GoEV City: Electric School Bus Webinar

Colorado GoEV City: Electric School Bus Webinar
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Electric School Buses Reduce Pollution

- 2020: Transportation now the #1 source of greenhouse gas (GHG) emissions in Colorado

- Front Range in “serious” nonattainment area for ground-level Ozone: causes respiratory illness (Denver ranked 12th in the U.S. for ozone pollution)

- Electric school buses:
  - Zero tailpipe emissions
  - 50% reduction in GHGs compared to diesel (Buses get cleaner every year alongside the electricity grid).

Twin Rivers School Districts in CA has 25 electric school buses:
- 12 electric Lion,
- 8 Motiv-powered Trans Tech,
- 5 Bluebird
Electric School Buses Costs & Trends

- 4,000 diesel school buses carry 42% of school kids in Colorado.
- Each electric bus can save districts:
  - $2,000 a year in fuel costs,
  - $4,400 a year in maintenance costs
  - $170,000-240,000 per bus in lifetime O&M costs
- Potential funding sources:
  - Alt Fuels Colorado Grant Program
  - Utility Partnerships
  - Innovative Leasing Options
- 5 Colorado school districts awarded Alt Fuels funding: Boulder, Denver, Aspen, Roaring Fork, West Grand
- BNEF: 84% of bus market will be electric by 2030

Total lifecycle costs for diesel vs electric school buses (U.S.Pirg)
Our Speakers

1. **Rick Coffin - Colorado Department of Health & Environment**: Diesel Exhaust Emissions & Implications

2. **Brad Redmond - West Fargo Public Schools**: Electric School Bus Pilot

3. **Chris Michalowski, Mountain Parks Electric**: Utility perspective & collaborating with schools

4. **Matt Goble, Regional Air Quality Council**: ALT Fuels Colorado Grant Program
Get on the EV Bus for Cleaner Air and Healthier Kids!
Diesel Exhaust - What is Diesel Exhaust?

• Mixture of gases and particulates produced during the combustion.
  • More than 40 listed air toxics.
  • Several known carcinogens.

• Diesel exhaust is an EPA-listed mobile source air toxic.

• World Health Organization classified diesel exhaust as carcinogenic to humans.
Diesel Exhaust - Toxic Air Contaminants

Acetaldehyde, acrolein, aluminum, ammonia, aniline, antimony compounds, arsenic, barium, benzene, beryllium compounds, biphenyl, bis-phthalate, bromine, 1,3-butadiene, cadmium, chlorinated dioxins, chlorine, chlorobenzene, chromium compounds, copper, cresol, cyanide, debenzofuran, dibutylphthalate, ethyl benzene, formaldehyde, hexane; lead, manganese and mercury compounds, methanol, methyl ethyl ketone, naphthalene, nickel, 4-nitro biphenyl, phenol, phosphorus, POM (incl. PAHs), propionaldehyde, selenium compounds, silver, styrene, sulfuric acid, toluene, xylene isomers and mixtures, zinc
Diesel Exhaust - Health Effects

• Children
  • Developing lungs more susceptible

• Immediate health effect
  • Irritation of eyes, nose, throat, and lungs
  • Coughs, headaches, lightheadedness, and nausea

• Long term health issues
  • Heart and lung diseases, cancer
Diesel Exhaust - Children’s Health

• Developing lungs more susceptible to exposure to air pollutants.

• Child respiratory rates are more rapid than adults’:
  
  • Early childhood: 20-40 breaths/minute
  • Late childhood: 15-25 breaths/minute
  • Adults: 12-18 breaths/minute

Thus exposure is greater for children
Diesel Exhaust - Children’s Exposure

• PM2.5 levels inside school buses are 5-10 times above the background level.
• Crankcase emissions (from under bus hood) seep into the cabin

• Exposure probably greatest inside school buses, but also at bus stops, other bus idling areas and in traffic

• Exposed twice a day:
  • 20 days per month
  • 9 months/year
  • 10 to 12 years

• 2 x 20 x 9 x 12 = 4,320 exposures
  • Throughout their childhood
Diesel Exhaust - EV Replacement Goals

- Reduce fuel use and emissions (idling not necessary)
- Reduce exposures of diesel emissions to:
  - Children
  - Drivers
  - Parents
  - Teachers
  - Mechanics
  - General public in traffic and neighborhoods
Additional Information

• Colorado Public Health Tracking Program, Asthma and Your Health
  https://coepht.colorado.gov/asthma-and-your-health
• Colorado Diesel Emissions Control Program
  https://www.colorado.gov/pacific/cdphe/diesel-emissions-control-program
• US EPA Diesel Emissions Reduction Act School Bus Program
  https://www.epa.gov/dera
• CDC Children’s Health and the Built Environment

