NARUC Electric Vehicles State Working Group

JUNE MEETING

JUNE 29, 2021
Welcome

Moderator: Commissioner Bocanegra, Illinois

Panelists

• Lori Bird, US Energy Program and Polsky Chair for Renewable Energy, World Resources Institute
• Robert Kelter, Senior Attorney, Environmental Law & Policy Center
• Susan Mudd, Senior Policy Advocate, Environmental Law & Policy Center
• Todd Watkins, Director of Transportation, Montgomery County Public Schools
<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
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<tbody>
<tr>
<td>3:00 PM</td>
<td>Welcome and Introductions (5 minutes)</td>
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<tr>
<td></td>
<td>• Agenda review</td>
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<tr>
<td></td>
<td>• Introduce yourselves</td>
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<tr>
<td>3:02 PM</td>
<td>Presentation: Lori Bird, World Resources Institute (13 minutes)</td>
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<td></td>
<td>• Lori Bird, US Energy Program and Polsky Chair for Renewable Energy at the World Resources Institute (WRI) will provide a national overview of school bus electrification and introduce WRI’s efforts in the space</td>
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<tr>
<td>3:15 PM</td>
<td>Presentation: Robert Kelter and Susan Mudd, Environmental Law &amp; Policy Center (13 minutes)</td>
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<td>• Robert Kelter, Senior Attorney with the Environmental Law &amp; Policy Center, and Susan Mudd, Senior Policy Advocate at the Environmental Law &amp; Policy Center will discuss findings from the Midwest with school bus electrification</td>
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<tr>
<td>3:28 PM</td>
<td>Presentation: Todd Watkins, Montgomery County Public Schools (13 minutes)</td>
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<tr>
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<td>• Todd Watkins, Director of Transportation, Montgomery County Public Schools, will discuss the school district’s efforts to transition their bus fleet</td>
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<td>3:41 PM</td>
<td>Discussion and Q&amp;A (19 minutes)</td>
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<td>• Speakers will take additional questions from working group members</td>
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<td>4:00 PM</td>
<td>Closed Door Discussion (28 minutes)</td>
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<td>• Working group members will discuss their own views and the actions their states have taken to date.</td>
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<tr>
<td>4:28 PM</td>
<td>Next Steps and Announcements (2 minutes)</td>
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<tr>
<td>4:30 PM</td>
<td>Adjourn</td>
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Introduce Yourselves – Will you be joining us at the Summer Policy Summit? In Denver or virtually?

EV Working Group Members
States:
- Arizona
- California
- Colorado
- Connecticut
- Delaware
- District of Columbia
- Florida
- Georgia
- Hawaii
- Illinois
- Kentucky
- Maryland
- Massachusetts
- Michigan
- Minnesota
- Missouri
- Nevada
- New Jersey
- New York
- North Carolina
- Ohio
- Oregon
- Pennsylvania
- Puerto Rico
- Rhode Island
- South Dakota
- Texas
- Utah
- Vermont
- Washington
- Wisconsin

National/Federal Partners:
- NARUC
- NRRI
- U.S. DOE
- National Labs
- U.S. EPA
WRI ELECTRIC SCHOOL BUS (ESB) INITIATIVE

Tuesday, June 29 – EV State Working Group
OBJECTIVE: Convert all 480,000 U.S. school buses to electric by 2030

- Aggregating demand and developing transition plans for equitable adoption (community engagement, financing, training, etc.)

- Engaging OEMs to scale manufacturing and radically reduce costs

- Enabling financing models and encouraging utility partnerships with schools (V2G, infrastructure costs, etc.)

- Enabling policy and funding at the state and federal level

- Galvanizing communities and stakeholders to push for an equitable and comprehensive transition
Electrification can accelerate decarbonization while bringing direct, tangible benefits to every community in the U.S.

- Improved health and cognitive outcomes for children
- Cleaner air, especially in high-pollution corridors
- Safer, quieter streets
- Reduced operating expenses for school districts
- Reduced tech costs through aggregated procurement
- New jobs in green manufacturing
- Increased capacity for a just, clean energy transition
Diesel buses are harmful to children’s health and development:

- School buses produce nearly twice as much soot per mile as a tractor-trailer truck.
- Children riding on diesel school buses are exposed to $5-15\times$ more air toxins than the rest of the population.
- Kids are sensitive to air pollution with documented impacts on respiratory health and academic performance.

