An Electrifying Plan for Vehicles

PA APA Conference
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Benefits of Electrification

Cost Savings
  • Fueling
  • Maintenance

Improved Air Quality
  • Environmental Benefits
  • Public Health Benefits and health reductions
Electrification Considerations

Vehicles
• Types
• Uses
• Range
• Charge time

Charging Infrastructure
• Charger types: level 1, 2 or Fast Chargers
• Property ownership and permitting
• Electric hookup
The Exercise

Using the City of Pittsburgh as an example, consider purchasing and installing the following:

• **Electric vehicles**
  • Municipal Fleet (sedans, refuse, police, EMS, etc.)
  • Transit Fleet

• **Charging Infrastructure**
  • Municipal Fleet
  • Transit Fleet
  • Resident Charging
  • Private Fleet Charging (taxis, car shares, private businesses)
**Features**

**Vehicles:**
- Electric Buses
  - Upfit of $550,000
- Electric Sedans
  - Upfit of $10,000

**State Grants:**
- 2 Electric Buses and Chargers (hypothetical)
- DC Fast Chargers ($50,000 Limit, must be public use)
- Level 2 Chargers (50% upfit = $10,000 limit, municipal fleet, private fleet or public)
- Electric Vehicles (100% upfit = $100,000 limit, municipal fleet)
Your Charge

• Use the map, features, and money at your table to develop a plan for electrification for:
  • Municipal fleet
  • Transit
  • Resident charging

Your spending limit is $200,000
Be sure to locate charging infrastructure, vehicles, and transit on the map
Battery Electric Buses for Pittsburgh

American Planning Association
Pennsylvania Chapter Annual Conference
October 14, 2018

David E. Wohlwill, AICP
Port Authority of Allegheny County
Port Authority Profile

- Began operations in 1964
- Carried 63 million riders in 2017
- On-street bus, three busways, light rail, Mon Incline and ACCESS paratransit
- 99 bus routes, 3 light rail routes
- 2,600 employees
- 731 buses, 83 rail cars, 4 inclined plane cars
- Funded by fare and advertising revenues along with money from federal, state and Allegheny County sources
- Governed by an 11-member Board of Directors
Port Authority’s Service Area
Development of Battery Electric Buses

- Santa Barbara, CA and Chattanooga, TN among early users of battery electric buses
- Typically operated on shorter distance, urban circulator routes.

Source: ElectricVehicleNews.com
Battery Electric Bus Issues

- Significantly higher upfront cost of BEBs compared to diesel buses ($550,000 increment for a 40-foot bus)
- Limited funding available to offset higher costs
- Concern about operating range of BEBs
- Need electric charging stations
- Amount of time needed to recharge batteries
- Natural gas is currently very available, particularly in Southwestern Pennsylvania. Much of the transit industry has opted to go with natural gas buses. (CATA in State College, PA is 100% CNG)
Further Development of Battery Electric Buses

- Recent technological advances made BEBs more feasible for heavy duty urban transit service
- In 2017, Proterra ran a bus 1,100 miles on a single charge on a test track.
- Anticipated revenue range to be 350 miles
- Costs of batteries sharply decreased
- Currently being operated in California (several systems) Chicago, New York City, Reno NV, Winnipeg, MB and other cities
Carnegie Mellon University/Traffic21 Study

- In 2014, Carnegie Mellon University/Traffic21 evaluated and compared the eight bus propulsion technologies for Port Authority.
- Compared CNG, LNG, Hybrid diesel electric, Biodiesel, conventional diesel and battery electric buses
- BEBs were found to be four times as energy efficient as conventional diesel buses.
- Greatest air pollution reduction benefits
- Study results documented in "Which Alternative Fuel Technology is Best for Transit Buses?"
Testing of Battery Electric Buses In Pittsburgh

- Proterra, New Flyer and BYD demonstrated 40’ buses in 2016
- New Flyer demonstrated a 60’ articulated coach in June 2018
Federal Low and No-Emission Bus Grant Program

• Support the transition of the nation’s transit fleet to the lowest emission and most energy efficient transit vehicles
• Provides funding for acquisition of zero-emission and low-emission transit buses, including acquisition, construction, and leasing of required supporting facilities
• 85% federal share for buses
• 90% for supporting equipment and facilities
• Private partnership
• Up to .5% for workforce training and .5% for National Transit Institute training
Federal Low and No-Emission Bus Grant Program

• $55 million total available in 2017
• Port Authority applied for $2.5 million in funding to deploy battery electric buses on 88 Penn Route
• Covered incremental cost of buying five 40-foot battery electric buses, two charging stations and training
• New Flyer and Duquesne Light - private partners
• 129 applications seeking for $515 million in funding
• 51 projects selected
• FTA awarded Port Authority $500,000 - enough to contribute to the purchase of two buses
• To be delivered in July 2019
Selection of 88 Penn Route for first use of Battery Electric Buses

- Short route - 6.1 miles (one way)
- Requires just five buses for peak service
- 3,136 average weekday riders in 2017, 18th busiest bus route
- Variety of operating conditions and terrain
- Route has long, steep hill
Communities Served by 88

