Funding Your Sustainable Fleet Webinar
Thursday, September 17, 2020

Sustainable Transportation

Presented by The Transportation & Innovation Partners
Sustainable Transportation
A virtual educational series for fleets

Presented by The Transportation & Innovation Partners
Funding Your Sustainable Fleet Webinar

September 17, 2020, 1 p.m.-2 p.m. CDT

Joe Pater
Director, OEI

Olivia Shanahan
Energy Grants Manager, OEI
Wisconsin Office of Energy Innovation

Vision
Securing Wisconsin’s energy future and improving its economy and environment

Mission
The Wisconsin Office of Energy Innovation promotes innovative and effective energy policies and programs that benefit Wisconsin’s citizens and businesses

Values
OEI is committed to:
- Open Communication and Transparency
- Collaboration and Teamwork
- Being Forward Looking and Solutions Oriented
- Building and Maintaining Expert-Level Knowledge
- Economic Viability
2020 Energy Innovation Grant Program (EIGP)

**Strategic Objectives:**
- Support innovative energy technologies such as energy storage and alternative fuel vehicles
- Provide equitable access to the benefits of clean energy, efficiency, and preparedness by reaching broad applicant types
- Incorporate comprehensive energy planning

**Policy Drivers:**
- Reduce carbon emissions and mitigate the effects of climate change
- Promote equity and inclusion
- Stimulate the economy or create jobs

**Eligible Applicants:**
- Municipalities, Universities, Schools, Hospitals, and Like Entities (MUSH Market)
- Manufacturers
# Eligible Activities for EIGP 2020

<table>
<thead>
<tr>
<th>Activity</th>
<th>Maximum Grant Request</th>
<th>Available Funds per Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Renewables and Energy Storage</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Renewable projects (other than Solar Photovoltaic Systems)</td>
<td>See below</td>
<td>$2.5 million</td>
</tr>
<tr>
<td>Solar Photovoltaic Systems</td>
<td>$500,000</td>
<td></td>
</tr>
<tr>
<td>Energy Storage System</td>
<td>$250,000</td>
<td></td>
</tr>
<tr>
<td>Renewable Systems with Energy Storage</td>
<td>$500,000 (Solar PV)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>$750,000 (all other Renewables)</td>
<td></td>
</tr>
<tr>
<td><strong>2. Energy Efficiency and Demand Response</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>$1 million</td>
<td>$3.0 million</td>
</tr>
<tr>
<td><strong>3. Electric and RNG Vehicles and Infrastructure</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Light-Duty and Off-Road Incentive</td>
<td>$100,000</td>
<td>$1.0 million</td>
</tr>
<tr>
<td>Medium-Duty and Heavy-Duty Incentive</td>
<td>$5,000</td>
<td></td>
</tr>
<tr>
<td>Infrastructure (host-owned level 2 electric vehicle charger, fuel cell charger, or RNG infrastructure)</td>
<td>$10,000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>50% up to $2,000</td>
<td></td>
</tr>
<tr>
<td><strong>4. Comprehensive Energy Planning</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>$100,000</td>
<td>$500,000</td>
</tr>
<tr>
<td><strong>Total Funds Available</strong></td>
<td></td>
<td>$7.0 million</td>
</tr>
</tbody>
</table>
Example Project: City of Madison

- $129,000 grant was provided to purchase 20 Chevrolet Bolts (full plug-in Electric vehicle)
- Install two Level 2 EV charging stations in city-owned facilities
- The city of Madison was required to match $10,000
- Chevrolet Bolts can travel 240 miles on a single charge
- 38% of the energy in Wisconsin is consumed by the transportation industry and this grant was aimed towards transforming the fleet and reducing carbon footprint
2020 EIGP: Stay up to date

Timeline:
- September, 2020: Program design finalized by Commission Order (in progress)
- October, 2020: Request for Proposals issued
- January, 2021: Applications due
- Spring 2021: Awards made with the goal of completing projects within 12 month performance period

For Updates:
Subscribe to Docket # 9709-FG-2020 for automatic updates. Visit psc.wi.gov and click “e-subscribe” at the bottom of the screen.
Contact Us!