The burden of air pollution is not shared equally:

- Air pollution inside the bus can be $10\times$ higher than ambient levels; 70% of low-income students take the bus compared to 50% of non-low-income students.
- In a 2019 study, PM exposure was 75% higher for Latino residents, 73% higher for Asian American, and 61% higher for African American residents.
- Children with disabilities often have to ride longer in buses than other kids because there are only a small number of buses available to them.
THE STATUS OF U.S. SCHOOL BUS ELECTRIFICATION

480,000 school buses in the U.S., 80% of all buses nationwide

Less than 1% are electric; ~350 electric buses

Electrifying every school bus will reduce **10 megatons of GHG per year**, almost **50%** of annual GHG emissions from all buses in the U.S.
FINANCING AND POLICIES FOR BUS ELECTRIFICATION

• **ESB-specific legislation passed in 5 states** since 2018
  – Utility planning and investments for transportation electrification (NV, CA)
  – Other bills include dedicated ESB grant programs for school districts (VA, MD, CA), school district eligibility for fleet electrification funds (CO)

• **$272M across 24 states** in total public funding for ESBs
  – CA accounts for 2/3 of this total public funding at $179M
  – **$105M in utility filings** (representing 1.3 billion MWh) for ESBs across 12 states
  – **$101M in VW settlement funding** for ESBs across 23 states
    • ~1/3 of total public funding to date for ESBs
    • In 16 of the states VW funding is the sole source of funding to date for ESBs

• **Substantial federal funds under consideration**
  – Infrastructure framework includes $7.5B for electric buses/transit; $7.5B for EV charging
  – **2021 Clean Commute for Kids Act** proposed with $25B over 10 yrs. for ESBs

Source: AtlasEV Hub
TOP 10 STATES BY TOTAL PUBLIC FUNDING FOR ESBS

Source: Atlas EV 2021

State funding sources:
- VW Settlement Funds
- State financial incentives such as state tax exemptions
- State voucher programs that offer rebates for buses and trucks (NY, CA, NJ)
- Cap and trade funds
- Green banks
18 V2G UTILITY PILOTS ACROSS 15 STATES

Iowa – Alliant Energy

Oregon – PGE

California – PG&E
- SCE
- SDG&E

Illinois – Ameren Energy

Michigan – DTE Energy

Maryland – PepCo (Exelon)

Massachusetts – National Grid

New Hampshire – NHEC

New Jersey – Atlantic City Electric (Exelon Co.)

New York – ConEd
- PSEG

North Carolina – Duke Energy

South Carolina – Duke Energy

Virginia – Dominion Energy

Florida – FP&L

Source: NSI 2021
KEY REGULATORY QUESTIONS

• Ownership of bus and battery assets
  – For V2G arrangements, asset ownership is an issue
  – Schools want to ensure that buses are available when needed; primary purpose is pupil transportation

• Charging infrastructure deployment
  – Charger installations challenging in some locations; some districts park buses in multiple locations
  – Who pays? Utility make-ready investments

• Rate structures
  – Demand charges can reduce fuel savings
  – New rate structures may be needed to encourage grid-friendly charging
THANK YOU

Lori Bird lori.bird@wri.org
Electric School Buses
Replacing an Asthma Trigger with a Clean Quiet Ride

National Association of Regulatory Utility Commissioners
Electric Vehicle State Working Group
June 29, 2021
Diesel School Buses Contribute to Childhood Asthma

Asthma, which diesel pollution exacerbates, is now the most common chronic condition among U.S. children, affecting 1 in 10 in the U.S.

A child sitting in the back of a school bus with windows closed is exposed to 4x more diesel pollution than a child riding in a car in front of the same bus.

Asthma attacks are triggered by pollutants like NOx emissions from diesel school buses resulting in unnecessary hospitalizations and deaths.

Children breathe 50% more air per pound of body weight than adults and their lungs are still developing, making them especially vulnerable to cancer and respiratory diseases caused by diesel pollution.

