Overview of PennDOT’s I-81 & I-78 Alternative Fuels Deployment Plan

Alternative Fuels Deployment Plan for I-81 and I-78 in Pennsylvania
FHWA APPLIED RESEARCH PILOT STUDY
Outline

1. Study Background and Goals
2. Organization of Final Report Document
3. Analysis Highlights
4. Summary of Study Outreach Activities
5. Products for Business Outreach
6. Lessons Learned and Next Steps
Study Background

- FHWA funded “Pilot” study led by PennDOT
- Supports FHWA’s Alternative Fuel Corridor (AFC) program
- Focuses on DC-Fast Charging locations
- Supports advancing AFC corridors from “Pending” to “Ready” status
- I-81/I-78 Corridor - Electric Vehicle and CNG Fuels
- Establish resource for future studies

https://www.fhwa.dot.gov/environment/alternative_fuel_corridors/
Identified Study Goals

- Demonstrate a **data-driven approach** to prioritizing locations for new infrastructure.
- Establish a **role** **PennDOT or MPO/RPOs** to play in planning and supporting future infrastructure.
- Evaluate **equitable methods for outreach** to businesses and infrastructure companies on priority locations and existing state funding programs.
- Understand the current **business models** for station hosts and third-party infrastructure companies.
- Collaborate with **DEP funding programs** to explore opportunities to incorporate Deployment Plan priorities into program application.
What is in the Study Report?

Intended as a Resource for future deployment plans ... not a template

- Introduction
  - Basics on AFC Program
  - Key steps for deployment plan

- Understanding the Basics
  - Basics on EV Charging & CNG
  - Business models - Partners

- Identifying Gaps & Needs
  - Identify I-81 / I-78 gaps
  - Demonstrate a process

- Identifying Priority Locations
  - Exit and site prioritization
  - Process, data, criteria

- Funding Opportunities
  - Overview of available grants
  - PennDOT P3; Utility programs

- Outreach and Implementation
  - Approach to support deployment
  - EV Networks, MPOs, Businesses

- Conclusions and Lessons Learned
  - Priority locations for I-81/I-78
  - Key process conclusions
1. Identify and map existing alternative fuel infrastructure in the corridor

2. Identify and visualize the gaps where infrastructure is needed

<table>
<thead>
<tr>
<th>Alternative Fuel Type</th>
<th>Corridor “Ready”</th>
<th>Corridor “Pending”</th>
</tr>
</thead>
<tbody>
<tr>
<td>EV Charging</td>
<td>Public DC Fast Charging no greater than 50 miles between one station/site and the next on corridor, and no greater than 5 miles off the highway. Additionally, each DC Fast Charging site should have both J1772 combo (CCS) and CHAdeMO connectors.</td>
<td>Public DC Fast Charging chargers separated by more than 50 miles. Location of station/site no greater than 5 miles off the highway.</td>
</tr>
<tr>
<td>CNG Fueling</td>
<td>Public fast fill, 3,600 psi CNG stations no greater than 150 miles between one station and the next on the corridor, and no greater than 5 miles off the highway.</td>
<td>Public, fast fill, 3,600 psi CNG stations separated by more than 150 miles. Location of station no greater than 5 miles off highway.</td>
</tr>
</tbody>
</table>
Analysis Highlights: EV Gaps

EV AFC Gaps in Corridor Infrastructure

- EV station, Carlisle PA
- EV station, Hagerstown, MD
- EV station, Allentown, PA
- EV station, Bethlehem, PA

Gap > 50 mi.