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West Fargo Public Schools, North Dakota Electric School Bus Case Study

Brad Redmond
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West Fargo Public Schools, North Dakota Electric School Bus Case Study

- Blue Bird Vision All-Electric School Bus
- Deployed August 2019
- $314,200 funded via Public Private Partnership
  - West Fargo Public Schools
  - North Dakota Department of Commerce
  - Coalition for a Secure Energy Future
  - Cass County Electric
- Logged 3,584 Miles through February 2020
Costs & Savings

- Transportation Fuel Costs
  - $0.14 / mile = Electricity
  - $0.40 / mile = Diesel

- O&M Costs
  - $0.15 / mile = E-Bus
  - $0.41 = Diesel Bus

- Totals
Cold-Weather Performance

Denver, CO
Weather averages
Overview | Graphs
Temperatures (°F)

Fargo, ND
Weather averages
Overview | Graphs
Temperatures (°F)
Chris Michalowski
Power Use Advisor
West Grand School District

- Kremmling, CO
- Serves approximately 440 students
- Electric school bus expected to cover 92 miles per day

Mountain Parks Electric

- Serves all of Grand and Jackson counties with portions of Summit, Routt and Larimer
- 22,000 meters
- Tri-State G&T co-op
As a utility why help our school districts procure electric school buses?

Utilities are the local experts in EV transportation and a trusted energy advisor.

Reduce diesel exhaust impact on children.

Additional kWh sales.

Help promote local EV adoption.

Lower school’s operating expense allowing budget to go further.
How Much Does it Cost?

West Grand School District Electric School Bus Cost:
Blue Bird, All American 78-Passenger Electric School Bus ($388,000)
Clipper Creek 19.2 kW, L2 charger installation ($7,000)
Total Cost: $395,000

Comparable Diesel: $147,000

Difference: $248,000
Get Creative with Funding

Alt Fuels Colorado Vehicle Grant: $273,563
MPE/Tri State G&T: $121,437
Total Contributions: $395,000

Electric School Bus Cost: $395,000

Total Cost to WGSD: $0.00

MPE contributed through our Education Fund which is funded by unclaimed capital credits.
“Even a FREE bus can be a tough sell”

Will it go up hills?

Will it be warm enough in the winter?

How do we charge the bus?

How much does it cost to charge?

What do we do with the bus at the end of its life?

Is it reliable and safe?

If we charge off peak will we have enough time?

Can we park it outdoors?
Deliverables

- MPE will meter and record hourly charging data/kW & kWh usage.
- WSGD will provide daily mileage to MPE.
- MPE will record corresponding weather data.
- WSGD will log daily cabin temperature at the end of the route.
- WSGD will charge outside of the typical peak hours of 5 PM - 10 PM.
- WSGD will provide maintenance log and costs associated with operating the electric bus.
Our Small Community is Excited!

Volkswagen Group of America (VW) Settlement funds in Colorado:

- Allocated to states by number of affected vehicles registered
  - Colorado allocated $68.7 million
- Can only be used for predetermined eligible projects that reduce NOx
- All funding administered by a trustee
  - Designated trustee is Wilmington Trust in Delaware
  - RAQC requests funding each round. We do not have funding in house.
• Program originally received $21.5 million for projects. As of Dec. 2019 approx. $9 million has been awarded.

• Program will fund vehicles in 6 categories: Heavy-duty freight, school/shuttle buses, freight switchers, medium-duty freight, airport GSE, forklifts.

• Charging infrastructure associated with vehicle request may be eligible for additional funding. Stand alone charging infrastructure is not eligible for ALT Fuels Colorado funding.

• Comparable diesel vehicle must be scrapped for each new vehicle requested.
School buses must meet all minimum standards for school transportation vehicles, outlined by CO Dept. of Education.

School buses are eligible to receive 117% of the incremental cost between a comparable new diesel bus and the new electric bus.

All required quotes will be due at the time of application submission. If your fleet needs additional time, please contact me ASAP.

Proof of utility engagement, specific to your AFC application, will be required with application submission.

Transportation departments, bus drivers, bus mechanics, etc. need to be consulted during the project evaluation phase.
Please email me with any additional questions.

Matt Goble  
ALT Fuels Colorado – Program Coordinator  
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Program Website: cleanairfleets.org (click on AFC program logo)
Questions?

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2. **Rick Coffin, Colorado Department of Health & Environment**: richard.coffin@state.co.us

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4. **Chris Michalowski, Mountain Parks Electric**: cmichalowski@mpei.com

5. **Matt Goble, Regional Air Quality Council**: Matt Goble <mgoble@raqc.org>