WELCOME!

Colorado Electric School Bus Roundtable
January 27, 2022
Let's Accelerate Colorado's Electric School Bus Future
Let's Accelerate
Colorado's Electric School Bus Future
Please **Sign In**: First, Last + Organization in chat box now

We will be **recording** this roundtable (and share later, with slides)

**Speaker Bios** are hyperlinked in agenda - we will send through chat

**Chat**: Please use chat for questions throughout the session

**Tech Help**: Please chat privately **ECTech**

**Survey**: Please give us feedback on our post-meeting survey

**Twitter handles**:
- @ElectricRoadmap
- @WRIRossCities
- @eschoolbus4kids

**Hashtags**:
- #cleanair4COkids
- #cleanair4kids
- #PlugInCO
GET SET FOR SOME GREAT SPEAKERS!

Todd Hawkins  
Senior Vice President, First in Charge, First Transit, and First Student Transit and First Vehicle Services

Ean Thomas Tafoya  
Colorado State Director, GreenLatinos

Sue Gander  
Director, Electric School Bus Initiative, WRI

Senator John Hickenlooper

Jason Wilcox  
Legacy Fleet Incentives and Assessment Center, US EPA Transportation & Climate Division

Governor Jared Polis

Landon Hilliard  
Safe Routes Program Coordinator, Boulder Valley School District

Adam West  
Project and Energy Efficiency Specialist, Denver Public Schools

Stacey Simms  
Senior Business Consultant, Excel Energy

Matt Stanberry  
Managing Director, Highland Electric

Joel Danforth  
Energy Programs & New Business Director, United Power

Dominic May  
Energy Resource Program Architect, La Plata Association

Ben Prochazka  
Executive Director, Electrification Coalition

Senator Stephen Fenberg  
Colorado State Senate Majority Leader

Representative Alex Valdez  
Colorado House District 5

Orville Thomas  
Government Relations Director, Lion Electric

Jacqueline Piero  
VP, Policy, Nuvve Holding Corp

Casey Ungs, Steamboat Springs School District

Christian Williss, Colorado Energy Office

Not pictured:
Michael King, Colorado Department of Transportation
Kay Kelly, Colorado Department of Transportation
Steve Mccannon, Colorado Department of Health and Environment
Getting to Know Each Other
Who We Are

The Electrification Coalition (EC) is a nonpartisan, non-profit organization committed to promoting policies and actions that facilitate the deployment of electric vehicles on a mass scale in order to combat economic and national security dangers caused by our dependence on oil.
90% of U.S. transportation is powered by oil.

Transportation is Colorado’s largest GHG emitting sectors
$514 BILLION IN GLOBAL EV INVESTMENT

- Automakers and other stakeholders continue to rollout EV investment as sales recover

- $55 Billion in new private investment announced Jan-April 2021

- $112 billion could land in U.S.
Colorado: School bus electrification

A State Summary of Bus Electrification and Key Bus Indicators

January 2022
WHAT MAKES SCHOOL BUSES WELL SUITED TO ELECTRIFICATION?

- Travel consistent routes that rarely exceed 100 miles
- Adequate time to recharge between routes
- Proximity to vulnerable populations (school kids)
- Well suited for vehicle-to-grid
ELECTRIC SCHOOL BUSES HIT THE ROAD

Electric School Buses in the United States
1,164 Electric School Buses announced, procured, delivered or in operation


Available School Bus Models

<table>
<thead>
<tr>
<th>Model</th>
<th>Range (Miles)</th>
<th>Estimated Price</th>
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<tbody>
<tr>
<td>IC Bus CE</td>
<td>200</td>
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<tr>
<td>LionC</td>
<td>155</td>
<td>$330,000</td>
</tr>
<tr>
<td>LionD</td>
<td>155</td>
<td>$350,000</td>
</tr>
<tr>
<td>GreenPower BEAST</td>
<td>150</td>
<td>Unknown</td>
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<tr>
<td>LionA</td>
<td>150</td>
<td>$300,000</td>
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<td>138</td>
<td>$325,000</td>
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<td>Blue Bird All American</td>
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<td>Blue Bird Vision</td>
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<td>$345,765</td>
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<tr>
<td>Collins Type A (Lightning...)</td>
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<td>$230,000</td>
</tr>
<tr>
<td>Blue Bird Microbird</td>
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<td>$275,000</td>
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</table>

Range from manufacturer websites. Estimated price based on data from publicly available bids or contracts.