Next AFC EV station in Springfield, NJ
Analysis Highlights: CNG Gaps

CNG AFC Gaps in Corridor Infrastructure

CNG station, Allentown, PA
CNG station, Fredericksburg, PA
CNG station, Carlisle, PA

Gap>150mi
Gap<150mi

No CNG stations on I-81 in MD

Next CNG station in Newark, NJ

Gap<150mi
Analysis Highlights: Prioritizing Locations

<table>
<thead>
<tr>
<th>Stage of Analysis</th>
<th>Steps</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exit Prioritization</td>
<td>1. Identify and summarize data to support prioritization</td>
</tr>
<tr>
<td></td>
<td>2. Develop exit prioritization scores based on data</td>
</tr>
<tr>
<td></td>
<td>3. Group exits by AFC gap locations and other prioritization needs</td>
</tr>
<tr>
<td>Site Identification</td>
<td>4. Evaluate types of businesses at priority exit locations</td>
</tr>
<tr>
<td>(for priority exits)</td>
<td>5. Develop scenarios to address AFC designation and other planning needs</td>
</tr>
</tbody>
</table>

Types of Data Used in Prioritization:

- Traffic and Truck Volume
- Roadway Connections
- Employment
- Amenities
- Vehicle Registration
- Origin-Destination Data
Analysis Highlights: Example of Exit Data

Traffic Volume, All Exits, I-81/I-78 PA Corridor

Jobs Within 5-Mile and 2-Mile Buffer, All Exits, I-81/I-78 PA Corridor
## Analysis Highlights: Scoring System

<table>
<thead>
<tr>
<th>Data Item</th>
<th>Scoring Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Traffic Volume</td>
<td>- Apply EXCEL PERCENTILE.INC function to each exit volume  &lt;br&gt; - If volume is in highest 20% of all exits, Score = 4  &lt;br&gt; - If volume is in highest 40% of all exits, Score = 3  &lt;br&gt; - If volume is in highest 60% of all exits, Score = 2  &lt;br&gt; - If volume is in highest 80% of all exits, Score = 1  &lt;br&gt; - Otherwise score = 0</td>
</tr>
<tr>
<td>Truck Volume</td>
<td>- Treated as a bonus score point  &lt;br&gt; - Apply EXCEL PERCENTILE.INC function to each exit volume  &lt;br&gt; - If truck volume is in highest 20% of all exits, Score = 1  &lt;br&gt; - Otherwise score = 0</td>
</tr>
<tr>
<td>Ramp Volume</td>
<td>- Treated as a bonus score point  &lt;br&gt; - Same scoring as truck volume</td>
</tr>
<tr>
<td>Employment</td>
<td>- Same scoring as Total Traffic Volume above, except based on total employment within a 2-mile buffer of corridor</td>
</tr>
<tr>
<td>NHS Connections</td>
<td>- Treated as a bonus score point  &lt;br&gt; - If exit connects to a National Highway System (NHS) route then an additional score point is assigned</td>
</tr>
<tr>
<td>Amenities</td>
<td>- Based on exit amenities (points are additive)  &lt;br&gt; - If food available then Score = 1  &lt;br&gt; - If gas or related amenities available then Score = 1  &lt;br&gt; - If other commercial amenities available then Score = 1-3 (assigned manually by reviewing businesses at each exit)</td>
</tr>
</tbody>
</table>
## Analysis Highlights: Evaluating Potential Sites

### Existing EV DC Fast Stations, PA

<table>
<thead>
<tr>
<th>Type of Business</th>
<th>PA DCFC</th>
<th>Blink</th>
<th>Charge Point</th>
<th>Electrify America</th>
<th>EVgo</th>
<th>Green-lots</th>
<th>Non-Network</th>
<th>Tesla</th>
</tr>
</thead>
<tbody>
<tr>
<td>Convenience/Gas</td>
<td>21</td>
<td>0</td>
<td>1</td>
<td>4</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>12</td>
</tr>
<tr>
<td>Sheetz</td>
<td>17</td>
<td>-</td>
<td>-</td>
<td>4</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>11</td>
</tr>
<tr>
<td>Rutter’s</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Royal Farms</td>
<td>1</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Weis Markets</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Auto</td>
<td>18</td>
<td>0</td>
<td>7</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>10</td>
<td>0</td>
</tr>
<tr>
<td>Food</td>
<td>10</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>8</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Shopping Ctr/Plaza</td>
<td>17</td>
<td>5</td>
<td>0</td>
<td>2</td>
<td>5</td>
<td>0</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>Hotel</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Other</td>
<td>13</td>
<td>4</td>
<td>0</td>
<td>4</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>81</strong></td>
<td><strong>9</strong></td>
<td><strong>8</strong></td>
<td><strong>10</strong></td>
<td><strong>18</strong></td>
<td><strong>1</strong></td>
<td><strong>13</strong></td>
<td><strong>22</strong></td>
</tr>
</tbody>
</table>