The Wisconsin Office of Energy Innovation is here to answer questions, meet with constituents, and connect you with our vast network of state and national resources.

Email: OEI@wisconsin.gov
Visit: https://psc.wi.gov/Pages/Programs/OEI.aspx
Mail: Public Service Commission of Wisconsin
Wisconsin Office of Energy Innovation
4822 Madison Yards Way
Madison, WI 53705
FTA Funding Sources for Sustainable Fleets

Matt Lange
Transportation Program Specialist
Region V
September 17, 2020
FTA Discretionary Award Options

- Buses and Bus Facilities Program (5339)
- Low or No Emission Vehicle Program (Low-No)
Discretionary Awards

• Opportunities for FTA award recipients to secure additional funding through competitive processes
• Offered only during certain time periods
• Each discretionary program uses different evaluation criteria, award limits, and other requirements
Buses and Bus Facilities Program

• Makes federal resources available to states and direct recipients to:
  – Replace, rehabilitate and purchase buses and related equipment
  – Construct bus-related facilities including technological changes or innovations to modify low or no emission vehicles or facilities
Buses and Bus Facilities Program

• Over $464 million awarded in FY2020
• Eligible recipients include:
  – Designated recipients that allocate funds to fixed route bus operators
  – States or local governmental entities that operate fixed route bus service
  – Indian tribes
Buses and Bus Facilities Program

• Eligibility (cont.)
  – Eligible recipients that receive grant funding under the formula or discretionary programs may allocate amounts from the grant to subrecipients that are public agencies or private nonprofit organizations engaged in public transportation
Buses and Bus Facilities Program

- **Match:** The federal share of eligible capital costs is 80 percent of the net capital project cost
- **Availability:** Funds are available the year appropriated plus three years
- **Deadline:** Spring (most recently April 29, 2020)
- [www.transit.dot.gov/bus-program](http://www.transit.dot.gov/bus-program)
## Buses and Bus Facilities Program

<table>
<thead>
<tr>
<th>State</th>
<th>Project Sponsor</th>
<th>Project Description</th>
<th>Funding Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>IL</td>
<td>Bloomington-Normal Public Transit System (DBA Connect Transit)</td>
<td>Build the Downtown Bloomington Transportation Center to replace the current on-street bus transfer area</td>
<td>$8,000,000</td>
</tr>
<tr>
<td>IL</td>
<td>Greater Peoria Mass Transit District (CityLink)</td>
<td>Construct a new operations and maintenance facility as well as upgrade existing facilities</td>
<td>$10,000,000</td>
</tr>
<tr>
<td>IL</td>
<td>Pace Suburban Bus Division of the Regional Transportation Authority</td>
<td>Lease a bus storage and maintenance facility until construction is finished on a new facility at the end of 2022.</td>
<td>$850,464</td>
</tr>
<tr>
<td>IN</td>
<td>Bloomington Public Transportation Corporation</td>
<td>Purchase electric buses and charging stations</td>
<td>$3,200,000</td>
</tr>
<tr>
<td>IN</td>
<td>Greater Lafayette Public Transportation Corporation</td>
<td>Expand and upgrade its CNG fueling station</td>
<td>$1,200,000</td>
</tr>
<tr>
<td>MI</td>
<td>City of Battle Creek (Battle Creek Transit)</td>
<td>Purchase buses to replace aging vehicles that have exceeded their useful life</td>
<td>$5,340,000</td>
</tr>
<tr>
<td>MI</td>
<td>Capital Area Transportation Authority (CATA)</td>
<td>Rehabilitate its bus terminal in downtown Lansing</td>
<td>$1,824,416</td>
</tr>
<tr>
<td>MI</td>
<td>Michigan Department of Transportation</td>
<td>Bus facility rehabilitation and expansion projects for four rural transit providers</td>
<td>$2,365,600</td>
</tr>
<tr>
<td>MI</td>
<td>Michigan Department of Transportation</td>
<td>Purchase transit vehicles for rural transit agencies across the state</td>
<td>$4,924,382</td>
</tr>
<tr>
<td>MI</td>
<td>Michigan Department of Transportation</td>
<td>Construction of a new headquarters and transfer station for Bay Area Transportation Authority</td>
<td>$13,380,000</td>
</tr>
</tbody>
</table>
# Buses and Bus Facilities Program