Largest Electric School Bus Order
In US History — Montgomery County (MD) Orders 326 Buses
ECONOMIC

- Cost effectiveness over total cost of ownership expected by 2030
- Potential for vehicle to grid (V2G) revenue, with multiple utility pilot programs underway
- Potential for more than $200,000 in lifetime energy cost savings when paired with a distributed energy resource (NREL 2019)

Nominal Cost Per Mile of School Buses (Type C) by Fuel Type

Public Funding for Electric School Buses by Year

- $9.0 million in 2016
- $16.3 million in 2017
- $22.6 million in 2018
- $132.2 million in 2019
- $173.0 million in 2020
- $125.2 million estimated in 2021

Public Funding for Electric School Buses By Program

- California Clean Energy Jobs Act 16%
- California Climate Investments 39%
- California HVIP 22%
- Other 6%
- VW Settlement 39%

- $485 million awarded or made available to date
- 1,504 electric school buses funded or committed
- 32.8 percent of Volkswagen Settlement Funds for electric vehicles awarded to school bus projects
UTILITIES LEADING THE WAY

Investments driven by energy storage potential of vehicle-to-grid enabled electric school buses

• Pilot project in White Plains with five fully operational vehicle-to-grid school buses
• Buses act as batteries during summer months when not in use
• Bus operator gets paid by Con Edison for grid services

Source: Con Edison

• Investing $13.5 million in 50 electric school buses
• Buses to serve as a grid resource to support integration of renewable electricity
• State of Virginia has since committed more than $20 million in public funds

Source: Dominion Energy
Buckle Up!
Let's Get Started
THE WRI ELECTRIC SCHOOL BUS INITIATIVE
ABOUT WRI
WRI is a global research organization that turns big ideas into action at the nexus of environment, economic opportunity and human well-being.
To move human society to live in ways that protect Earth's environment and its capacity to provide for the needs and aspirations of current and future generations.
WRI is a global research organization with over 1,400 experts working across 60+ countries.
Why Electrify the U.S. school bus fleet?

Electrification can accelerate decarbonization while bringing direct, tangible benefits to every community.

- **Improved health** and cognitive outcomes for children
- **Cleaner air**, especially in high-pollution corridors and communities of color
- **Reduced operating expenses** for school districts
- **New jobs** in green manufacturing
- **A tipping point** for MHD + electrification
- Enhanced **resiliency** and **renewables integration** with V2G
Diesel buses harm health & 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 up to **12 times more air toxics** inside the bus than ambient levels.

• There are **documented impacts** on respiratory health and academic performance.

*Journal of Health Economics, International Agency for Research on Cancer, National Bureau of Economic Research*
The burden of air pollution is inequitable

- **70% of low-income students** take the bus compared to 50% of non-low-income students

- PM exposure from on-road sources can be **75% higher for Latinos, 73% higher for Asian Americans, and 61% higher for African Americans**

- Children with disabilities often **ride longer** than other kids

- Indigenous communities are **disproportionately impacted** by air pollution, and have **childhood asthma rates 150% above national average**
The Challenges facing school bus electrification

- Higher upfront costs
- Infrastructure development
- New technology
- Technology myths
- Need to scale quickly

 THESE DISPROPORTIONATELY IMPACT DISADVANTAGED COMMUNITIES
The status of electrification

- **480,000** school buses in the U.S., **80%** of all buses nationwide
- Less than **1%** are electric
- Electric school buses can be found in **33 states**
In November 2021, Congress passed the bipartisan Infrastructure Investment & Jobs Act, including a **record $5 billion** to replace older, polluting school buses with cleaner and electric school buses.

That includes **$2.5 billion in dedicated, standalone funding for electric school buses** and another $2.5 billion for electric and alternative fuel school buses.

Now EPA is charged with **designing and implementing a Clean School Bus Program** to disburse the funds.
1,100+ electric school buses have been committed, procured, delivered or put in operation in at least 33 states.
**ELECTRIC SCHOOL BUS ADOPTION**

1,100+ electric school buses committed, procured, delivered or in operation:
- 258 districts (2% of all SDs)
- 1/3 in top 25% most vulnerable counties
- at least one in 33 states

ESBs are in:
- suburban areas (36%)
- cities (30%)
- towns (17%)
- rural areas (17%)
Our Aim: ELECTRIFY the entire U.S. fleet BY 2030

Partner with communities, school districts, industry experts, manufacturers, utilities, and policy makers to **transform and electrify** the school bus market.

Together, build unstoppable momentum to **electrify** 480,000 school buses in the U.S. by 2030.