INVEST IN A CLEAN RIDE FOR KIDS
Benefits of Electric School Buses

ENVIRONMENTAL AND HEALTH BENEFITS

Argonne’s AFLEET tool calculates switching from diesel to electric school buses saves about \textbf{10.3 tons of greenhouse gas emissions} annually per bus.

A single electric transit bus has been estimated to save \textbf{$55,000 per year in health costs}; a school bus’ savings likely lower due to fewer miles traveled, young children’s lungs are particularly susceptible to irritation from diesel emissions.

- Can be equipped with \textbf{seatbelts}
- \textbf{Less noise pollution} and \textbf{no diesel smell}
- Drivers report quieter bus leads to \textbf{quieter, more well-behaved children}

\textbf{14 million fewer absences from school a year}
Benefits of Electric School Buses

HEALTH BENEFITS

Adopting Clean Fuels and Technologies on School Buses
Pollution and Health Impacts in Children

Sara D. Adar1, Jennifer D’Souza1, Lianne Sheppard2,3, Joel D. Kuhlman2,3, Teal S. Hallstrand2, Mark E. Davey6, James R. Sullivan6, Jordan Jahnke5, Jane Koenig1, Timothy V. Larson6,7 and L. J. Sally Liu2,3,7

1Department of Epidemiology, University of Michigan, Ann Arbor, Michigan; 2Department of Environmental and Occupational Health Sciences, Department of Biostatistics, and 3Department of Epidemiology, University of Washington, Seattle, Washington; 4Department of Epidemiology and Public Health, Swiss Tropical and Public Health Institute, Basel, Switzerland; 5Department of Biostatistics, University of Michigan, Ann Arbor, Michigan; and 6Department of Civil and Environmental Engineering, University of Washington, Seattle, Washington

Abstract

Rationale: More than 25 million American children breathe polluted air on diesel school buses. Emission reduction policies exist, but the health impacts to individual children have not been evaluated.

Methods: Using a natural experiment, we characterized the exposures and health of 275 school bus riders before, during, and after the adoption of clean technologies and fuels between 2005 and 2009. Air pollution was measured during 597 trips on 188 school buses. Repeated measures of exhaled nitric oxide (FNO2), lung function (FEV1, FVC), cilia, and absenteeism were also collected monthly (1.768 visits). Mixed-effects models longitudinally examined the adoption of diesel oxidation catalysts (DOCs), closed/clean/ventilation systems (CCVs), ultralow-sulfur diesels (ULS), or biodiesel with exposures and health.

Measurements and Main Results: Fine and ultraviolet particle concentrations were 10–50% lower on buses using ULS, DOCs, and/or CCVs. ULS adoption was also associated with reduced FNO2 (−14% [95% confidence interval (CI) −23 to −10%]), greater changes in FVC and FEV1 (0.02 [95% CI 0.003 to 0.05]) and 0.01 [95% CI −0.006 to 0.02] L/y, respectively), and lower absenteeism (−1% [95% CI −1.60 to −0.27%]), with stronger associations among patients with asthma. DOCs, and to a lesser extent CCVs, were also associated with improved FNO2, FVC growth, and absenteeism, but these findings were primarily restricted to patients with persistent asthma and were often sensitive to control for ULS. No health benefits were noted for biodiesel. Extrapolating to the U.S. population, changed fuel technologies likely reduced absenteeism by more than 14 million/y.

Conclusions: National and local diesel policies appear to have reduced children’s exposures and improved health.

Keywords: particulate matter; air pollution; asthma; absenteeism; lung function

Fixing school buses is an effective (and cheap) way to improve students’ health and academic performance

Wen Jiaque, Sarah Heerdik, and Daniel Goughman - Monday, April 22, 2019
School buses: Cleaning up the fleet

Old school buses are very polluting. Newer, cleaner options exist.

