- Predicts workplace charging demand by census block group
  - kWh of demand
  - Number of charging events
- Data inputs
  - Market Tool results — PEV ownership location
  - LODES and TDM data — workplaces and commuting distances
  - PEV Scenario — mix of PEV types and ranges
  - Pricing and frequency scenarios for charging

LODES = LEHD (Longitudinal Employer-Household Dynamic) Origin-Destination Employment Statistics
Fast Charging Analysis Tool

- Evaluates demand for DC fast charging based on travel patterns and demand at existing and proposed sites
- Data inputs
  - Results of Market Tool
  - Long trip data

Tool Results

- Three geographies
  - DVRPC Region – 5% PEV penetration
  - Commonwealth of Pennsylvania – 5% PEV penetration
  - State of New Jersey – 10% PEV penetration
- All results are available in an online, interactive map hosted on DVRPC’s website.
  - [https://tinyurl.com/DVRPC-EV-Toolkit](https://tinyurl.com/DVRPC-EV-Toolkit)
  - The data underlying the maps are also available for download at DVRPC’s GIS Portal.
Next Steps

• Update data to gauge progress
  ▪ 2020 vehicle registration data
  ▪ More recent demographic and commuting data
  ▪ More representative vehicle mix

• Calibrate Fast Charging Tool for east coast
  ▪ Potential opportunity with INRIX data

Next Steps

• Integrate into on-line EV resource kit
• Use to support partners and stakeholders
  ▪ State and local governments
  ▪ Electric distribution companies
  ▪ EV charging companies
  ▪ Businesses and developers
Thank you!

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