Opportunities for Adopting Electric Vehicles (EVs) in Municipal Fleets: A Primer

Sustainable Jersey Webinar
November 29, 2017

Webinar Speakers

• Nancy Quirk, Sustainable Jersey
• Matthew Goetz, Georgetown Climate Center
• Nick Nigro, Atlas Public Policy
• Mike Hornsby, NJ Board of Public Utilities
What is Sustainable Jersey?

- Certification program for municipalities and schools
- We provide:
  - **Tools, resources, and guidance** to help municipalities and schools become more sustainable
  - **Grants and funding** for municipalities and schools
  - **Regional Hubs**

Program Participants

- **Municipal Program**
  - 445 (79%) participating
  - 208 Certified
    - 160 Bronze
    - 48 Silver

- **Schools Program**
  - 281 Districts (46%)
  - 700 Schools (28%)
    - 11 Bronze
    - 13 Silver
Actions: Prosperity, Planet, People

- Municipalities / Schools choose from menu of actions to accumulate points

- Actions created by issue-based Task Forces:
  - subject matter experts
  - local leaders
  - state / federal agencies
  - stakeholders

Operations and Management: Fleet Actions

- Fleet Inventory (10 points)
  - Evaluate current vehicle use
  - Fleet planning exercise

- Meet Target for Green Fleets (30 points)
  - Average fleet fuel efficiency of 35 mpg OR
  - Achieve 20% reduction in fuel use within 4 years

- Purchase Alternative Fuel Vehicles (10 points)
  - Hybrid
  - CNG
  - Propane (LPG)
  - Electric
  - Ethanol
  - http://www.hyattsville.org/733/Electric-Police-Vehicles
Make Your Town Electric Vehicle Friendly Action

• Required activities
  – Zoning ordinance -- EV charging stations as accessory use
  – Ordinance -- design standards for EVSE parking spaces
  – Training for local officials
• Outreach activities (must do ONE)
  – Incentive for pre-wiring for EV charging station
  – Awareness event
  – Commitment from 3 local partners for workplace chargers
  – Commitment from 3 local partners for multi-family chargers

Public EV Charging Infrastructure Action

• Required elements
  – Municipality instrumental in the project
  – Publicly available
  – Listed on “public directory”
  – Signage/Promotion of Charging Stations
• Charging station may be:
  – Located on private property
  – Owned and operated by a local nonprofit
Workplace EV Charging: *It Pays to Plug In*

- NJ DEP and NJ BPU grant program
- Workplace charging stations (public, private, educational, government)
  - Up to $250 per Level 1 Charger
  - Up to $5,000 per Level 2 Charger
- First come, first served
- Sustainable Jersey Actions
  - Public Charging Infrastructure
  - Make Your Town EV Friendly

drivegreen.nj.gov/programs.html

VW Settlement: $72M

- Proposals for projects invited -- NJDEP
  - [http://www.state.nj.us/dep/vw/faq.html](http://www.state.nj.us/dep/vw/faq.html)
- Due January 31, 2018
- Eligible categories include:
  - Class 4-8 School Bus, Shuttle Bus, Transit Bus
  - Class 4-7 Local Freight Trucks
  - EV charging equipment
  - Hydrogen fuel cell vehicle supply equipment
EV Smart Fleets

Making Electric Vehicles Affordable for Fleets through a Multi-State Procurement

Sustainable Jersey
November 29, 2017

Agenda

• Overview of EV Smart Fleets
• Why EVs? The benefits of electrifying your fleet
• EV procurement opportunities and resources
**EV Smart Fleets**

**EV Smart Fleets Goals:**

- Provide cost savings for fleets
- Increase access to a wider range of EV models
- Be replicable in future years
- Meet needs of state and local government fleets

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**Project Partners**

[CALSTART](calstart.org)

[NESCAUM](nescaum.org)

[Georgetown Climate Center](georgetownclimate.org)

[Ross Strategic](rossstrategic.com)

[California Department of General Services](dgs.ca.gov)

[Atlas Public Policy](atlaspolicy.com)

Greater New Haven Clean Cities Coalition
Ocean State Clean Cities Coalition
Sacramento Clean Cities
Granite State Clean Cities Coalition
Columbia-Willamette Clean Cities Coalition
Denver Metropolitan Clean Cities Coalition
Long Beach Clean Cities Coalition
New Jersey Clean Cities Coalition
Project Timeline

- Outreach to Fleets and Procurement Agencies
- Analysis & Development of Procurement Principals
- Development of Request for Proposals from Dealerships
- Issuance of Request for Proposals
- Responses and fleet orders

Four EV Technology Options

- Battery electric vehicle (BEV)
- Hydrogen fuel cell (FCEV)
- Plug-in hybrid electric (PHEV)
- BEVs + range extender (BEVx)
Plug-in Hybrid Electric Vehicles

- Equipped with a battery and gasoline engine
- Can run on gasoline when battery range is exhausted and to boost power
- All-electric range currently over 50 miles

BEV + Range Extender

- Battery electric vehicle equipped with range-extending gasoline generator
- Range extender kicks in only if battery is low
- L.A.P.D. acquired 100 BMWi3s