Ensure an **equitable transition** by focusing on underserved communities.
Our vision involves multiple stakeholders

Goal: An Equitable Transition to Electric School Buses

School Districts
Manufacturers
Utilities
Federal & State Policymakers
Local Communities

Foundation: Equity, Communications, Engagement
Project wide Advisory council members

<table>
<thead>
<tr>
<th>Name</th>
<th>Position/Title</th>
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<tbody>
<tr>
<td>Maria S. Bocanegra*</td>
<td>Commissioner, Illinois Commerce Commission</td>
</tr>
<tr>
<td>Solyana Mesfin*</td>
<td>High school student &amp; Student Member, Kentucky Board of Education</td>
</tr>
<tr>
<td>Harold Wimmer*</td>
<td>National President &amp; CEO, American Lung Association</td>
</tr>
<tr>
<td>Curt Macyyn*</td>
<td>Executive Director, National School Transportation Association</td>
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<tr>
<td>Mari McClure</td>
<td>President &amp; CEO, Green Mountain Power</td>
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<tr>
<td>Melissa Miles</td>
<td>Executive Director, New Jersey Environmental Justice Alliance</td>
</tr>
<tr>
<td>Patty Monahan</td>
<td>Commissioner, California Energy Commission</td>
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<tr>
<td>Michael A. Nutter</td>
<td>Former Mayor of Philadelphia</td>
</tr>
<tr>
<td>Andre Perry</td>
<td>Senior Fellow, Metropolitan Policy Program, Brookings</td>
</tr>
<tr>
<td>Gil C. Quiniones</td>
<td>CEO, ComEd</td>
</tr>
<tr>
<td>Victor A. Rojas</td>
<td>Senior Vice President, Sustainable Capital Advisors</td>
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<tr>
<td>Gilbert Rosas</td>
<td>Energy Education Specialist, Stockton Unified School District</td>
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<tr>
<td>Nathaniel Smith</td>
<td>Founder &amp; Chief Equity Officer, Partnership for Southern Equity</td>
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<tr>
<td>Carol Tyson</td>
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**Equity-centered project**

**Equity point of contact on each Pillar team:**
- Attends all meetings with focus on identifying equity intersections
- Work with the team to determine their response and support implementation
- Track all equity intersections, from workplans to implementation strategies, events, and document review

**Equity framework:**
- Outlines project approach to equitably transition school buses to electric by 2030
- Considers racial, income and mobility equity, and historical and structural barriers to access for all
- Guides overall project decision-making to normalize, operationalize, and institutionalize equity within the project activities and outcomes
Where we’re Working
Our NATIONAL Partners (WITH MORE TO COME)
Thank you

Find out more at wri.org/electric-school-buses
Electric School Bus Facts and Figures
Colorado School Bus Indicators

On the Road*
- 6,261 School Buses as of 2019
- 1.2% of National Total

New Registrations*
- 484 New School Buses Registered Since 2019
- 0% Electric

Utility Investment
- Approved: $2.2 Million
- Pending: $0

Alternative Fuel Buses on the Road*
- 494 Alternative Fuel School Buses
- 2+ Electric School Buses (29 more on the way)

Policy Environment
- 2 Supportive Policies
- 2 Incentive Programs

Government Funding
- $9.9 Million Awarded
- 8th in the Nation
- 31 Buses Committed

*School Buses on the Road represents a snapshot from 2019. New Registrations represents new school buses registered from 2019 to date. Turnover in the existing fleet during this time is unknown. Data may omit electric school buses that don’t use a unique chassis.
More than 5,800 School Buses on the Road in Colorado

School Buses by County

School Buses by Fuel Type

- Diesel: 5,324 (90%)
- Propane: 384 (7%)
- Gas: 120 (2%)
- CNG: 55 (1%)

School Bus Stock Data as of EOY 2019.
$9.9 Million Awarded for 31 Electric School Buses from ALT Fuels Colorado

Aurora Public Schools: 7
Boulder Valley School District: 6
Steamboat Springs School District: 5
Aspen School District: 4
James Irwin Charter School: 2
Other: 7

Total Vehicles Committed: 31

Round 1 (Sep '18): $418,000
Round 3 (Nov '19): $624,953
Round 5 (Dec '20): $3,104,845
Round 6 (Jul '21): $5,725,524

Note: Funding for the ALT Fuels Colorado Program comes from the Volkswagen Settlement

*Buses may not be deployed
Policy Support Ramping Up

**ZEV Bus and Truck MOU**
Colorado signs on to the ZEV Bus and Truck MOU seeking 100 percent ZEV medium- and heavy-duty vehicle sales by 2050.

