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

Agenda

3:00 PM	 Welcome and Introductions (5 minutes) Agenda review Introduce yourselves
3:02 PM	 Presentation: Lori Bird, World Resources Institute (13 minutes) 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
3:15 PM	 Presentation: Robert Kelter and Susan Mudd, Environmental Law & Policy Center (13 minutes) Robert Kelter, Senior Attorney with the Environmental Law & Policy Center, and Susan Mudd, Senior Policy Advocate at the Environmental Law & Policy Center will discuss findings from the Midwest with school bus electrification
3:28 PM	 Presentation: Todd Watkins, Montgomery County Public Schools (13 minutes) Todd Watkins, Director of Transportation, Montgomery County Public Schools, will discuss the school district's efforts to transition their bus fleet
3:41 PM	 Discussion and Q&A (19 minutes) Speakers will take additional questions from working group members
4:00 PM	 Closed Door Discussion (28 minutes) Working group members will discuss their own views and the actions their states have taken to date.
4:28 PM	Next Steps and Announcements (2 minutes)
4:30 PM	Adjourn

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



WORLD Resources Institute

WRI ELECTRIC SCHOOL BUS (ESB) INITIATIVE

Tuesday, June 29 – EV State Working Group

IMAGE: FLICKR/CHRIS DEVERS

WRI SCHOOL BUS ELECTRIFICATION INITIATIVE

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

SCHOOL BUS ELECTRIFICATION BENEFITS ALL COMMUNITIES

Electrification can accelerate decarbonization while bringing direct, tangible benefits to every community in the U.S.





SCHOOL BUS HEALTH & EQUITY IMPACTS

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 **5-15x** 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 10X higher than ambient levels; 70% of lowincome 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
 - <u>2021 Clean Commute for Kids Act</u> proposed with \$25B over 10 yrs. for ESBs

TOP 10 STATES BY TOTAL PUBLIC FUNDING FOR ESBS



18 V2G UTILITY PILOTS ACROSS 15 STATES



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



WORLD Resources Institute

THANK YOU

Lori Bird lori.bird@wri.org

RECTOR

IMAGE: FLICKR/CHRIS DEVERS



Electric School Buses

Replacing an Asthma Trigger with a Clean Quiet Ride

National Association of Regulatory Utility CommissionersElectric Vehicle State Working GroupJune 29, 2021

Diesel School Buses Contribute to Childhood Asthma





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



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.



Benefits of Electric School Buses

Argonne's AFLEET tool calculates switching from diesel to electric school buses saves about **10.3 tons of greenhouse gas emissions** annually per bus

A single electric transit bus has been estimated to save **\$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 **seatbelts**
- Less noise pollution and no diesel smell
- Drivers report quieter bus leads to **quieter**, more wellbehaved children



— could result in —



million fewer absences from school a year



Benefits of Electric School Buses

ORIGINAL ARTICLE

Adopting Clean Fuels and Technologies on School Buses

Pollution and Health Impacts in Children

Sara D. Adar¹, Jennifer D'Souza¹, Lianne Sheppard^{2,3}, Joel D. Kaufman^{2,4,5}, Teal S. Hallstrand⁴, Mark E. Davey⁶, James R. Sullivan², Jordan Jahnke⁷, Jane Koenig², Timothy V. Larson^{2,8}, and L. J. Sally Liu^{2,6†}

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BROOKINGS



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

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 (F_{ENO}), lung function (FEV₁, FVC), and absenteeism were also collected monthly (1,768 visits). Mixedeffects models longitudinally related the adoption of diesel oxidation catalysts (DOCs), closed crankcase ventilation systems (CCV s), ultralow-sulfur diesel (ULSD), or biodiesel with exposures and health.

Measurements and Main Results: Fine and ultrafine particle concentrations were 10–50% lower on buses using ULSD, DOCs,

and/or CCVs. ULSD adoption was also associated with reduced $F_{\rm ENO}$ (-16% [95% confidence interval (CI), -21 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 0.03] L/yr, respectively), and lower absenteeism (-8% [95% CI, -16.0 to -0.7%]), with stronger associations among patients with asthma. DOCs, and to a lesser extent CCVs, also were associated with improved $F_{\rm ENO}$, FVC growth, and absenteeism, but these findings were primarily restricted to patients with persistent asthma and were often sensitive to control for ULSD. No health benefits were noted for biodiesel. Extrapolating to the U.S. population, changed fuel/technologies likely reduced absenteeism by more than 14 million/yr.

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



AMBOY BUS CO. INC.

School buses: Cleaning up the fleet

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

21 lbs

Fine particles (PM 2.5)

Yearly

emissions, with bus driving

15,000 miles

annually.



3 lbs

0.4 lbs

1.6 lbs

Well to wheels emissions using AFLEET emissions model.

Cleaner Options Exist!



Vehicle to Grid (V2G) Opportunities

WHY ELECTRIC SCHOOL BUSES ARE A GOOD FIT



Electric school buses can serve dualuse 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







THANK YOU

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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?

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

Peer Discussion – Commissioners and Commission Staff Only

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?

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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?
- 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: <u>NARUC-EVSWG@lists.naruc.org</u>