<table>
<thead>
<tr>
<th>State</th>
<th>Project Sponsor</th>
<th>Project Description</th>
<th>Funding Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>MN</td>
<td>Metropolitan Council on behalf of Minnesota Valley Transit Authority (MVTA)</td>
<td>Improve and modernize the Burnsville Bus Garage</td>
<td>$2,800,000</td>
</tr>
<tr>
<td>MN</td>
<td>Minnesota State Department of Transportation</td>
<td>Purchase new buses for rural transit agencies throughout the state</td>
<td>$4,412,890</td>
</tr>
<tr>
<td>OH</td>
<td>Butler County Regional Transit Authority</td>
<td>Purchase new buses to replace aging buses that have exceeded their useful life</td>
<td>$4,324,608</td>
</tr>
<tr>
<td>OH</td>
<td>Greater Dayton Regional Transit Authority</td>
<td>Construct bus storage and maintenance facilities</td>
<td>$2,000,000</td>
</tr>
<tr>
<td>WI</td>
<td>City of Madison</td>
<td>Purchase new 60-foot articulated buses and upgrade a maintenance facility to accommodate the larger buses</td>
<td>$4,676,760</td>
</tr>
<tr>
<td>WI</td>
<td>Milwaukee County</td>
<td>Replace an aging roof that has exceeded its useful life at the maintenance facility</td>
<td>$3,003,628</td>
</tr>
<tr>
<td></td>
<td><strong>Region V (IL, IN, MI, MN, OH, WI) Total</strong></td>
<td></td>
<td><strong>$72,749,490</strong></td>
</tr>
</tbody>
</table>
Low or No Emission Vehicle Program

• Provides funding to state and local governmental authorities for the purchase or lease of:
  – Zero-emission and low-emission transit buses
  – Acquisition, construction, and leasing of required supporting facilities

• Over $130 million awarded in FY2020
Low or No Emission Vehicle Program

• Eligible applicants include:
  – Direct recipients of FTA grants under the Section 5307 Urbanized Area Formula program
  – States
  – Indian Tribes
  – Proposals for funding eligible projects in rural areas must be submitted as part of a consolidated state proposal (excepting Tribes)
  – States and other eligible applicants also may submit consolidated proposals for projects in urbanized areas
Low or No Emission Vehicle Program

• **Match:**
  - The Federal share of the cost of leasing or purchasing a transit bus is not to exceed 85 percent of the total transit bus cost.
  - The federal share in the cost of leasing or acquiring low- or no-emission bus-related equipment and facilities is 90 percent of the net project cost.
Low or No Emission Vehicle Program

- **Availability**: Funds are available the year appropriated plus three years
- **Deadline**: Spring (Most recently April 16, 2020)
- [https://cms7.fta.dot.gov/funding/grants/lowno](https://cms7.fta.dot.gov/funding/grants/lowno) (search “FTA lowno”)
## Low or No Emission Vehicle Program

<table>
<thead>
<tr>
<th>State</th>
<th>Project Sponsor</th>
<th>Project Description</th>
<th>Funding Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>IL</td>
<td>Rock Island County Metropolitan Mass Transit District (MetroLINK)</td>
<td>Purchase new electric buses to replace buses that have exceeded their useful life and to expand service</td>
<td>$2,965,851</td>
</tr>
<tr>
<td>MI</td>
<td>Michigan Department of Transportation</td>
<td>Replace aging diesel buses with zero-emission electric buses and related charging station infrastructure</td>
<td>$6,393,031</td>
</tr>
<tr>
<td>MN</td>
<td>City of Rochester</td>
<td>Purchase new electric buses for service expansion and related charging infrastructure</td>
<td>$3,156,746</td>
</tr>
<tr>
<td>OH</td>
<td>Laketran</td>
<td>Purchase an electric bus with support charging infrastructure</td>
<td>$1,900,000</td>
</tr>
<tr>
<td>WI</td>
<td>City of Racine</td>
<td>Purchase battery electric buses, charging stations and infrastructure upgrades</td>
<td>$3,183,723</td>
</tr>
<tr>
<td></td>
<td><strong>Region V (IL, IN, MI, MN, OH, WI) Total</strong></td>
<td></td>
<td><strong>$17,599,351</strong></td>
</tr>
</tbody>
</table>
FY2020 Timeline