**State Study Released**
Colorado Medium- and Heavy-Duty Vehicle Study released as part of ongoing development of Clean Truck Strategy

**Public Funding on the Way**
$150 million for school bus electrification in Governor Polis’ proposed budget

- July 2020
- October 2021
- November 2021
In January 2021, Xcel Energy approved for a $112 million transportation electrification package including a $2.2 million school bus electrification program.
Available Funding

- **Xcel Energy**
  - $2.2 M available
  - $275,000 per bus

- **ALT Fuels Colorado**
  - ~$3 M remaining
  - Up to 117% of incremental cost
  - Next round TBD

- **EPA Clean School Bus Program**
  - $5 B appropriated
  - Details coming soon

*Source: Xcel Energy*  
*Source: RAQC*  
*Source: EPA*  
*Federal Program*
We're at Lunch!
Meet us back here at 12:55pm MT
An electric school bus produces less than half the GHG Emissions of a Diesel School Bus

- **Study (2019)** shows emissions of MDHD vehicles based on national average grid emissions
- Average electric school bus emits less than half the GHG emissions of diesel school bus

**Figure 5.** Life Cycle Global Warming Emissions for Different Heavy-Duty Electric Vehicles on the Average US Grid (generation-weighted) in 2016

Per-mile life cycle global warming emissions vary for different types of heavy-duty vehicles depending on a vehicle's fuel efficiency. Shown are life cycle emissions from diesel and electric versions of five common heavy-duty vehicles. Bars for electric vehicles represent life cycle global warming emissions for vehicles charged on the average grid in the United States. Range bars represent emissions from the most and least carbon-intensive electricity grids in the United States.

Note: Fuel economies for the electric refuse truck and school bus were estimated based on the fuel economy of the corresponding diesel vehicle and its average speed. Fuel economies for the electric delivery truck and semi trucks were measured directly.


Colorado grid DIRTIER than National Average

- Composition of Colorado Electricity Grid (RMPA):
  - 42.5% coal
  - 26.5% gas
  - 17% wind
  - 12% hydro
  - 2% other
- Higher share of fossil fuels than national average
- Higher CO₂ emissions than national average
Next Steps

For School Districts, Interested Policy Makers, and Advocates
Engage Stakeholders

School district administrators, superintendents, city council members, utility representatives, school bus fleet managers, bus drivers, maintenance staff, school facility managers, parents, and students.
Identify Partners

Utilities, States & Municipalities, NGOs,
When do you want your fleet to be 100% Electric? Work backwards from there, based on carbon goals, contracts, rate of existing fleet retirement.
Pathways to Funding

Utilities, States & Federal Programs (existing or possible), Public/Private Partnerships, Pay as You Save financing models
Plan Routes and Charging Schedules

Ensure EVSE and ESB deployments are able to meet anticipated needs.
Procure Vehicles and Chargers

Acquire and install EVSE and ESB. Match deployment timelines to acquisition opportunities.

See http://driveevfleets.org to see ESBs available via the Climate Mayors EV Purchasing Collaborative, a partnership with EC, Climate Mayors & Sourcewell.

For more information visit: https://www.electrificationcoalition.org/schoolbus/
"Time and time again... You hear people say we want to be part of the EV revolution."

Ean Thomas Tafoya, GreenLationos
"These buses will help the millions of children, particularly minority and lower income, who are exposed to air pollution when they ride diesel buses to school."

Senator John Hickenlooper, U.S. Senate
“We are facing such a shortage of school bus drivers right now. They are also affected by that diesel exhaust coming from school buses.”

Jason Wilcox, Environmental Protection Agency
“Each school district is at a different place in the process, but you should be doing something now.”

Steve McCannon, Colorado Department of Public Health and Environment
“Engage your utility early and often, they are going to be a critical resource for you.”

Christian Williss, Colorado Energy Office
"We have nearly eliminated in-cab noise, and from a safety perspective that’s going to be great for the driver."

Casey Ungs, Steamboat Springs School District
"The fact that we can recycle the harder materials that are part of this vehicle is so much better than what we are used to."

Kay Kelly, Colorado Department of Transportation
THANK YOU to Our Speakers Today!

Colorado Electric School Bus Roundtable
January 27, 2022

Contact:

Katrina McLaughlin
katrina.mclaughlin@wri.org

Celia Kosinski
ckosinski@electrificationcoalition.org
Here is the link to register for the afternoon participation session:

https://us02web.zoom.us/meeting/register/tZ0lf-CtpjIpG9U54rAKoDqoPu6klvmebAGA