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I-81 / I-78 Priority Locations for DCFC

Deployment Scenario 1: Fill Gaps (3 New Stations)

- EV AFC Stations
- Prioritized exit for deployment of new EV AFC station

Distance Indicators:
- 25 mi.
- 35 mi.
- 45 mi.
- 25 mi.
- Gap=95 mi.
- Gap=60 mi.
## Deployment Scenario 1: Fill Gaps (3 New Stations)

<table>
<thead>
<tr>
<th>Deployment Role</th>
<th>Rt.</th>
<th>Exit</th>
<th>Sites for Potential Station(s) (Miles from Exit)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Existing Station: Hagerstown, MD</td>
<td>I-81</td>
<td>6 (MD)</td>
<td>Sheetz (&lt;1), Dunkin (&lt;1), Weis (&lt;1), Wendy’s (&lt;1), Arby’s (&lt;1), Giant (&lt;1), Shopping Mall (&lt;1)</td>
</tr>
<tr>
<td>Gap 1: MD to Carlisle</td>
<td>I-81</td>
<td>14</td>
<td>Sheetz (&lt;1), Shopping Mall (&lt;1), Nissan (&lt;1), Harley-Davidson (&lt;1), Battery Warehouse (&lt;1), Dunkin (1), Walmart (1.8)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>16*</td>
<td>Sheetz (&lt;1), Shopping Mall (&lt;1), Giant (&lt;1), Target (&lt;1), Aldi (&lt;1)</td>
</tr>
<tr>
<td>Existing Station: Carlisle, PA</td>
<td>I-81</td>
<td>52</td>
<td></td>
</tr>
<tr>
<td>Gap 2: Carlisle to Bethlehem, West</td>
<td>I-81</td>
<td>72*</td>
<td>Sheetz (&lt;1), Dunkin (&lt;1), Harley-Davidson (&lt;1), Wendy’s (2), Arby’s (2), Shopping Mall (2)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>77</td>
<td>Sheetz (&lt;1), Travel Centers of America (&lt;1), Flying J Travel Center (&lt;1), Pilot Travel Center (&lt;1)</td>
</tr>
<tr>
<td>Gap 3: Carlisle to Bethlehem, East</td>
<td>I-78</td>
<td>13</td>
<td>Sheetz (&lt;1)</td>
</tr>
<tr>
<td></td>
<td>I-78</td>
<td>23</td>
<td>Love’s (&lt;1), Dunkin (&lt;1)</td>
</tr>
<tr>
<td></td>
<td>I-78</td>
<td>29*</td>
<td>Rutter’s (&lt;1), Dunkin (1), Wendy’s (1), Walmart (1.3), Wawa (1.3), Arby’s (2)</td>
</tr>
<tr>
<td>Existing Station: Allentown, PA</td>
<td>I-78</td>
<td>51/53</td>
<td></td>
</tr>
<tr>
<td>Existing Station: Bethlehem, PA</td>
<td>I-78</td>
<td>67</td>
<td></td>
</tr>
<tr>
<td>Gap to NJ station (53 mi. from PA border) unable to be filled in PA</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Existing Station: Springfield, NJ</td>
<td>I-78</td>
<td>49 (NJ)</td>
<td></td>
</tr>
</tbody>
</table>
Deployment Scenario 2: Aggressive Deployment (7 New Stations)

- EV AFC Stations
- Prioritized exit for deployment of new EV AFC station
Study Outreach

**PennDOT Deployment Plan Priority Locations**

**EV Networks**
- Share & Promote Priority Locations
  - Generate network company interest in PennDOT priority locations.
  - Learn if network companies are already working with businesses in these locations.
  - Indicate that priority locations may be prioritized in grant selection process.
  - Share brochure promoting DEP grant opportunities, for networks to share with businesses with whom they have relationships.