• Notices for both programs were announced in **January** (Low-No) and **February** (5339)
• Deadlines were originally set for **March**
• Selections were announced in **June** (Low-No) and **August** (5339)
Prepare to Apply

• Make sure you are registered at Grants.gov. The registration process can take **several weeks**. The link to register is: www.grants.gov/web/grants/register.html

• It is recommended you submit your application at least 72 hours ahead of the deadline to correct any problems that arise during submission (time allowances are not made for technical problems)
Notices of Funding Opportunity

• [www.transit.dot.gov](http://www.transit.dot.gov) email alerts
• [www.grants.gov](http://www.grants.gov) email alerts
• Technical assistance: [www.n-catt.org](http://www.n-catt.org)
Contact Info

Matt Lange
FTA Region 5
Matthew.Lange@dot.gov
312.353.4118

The contents of this document do not have the force and effect of law and are not meant to bind the public in any way. This document is intended only to provide clarity to the public regarding existing requirements under the law or agency policies. Grantees and subgrantees should refer to FTA’s statutes and regulations for applicable discretionary award requirements.
U.S. Environmental Protection Agency’s Diesel Emission Reduction Program

Funding Your Sustainable Fleet Webinar
September 17, 2020
Frank Acevedo, Mobile Source Program Manager
www.epa.gov/cleandiesel
Diesel Emissions Reduction Act

- Provides funding, on a competitive basis, to eligible entities, to achieve significant reductions in diesel emissions in terms of pollution produced and diesel emissions exposure, particularly from fleets operating in areas designated by the Administrator as poor air quality areas.
Who can apply for DERA Grants?

- Regional, state, local, tribal or port agency with jurisdiction over transportation or air quality; and

- Nonprofit organization or institution which
  - Represents or provides pollution reduction or educational services to persons or organizations that operate diesel fleets; or
  - Has, as its principle purpose, the promotion of transportation or air quality

- For-profits and individuals can benefit through partnerships with eligible entities.
Eligible Vehicles, Engines & Equipment

- May include, but are not limited to:
  - Buses;
  - Class 5 – Class 8 heavy-duty highway vehicles;
  - Marine engines and now vessel replacements;
  - Locomotives engines; and
  - Non-road engines, equipment or vehicles used in:
    - Construction; Handling of cargo (including at a port or airport);
    - Agriculture; Mining; or Energy production (including stationary generators and pumps)
What will EPA Fund?

- **Certified Clean Alternative Fuel Conversion:** 40%
- **Certified Vehicle/Equipment Replacement:**
  - 25% of a vehicle powered by a diesel or alternative fueled engine (including hybrids) certified to EPA emission standards;
  - 35% of a vehicle powered by an engine certified to meet CARB’s Optional Low-NOx Standards;
  - 45% of a vehicle powered by a zero tailpipe emission power source.
- **Replacement of Drayage Trucks:** 50%
- **Certified Engine Replacement:**
  - 40% of a diesel or alternative fueled engine (including hybrids) certified to EPA emission standards
  - 50% of the cost of an engine certified to meet CARB’s Optional Low-NOx Standards
  - 60% of the cost of a zero tailpipe emission power source
- **Verified Idle Reduction Technologies:**
  - **On-Highway Idle Reduction Technologies:** 100% if combined, 25% if stand-alone.
  - **Locomotive Idle Reduction Technologies:** 40%
  - **Marine Shore Connection Systems:** 25%
  - **Electrified Parking Spaces:** 30%
DERA Program Benefits and Accomplishments (FYs 2008-2016)