- Population served is 32,525 (10% of City’s population)
- Several communities (East Liberty, Garfield and Larimer) have poverty rates above 25%
- Serves major commercial/retail areas (Downtown Pittsburgh, Strip District and East Liberty)
- Serves corridor with high levels of black carbon
Benefits

• Elimination of tailpipe emissions of PM, CO, NOx and VOCs
• Reduce greenhouse gas emissions by 325 tons annually
• Estimated annual fuel savings of 55,000 gallons
• Quieter
• Anticipated 24% reduction in operating, maintenance and ownership costs
• Familiarize public and Port Authority staff with battery electric buses
Interest in further deployment of Battery Electric Buses for Pittsburgh

• In May 2018 PennPIRG and PennEnvironment call for Pennsylvania’s transit systems to convert to electric buses

• Report predicts that if Port Authority replaced all diesel buses with electrics, 23,000 tons of greenhouse emissions would be eliminated annually - equivalent to removing 4,500 cars from area roads

• Suggested Volkswagen Settlement Funding could be used, but amount is limited
Pittsburgh Bus Rapid Transit Project

- City, Port Authority, Urban Redevelopment Authority and Allegheny County
- Link Downtown, Uptown, Oakland and other East End neighborhoods
- Busiest transit corridor in Southwestern Pennsylvania
- About to enter into Final Design
- Revenue service would begin 2021
Pittsburgh Bus Rapid Transit Project

- 25 Battery Electric 60’ Articulated Buses
- To be operated on core route serving Downtown, Uptown, Oakland and East Busway to Wilkinsburg
- Charging stations would be located in Wilkinsburg and East Liberty Garage
- Potential to operate on second route to Highland Park

Proposed Layover and Charging Station at Wallace Terminal of Wilkinsburg Station
Thank you!

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American Heart Association “State of the Air”
Failed for ozone and long and short term particulates

EPA Standards for PM 2.5
Has improved in past years, but beginning to show an uptick in pollution

PennEnvironment “Trouble in the Air” Report
Pittsburgh 4th in large metropolitan areas in number of days that air poses moderate to serious health risks

22% Childhood Asthma Rate in Some Schools
Compared to a 10% national average, study by local researcher
SOURCES OF POLLUTION

“Toxic 10” point source polluters

Pittsburgh’s topography lends itself to inversion events, causing pollution from regional energy generation to linger

Vehicle emissions 🌟
SOURCES OF POLLUTION

Vehicle Emissions
• 100% fossil fuel free fleet
• 50% transportation emissions reduction
• 100% renewable energy use
### ELECTRIFICATION GOALS

EV Task Force formed September, 2018 to enable EV adoption city-wide.

<table>
<thead>
<tr>
<th>Audience</th>
<th>Needs</th>
<th>Strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Municipal Fleet</strong></td>
<td>Purchase and deploy vehicles</td>
<td>Start with sedans and existing infrastructure</td>
</tr>
<tr>
<td></td>
<td>Purchase and deploy charging infrastructure</td>
<td>Couple with renewable energy generation, ensure ease of use</td>
</tr>
<tr>
<td><strong>Other Fleets (car share, taxis, private businesses, etc.)</strong></td>
<td>Enable and incentivize charging infrastructure development for fleets operating in City of Pittsburgh</td>
<td>DC fast charging in convenient locations for taxis</td>
</tr>
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<td></td>
<td>Find opportunities to share fleet charging infrastructure with gov’t or residential</td>
<td></td>
</tr>
<tr>
<td><strong>Residential</strong></td>
<td>Enable charging opportunities for residents (esp. those without driveways)</td>
<td>Permitting within the right of way, neighborhood hubs for level 2</td>
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<tr>
<td></td>
<td>Reduce “range anxiety” for long trips</td>
<td>DC fast charging along interstates and main thoroughfares</td>
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CURRENT FLEET MAKEUP

1200 Total Fleet

- 24 Biofuel Refuse Packers (2 CNG on order)
- 10 EV Sedans (+ 10 in 2019)
- 10 Hybrid Sedans (7 on order)
## Total and Phased PLI Fleet Conversion Estimated Annual Emissions Reductions

<table>
<thead>
<tr>
<th># Vehicles</th>
<th>VMT</th>
<th>GHG (MT CO2-e)</th>
<th>Nox (ton)</th>
<th>PM (lb)</th>
<th>HC (ton)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>50</td>
<td>234,914</td>
<td>77.4</td>
<td>0.02</td>
<td>0.87</td>
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<tr>
<td>Phased</td>
<td>6</td>
<td>28,190</td>
<td>9</td>
<td>0.002</td>
<td>0.1</td>
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</tbody>
</table>
CURRENT CHARGING INFRASTRUCTURE

**Municipal Fleet**
- 10 solar-powered mobile units for the Permits, Licensing and Inspections fleet (AFIG grant)
- 4 grid-tied units at the Motorpool lot

**Public**
- 11 level 2 chargers at Parking Authority Lots (AFIG grant)
- 8 on order (Duquesne Light Co. donation)
FUNDING OPPORTUNITIES

State Grants:
• Alternative Fuels Incentive Grant
• Clean Diesel Grant
• EV Fast Charging or Hydrogen Fuel Cell Equipment
• Level 2 Light Duty EV Charging Equipment Rebate

Electric Utility Incentives

Levaraging Private Companies

Return on Investment
THANKS!

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