<table>
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<tr>
<th></th>
<th>1992 diesel</th>
<th>2019 diesel</th>
<th>Electric, charged on MN grid</th>
<th>Electric, charged with renewables</th>
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<tbody>
<tr>
<td>Yearly emissions, with bus driving 15,000 miles annually,</td>
<td>58,000 lbs</td>
<td>46,000 lbs</td>
<td>32,000 lbs</td>
<td>167 lbs</td>
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<tr>
<td>Greenhouse gases</td>
<td></td>
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<tr>
<td>Nitrogen oxides</td>
<td>506 lbs</td>
<td>36 lbs</td>
<td>19 lbs</td>
<td>0 lbs</td>
</tr>
<tr>
<td>Fine particles (PM 2.5)</td>
<td>21 lbs</td>
<td>1.6 lbs</td>
<td>3 lbs</td>
<td>0.4 lbs</td>
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Well to wheels emissions using AFLEET emissions model.
Vehicle to Grid (V2G) Opportunities

WHY ELECTRIC SCHOOL BUSES ARE A GOOD FIT

Electric school buses can serve dual-use as zero emissions transportation during the school year and as a grid resource during peak demand times of day and peak demand season when the buses are idle (about 75% of the year).
Utilities can Play a Role

INVESTING IN ELECTRIC SCHOOL BUSES

$40,000 to Triad school district in East St. Louis Area towards purchase of 3 buses

In Indiana, committed to cover up to $120,000 each for a school bus in four districts; not approved by IURC

In Minnesota, proposed 20 V2G buses, summer only, demonstration pilot as part of COVID recovery docket

In Iowa, contributed to and will test V2G school buses at Cedar Rapids school with 125 KW charger
Let's Create This Future

#CLEANRIDE4KIDS
THANK YOU

SUSAN MUDD, SENIOR POLICY ADVOCATE
SMUDD@ELPC.ORG

ROB KELTER, SENIOR ATTORNEY
RKELTER@ELPC.ORG
Electrification of the Fleet

Moving from all diesel to all electric school buses
Where we were

- Hearing lots of info about electric school buses emerging in market
- Hearing manufacturers saying all electric in next 5-10 years
- Lots of interest/pressure from all around
- Concerned about grants drying up
- VW grant
- Disappointing to many
What we learned

- Meeting with Highland
- Same money as diesel
What we did

- Investigated legitimacy of notion
- RFI
- RFP
- Pre-award
- Contract and financial model
- 25, 61, 120, 120...
How it works

- Turn-key project
  - Use of bus
  - Design, install, maintenance of charging infrastructure
  - Charge management services
  - Maintenance of bus
  - Electric
How it works

- Same cost as diesel for 7 years, then cheaper
  - Declining EV prices, increasing diesel prices
  - Cheaper to run on electric than diesel
  - Maintenance reductions of 50+%
Why it works

- Took all risk from school system
  - Know exactly what EV school buses will cost over life of bus
  - Highland took on grant and V2G risk
  - Eliminated need for additional funds to electrify
  - All excuses evaporated
Questions??

- Now – please ask
- Later – please email
  - todd_watkins@mcpsmd.org
Questions?

Raise your hand to ask a question or type a question into the question box.
Facilitator

- EV Working Group Chair Maria Bocanegra and Illinois Commerce Commission Staff
Discussion Questions

1. Which benefits are your commission able to consider in utility proposals for school bus electrification?
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2. Has your commission evaluated proposals for electric school bus programs?
   - If so, what strengths and areas for improvement did you observe in utility proposals?
Discussion Questions

1. Which benefits are your commission able to consider in utility proposals for school bus electrification?

2. Has your commission evaluated proposals for electric school bus programs?
   - If so, what strengths and areas for improvement did you observe in utility proposals?

3. Are you aware of whether school districts in your jurisdiction are considering electrifying their bus fleets?
   - If so, do you have a sense of their level of commitment?
Announcements

- **7/13 (1-2:30pm ET) EVgo Virtual Site Tour and Presentation**
- **Registration is now open for the Hybrid Summer Policy Summit:** **July 18-21, 2021 in Denver, CO**
  - **7/18 – Elec and Rate Design:** The Path to Electrification: The Regulatory Rate Design Considerations for its Continued Success
  - **7/20 – ERE:** Fleet Electrification: How to Make Sure the Grid is in it for the Long Haul
- **Presentations and recordings of past EVSWG events**
- EVSWG Listserv: NARUC-EVSWG@lists.naruc.org