Chevy Volt
Ford Fusion Hybrid
BMW i3
80-mile all-electric range
150-mile extended range
Battery Electric Vehicles

- Runs solely on battery power
- Zero tailpipe emissions
- Electric ranges of current mainstream consumer models up to 238 miles

Battery Advances are Making Electric Vehicles Affordable

<table>
<thead>
<tr>
<th>Vehicle</th>
<th>Range in miles</th>
<th>MSRP</th>
</tr>
</thead>
<tbody>
<tr>
<td>2017 Chevy Bolt</td>
<td>238</td>
<td>$37,500</td>
</tr>
<tr>
<td>2017 Tesla Model 3</td>
<td>215</td>
<td>$35,000</td>
</tr>
<tr>
<td>2016 Tesla Model S</td>
<td>259</td>
<td>$79,500</td>
</tr>
<tr>
<td>2017 Nissan LEAF</td>
<td>84</td>
<td>$29,010</td>
</tr>
<tr>
<td>2016 Tesla Model X</td>
<td>238</td>
<td>$83,000</td>
</tr>
<tr>
<td>2017 BMW i3</td>
<td>114</td>
<td>$43,600</td>
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<tr>
<td>2016 Ford Focus Electric</td>
<td>76</td>
<td>$29,170</td>
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<tr>
<td>2011 Nissan LEAF</td>
<td>84</td>
<td>$32,780</td>
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<tr>
<td>2014 BMW i3</td>
<td>81</td>
<td>$41,350</td>
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<tr>
<td>2012 Ford Focus Electric</td>
<td>76</td>
<td>$39,200</td>
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</tbody>
</table>

Source: Bloomberg New Energy Finance (June, 2017)
Benefits of Fleet Electrification

- Fuel cost and maintenance savings
- Air pollution and climate benefits
- State and municipal policy goals

Lower Annual Operating Costs: Nissan Leaf vs. Sentra

Reduction of Criteria Pollutants and GHG Emissions

Health benefits from reduction of particulate matter and NOx emissions

Greater than 50% reduction in GHG emissions (U.S. grid average)

Fleet Electrification Tools and Resources

- Fleet outreach survey

- Analysis of procurement strategies
  - EV Fleet Procurement Analysis Tool
  - Fleet Procurement Analysis Report

- Case studies of successful EV fleet procurements
Fleet Procurement Analysis Tool

- Total cost of ownership (TCO) fleet procurement comparison
  - Evaluates several procurement structures
  - Compares two procurement scenarios side by side
  - Includes lifecycle environmental impacts analysis
  - Includes user-defined sensitivity analyses
- Easy to use, flexible, available to fleets
  - Microsoft Excel-based
  - Auto-populates default values based on location and vehicles
  - Presents summary dashboards and detailed financial tables

Free download at
www.evsmartfleets.com

EV Fleet Procurement Analysis Tool: Input Screen
Fleet Procurement Analysis Tool: Output Dashboard

New Jersey Procurement Example

- "Apples-to-apples" comparison of public fleet purchase of Chevy Bolt EV & Chevy Cruze
  - 10 vehicles purchased with cash
  - Use MSRP for upfront price
  - Total ownership cost of Bolt EV is < 5% more than Cruze
    - Federal incentive
    - 50% lower operating cost for Bolt EV
    - Bolt EV becomes cheaper around $3/gal gasoline
  - Bolt EV has considerably lower emissions
    - 60% drop in CO₂ emissions
    - >50% drop in NOₓ emissions
    - 99% drop in VOC
Vehicle Cost Per Mile (Nominal) in NJ

- Depreciation (less tax credits and incentives)
- Financing
- Fuel
- Taxes & Fees

<table>
<thead>
<tr>
<th>Year</th>
<th>Model</th>
<th>Gasoline Cost ($)</th>
<th>Depreciation ($)</th>
<th>Financing ($)</th>
<th>Fuel ($)</th>
<th>Taxes &amp; Fees ($)</th>
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</thead>
<tbody>
<tr>
<td>2017</td>
<td>Cruze ICE (Baseline)</td>
<td>$0.415</td>
<td>$0.010</td>
<td>$0.083</td>
<td>$0.093</td>
<td>$0.136</td>
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<tr>
<td></td>
<td>Bolt EV BEV (Comparison)</td>
<td>$0.435</td>
<td>$0.010</td>
<td>$0.083</td>
<td>$0.046</td>
<td>$0.039</td>
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Chevrolet Cruze ICE (Baseline) 2017
Chevrolet Bolt EV BEV (Comparison)

Gasoline Cost Sensitivity Analysis in NJ

- Current Value: $2.50

<table>
<thead>
<tr>
<th>Gasoline Cost ($) (Gallon)</th>
<th>Nominal Cost per Mile</th>
</tr>
</thead>
<tbody>
<tr>
<td>$2.50</td>
<td>$0.44</td>
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<tr>
<td>$2.67</td>
<td>$0.45</td>
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<tr>
<td>$2.83</td>
<td>$0.46</td>
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<td>$3.00</td>
<td>$0.47</td>
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<tr>
<td>$3.17</td>
<td>$0.48</td>
</tr>
<tr>
<td>$3.33</td>
<td>$0.49</td>
</tr>
<tr>
<td>$3.50</td>
<td>$0.50</td>
</tr>
<tr>
<td>$3.67</td>
<td>$0.51</td>
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<tr>
<td>$3.83</td>
<td>$0.52</td>
</tr>
<tr>
<td>$4.00</td>
<td>$0.53</td>
</tr>
</tbody>
</table>