<table>
<thead>
<tr>
<th>Investment of DERA Program</th>
<th>Emission and Fuel Reductions</th>
</tr>
</thead>
<tbody>
<tr>
<td>$629 million funds awarded</td>
<td>472,700 tons of NO&lt;sub&gt;x&lt;/sub&gt;</td>
</tr>
<tr>
<td>67,300 engines retrofitted or replaced</td>
<td>15,490 tons of PM</td>
</tr>
<tr>
<td>Up to $19 billion in monetized health benefits</td>
<td>17,700 tons of hydrocarbon</td>
</tr>
<tr>
<td>Up to 2,300 fewer premature deaths</td>
<td>61,550 tons of carbon monoxide</td>
</tr>
<tr>
<td>64% of projects targeted to areas with air quality challenges</td>
<td>5,089,170 tons of carbon dioxide</td>
</tr>
<tr>
<td>3:1 leveraging of funds from non-federal sources</td>
<td>454 million gallons of fuel saved</td>
</tr>
</tbody>
</table>
# Clean Diesel = Clean Air

## DERA Successes FY 2008-FY 2016

<table>
<thead>
<tr>
<th><strong>67,300</strong></th>
<th>Engines retrofitted or replaced</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>472,700</strong> tons of NOx and <strong>15,490</strong> tons of PM and <strong>5.1 million</strong> tons of CO₂ prevented</td>
<td></td>
</tr>
<tr>
<td><strong>454</strong></td>
<td>Million gallons of fuel saved</td>
</tr>
<tr>
<td><strong>Over $629 Million</strong></td>
<td>funds awarded</td>
</tr>
</tbody>
</table>

## Reaching Areas of Need

- **64%**
  - 64% of projects targeted to areas with air quality challenges

## Clean Air Benefits

- **$19B**
  - $1 federal aid attracts $3 in non-federal matching funds to provide up to $19 billion in monetized health benefits

Source: 4th DERA Report to Congress
DERA Funded Sectors 2008-2016
EPA funded 26 national competitive grants in FY 2015 to reduce emissions from 479 diesel engines or pieces of equipment for a total of $15.4 million.

EPA funded 21 national competitive grants in FY 2014 for a total of $10.6 million. These grants upgraded 400 engines and vehicles.

EPA funded 35 national competitive grants in FY 2016 for a total of $32.9 million. These grants retrofitted or replaced 966 engines or vehicles.
# R5 State DERA Funding 2020

<table>
<thead>
<tr>
<th>State Agency</th>
<th>EPA Funding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Illinois EPA</td>
<td>$369,441</td>
</tr>
<tr>
<td>Indiana DEM</td>
<td>$521,201</td>
</tr>
<tr>
<td>Michigan EGLE</td>
<td>$359,238</td>
</tr>
<tr>
<td>Minnesota PCA</td>
<td>$515,073</td>
</tr>
<tr>
<td>Ohio EPA</td>
<td>$547,440</td>
</tr>
<tr>
<td>Wisconsin DNR</td>
<td>$517,062</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$2,829,455</strong></td>
</tr>
</tbody>
</table>
## R5 National DERA Funding 2020

<table>
<thead>
<tr>
<th>DERA Competitive (9)</th>
<th>Amount</th>
<th>Location(s)</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>National School Transportation</td>
<td>$632,500</td>
<td>R5 States</td>
<td>10/1/2020</td>
</tr>
<tr>
<td>Leonardo Academy</td>
<td>$314,365</td>
<td>IL, MN</td>
<td>10/1/2020</td>
</tr>
<tr>
<td>Leonardo Academy</td>
<td>$80,678</td>
<td>WI</td>
<td>10/1/2020</td>
</tr>
<tr>
<td>Coalition for Sustainable Initiatives</td>
<td>$631,360</td>
<td>MI, WI</td>
<td>10/1/2020</td>
</tr>
<tr>
<td>Southwest Detroit Environmental Vision</td>
<td>$1,282,426</td>
<td>MI, OH</td>
<td>10/1/2020</td>
</tr>
<tr>
<td>American Lung Association</td>
<td>$1,945,545</td>
<td>IL, IN, OH</td>
<td>10/1/2020</td>
</tr>
<tr>
<td>American Lung Association</td>
<td>$1,904,337</td>
<td>IL</td>
<td>10/1/2020</td>
</tr>
<tr>
<td>Regional Transit Authority</td>
<td>$594,765</td>
<td>IL</td>
<td>10/1/2020</td>
</tr>
<tr>
<td>Chicago Dept of Transportation</td>
<td>$591,360</td>
<td>IL</td>
<td>10/1/2020</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$7,976,336</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
DERA – Moving Forward