**MPOs**
- Share Findings & Coordinate Outreach to Businesses
  - Gain insight on most appropriate channels of communications to local business communities.
  - Educate the MPO as they participate with municipalities on reviewing new business plans. Can educate on need for infrastructure to those businesses in the planning stage.

**Businesses**
- Promote DEP Grants to Businesses in Priority Location
  - Share brochure promoting DEP grants for DC-Fast Charging.
    - Target distribution of brochure to locations in “Pending” AFC Corridors that would fill gaps identified in Deployment Plans.
    - Provide key PennDOT and DEP contacts in brochure to obtain more information. PennDOT can provide information on current DC-Fast Charging infrastructure needs and DEP grants.
  - Additional outreach interviews could be conducted to key businesses that have DC-Fast Charging in other areas of the state, with support from the EV networks, if interested.

**Grant Application**

**PennDOT Direct Interested Businesses to Network Companies**

**Information Sharing**
Brochure can be “generalized” for application to other areas
**Key Corridor Conclusions**

Identified 3 locations and potential businesses for new EV fast-charging stations:
- I-81 Exit 14, 16, or 17 in Chambersburg
- I-81 Exit 72 or 77 in Harrisburg
- I-78 Exit 29 in Hamburg

The EV-“Pending” gap from Bethlehem to Springfield, NJ, and the CNG-“Pending” gap from Carlisle to Knoxville, TN, would be filled more efficiently with new stations not in PA, but in NJ and MD, respectively.

An additional “aggressive” EV scenario was developed that aims to both fill existing gaps and provide additional stations at key exits in the Harrisburg and Allentown metro areas.
Other Lessons Learned

Data Driven Approach

- Demonstrates that locations have been prioritized not merely to meet FHWA distance requirements, but also because of their potential economic viability

Role for PennDOT and/or MPO/RPOs

- Identifying and sharing priority locations
- Promotion and education of funding opportunities to EV charging companies & businesses
Other Lessons Learned

Methods for Outreach

- Outreach with EV charging companies is critical, as they are the primary stakeholders responsible for implementation.

Understanding Business Models

- Understanding EV station business models (for site owner and charging company) informs and enhances every aspect of the Deployment Plan.
Other Lessons Learned

Collaborate with DEP on Funding Programs

- Collaboration with administrators of funding programs is critical, as this is the strongest incentive that PennDOT has that can facilitate the deployment of new AFC infrastructure.
Next Steps

- Continue Outreach to Businesses
- Maintain Discussions with EV Network Companies
- Work with PA DEP on Grant Opportunities
- Track Infrastructure Installations
- Share Lessons Learned with Planning Partners

Are MPO/RPOs willing to support this?

Integration of Deployment Plan Priorities as Application Selection Criteria

Sharing at upcoming Planning Partners Meeting (Nov)
Discussion

- Who will lead future outreach to businesses and EV-Network companies? What roles can state, regional and local agencies play?

- What other ideas do you have on ways that PennDOT or other regional planning partners can support alternative fuel planning?
Discussion - Questions for Fall Planning Partners Meeting

- What MPO/RPOs are interested in planning for alternative fuel infrastructure?
- Have any MPO/RPOs already conducted studies or identified priorities for alternative fuel infrastructure?
- What other ideas do you have on ways that PennDOT or other regional planning partners can support alternative fuel planning?
- Do you feel this study will be useful as a resource for your agency planning related to alternative fuel infrastructure?