- 2017 Chevrolet Cruze ICE (Baseline)
- 2017 Chevrolet Bolt EV BEV (Comparison)
Lifecycle Environmental Analysis in NJ

**Lifecycle CO2 Fuel Emissions (lbs/mile)**

- **2017 Chevrolet Cruze ICE (Baseline)**: 0.7
- **2017 Chevrolet Bolt EV BEV (Comparison)**: 0.3

**Lifecycle Criteria Pollutants**

- NOX (mg/mi)
- SOX (mg/mi)
- PM10 (mg/mi)
- PM2.5 (mg/mi)
- VOC (mg/mi)

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>2017 Chevrolet Cruze ICE (Baseline)</th>
<th>2017 Chevrolet Bolt EV BEV (Comparison)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NOX</td>
<td>230.0</td>
<td>120.4</td>
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<tr>
<td>SOX</td>
<td>106.8</td>
<td>16.7</td>
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<tr>
<td>PM10</td>
<td>15.7</td>
<td>15.8</td>
</tr>
<tr>
<td>PM2.5</td>
<td>4.4</td>
<td>3.0</td>
</tr>
<tr>
<td>VOC</td>
<td>2.6</td>
<td>0.0</td>
</tr>
</tbody>
</table>

Benefits Improve with Cleaner Grid

**Lifecycle Criteria Pollutant Emissions**

- NOX (mg/mile)
- SOX (mg/mile)
- PM10 (mg/mile)
- PM2.5 (mg/mile)
- VOC (mg/mile)

<table>
<thead>
<tr>
<th>Pollutant</th>
<th>2017 Chevy Cruze (internal combustion engine)</th>
<th>2017 Chevy Bolt - EV (Electric Vehicle – Albany, NY, grid)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NOX</td>
<td>230.0</td>
<td>120.4</td>
</tr>
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New Report: Electric Vehicle Procurements for Public Fleets

- Deep dive on EV procurements from EV Smart Fleets
- **Main Finding**: public fleets can procure EVs at a cost that is competitive with, or lower than, conventional vehicles under several conditions
- **Key Content**
  - Insights from stakeholder outreach
  - Evaluation of elements in a vehicle procurement
  - Scenario-based procurement analysis


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Public Fleet Procurement Case Studies

**Key lessons learned:**
- Opportunity to capture tax credit
- Employee acceptance
- Cost savings from reduced operating expenses
NEW JERSEY BOARD OF PUBLIC UTILITIES (NJBPU) ALTERNATIVE FUEL VEHICLE (AFV) PROGRAM

PRESENTED BY
MIKE HORNSBY
NJBPU
11/29/17
NJBPU
Alternative Fuel Vehicle (AFV) Program

• The State of New Jersey encourages the use of AFVs.
• BPU’s activities involve AFVs, AFV infrastructure development, and public education.
• For light duty vehicles (automobiles), BPU is primarily focused on Electric Vehicles (EVs) and EV charging infrastructure.
• For heavy duty vehicles, BPU is primarily focused on Compressed Natural Gas (CNG) vehicles and infrastructure.

NJBPU
Alternative Fuel Vehicle (AFV) Program

BPU’s goal is to accelerate the adoption of AFVs by:

• Leading a State AFV Work Group
• Informing and educating consumers and first responders about AFVs
• Demonstrating AFV benefits
• Recommending policies and incentives for AFV vehicles and infrastructure
• Accelerating AFV adoption in state and local government
NJBPU
Alternative Fuel Vehicle (AFV) Program

Electric Vehicle (EV) Infrastructure Stakeholder Process

• BPU is presently conducting an EV infrastructure stakeholder process, and welcomes your input.
• All public comments for the stakeholder process have been posted here: http://www.bpu.state.nj.us/bpu/agenda/stakeholdercomments.html.
• To submit comments or to be placed on the distribution list, please email evstakeholder.group@bpu.nj.gov

NJBPU
CNG Vehicle Grant Program

• The program will help fund CNG powered vehicles Class 5 through 8
• Eligibility is limited
• Application window opens noon on November 20, 2017, and closes noon on December 20, 2017. Applications should be submitted to the email address: BPU.CNGVehicleGrant@BPU.NJ.Gov
• Details: http://www.nj.gov/bpu/commercial/cng.html
• Submit applications or inquiries to: BPU.CNGVehicleGrant@BPU.NJ.Gov
NJBPU
Alternative Fuel Vehicle (AFV) Program

Electric Vehicles

If you are interested in further information or having a speaker speak about electric vehicles to your civic organization please contact:

evstakeholder.group@bpu.nj.gov

~Battery Electric Vehicles are exempt from state sales tax~