- FY2020 School Bus Rebates ~ October 2020
- FY2021 DERA National RFA ~ January 2021
  - Program will continue to prioritize projects related to goods movement and projects in areas of poor air quality
- FY2021 DERA Tribal RFA ~ Spring 2021
- FY2021 DERA State Program ~ March 2021
- FY2021 School Bus Rebates ~ October 2021
National Clean Diesel Campaign
http://www.epa.gov/cleandiesel

EPA Ports Initiative
http://www.epa.gov/ports-initiative

Midwest Clean Diesel Initiative
http://www.epa.gov/midwestcleandiesel

EPA’s SmartWay Transport Partnership
http://www.epa.gov/smartway
Progress to Near-Zero NOx Emissions

Source: U.S. EPA Office of Transportation and Air Quality (OTAQ)
Progress to Near-Zero PM Emissions

Source: U.S. EPA Office of Transportation and Air Quality (OTAQ)
Heavy Duty On-Highway Clean Diesel Progress

Source: U.S. EPA Office of Transportation and Air Quality (OTAQ)
New Diesel Technology in the U.S.

- 75% of all commercial vehicles in the U.S. are diesel-powered.
- 43% powered by newest generation of advanced diesel technology.
- 6.8% increase since last year.

Source: Diesel Technology Forum using July 2019 U.S. Vehicles in Operation Data (Class 5-8 vehicles, Model Year 2010 and newer) provided by NHTSA.
Expanding Investments in New Technology in School Buses

94% of school buses in the U.S. are diesel-powered

46% powered by newest generation of advanced diesel technology

6.5% increase since last year

Source: Diesel Technology Forum using July 2019 U.S. Vehicles in Operations Data (Class 3-4 vehicles, Model Year 2010 and newer) provided by HIS Market
Expanding Investments in New Technology in Transit Buses

84% of transit buses in the U.S. are diesel-powered.

40% powered by newest generation of advanced diesel technology

6.9% increase since last year

Source: Diesel Technology Forum using July 2019 U.S. Vehicles in Operations Data (Class 3-4 vehicles, Model Year 2010 and newer) provided by HIS Market
It would take **60** of today’s clean diesel trucks to equal the emissions from **one truck** sold in 1988.
Large Off-Road Equipment Clean Diesel Progress

Source: U.S. EPA Office of Transportation and Air Quality (OTAQ)
It would take 23 of today’s clean diesel backhoes to equal the emissions from one backhoe sold in 1997.
Locomotive Clean Diesel Progress

Source: U.S. EPA Office of Transportation and Air Quality (OTAQ)
Why Engine Replacement Makes Sense

- By 2020, EPA estimates that only 5% of switch engines in service will be powered by the latest clean diesel engine.
Workboat Clean Diesel Progress

Source: U.S. EPA Office of Transportation and Air Quality (OTAQ)
Why Engine Replacement Makes Sense

By 2020, EPA estimates that only 3% of tug boats in service will be powered by the latest clean technology.

- Replacing 1 of the oldest engines with the newest clean diesel Tier 4 engines removes 96,000 lbs of NOx / Year.
  This is equivalent to replacing 76 older trucks or removing 74,000 cars for 1 year.

Tier 4 = Near Zero Emissions

- 91% Reduction in NOx emissions compared to Oldest Uncontrolled Engines.
- Latest Generation Tier 4 Standard significantly reduces emissions.
Sample Potential Emissions Reductions (Onroad Projects)*

<table>
<thead>
<tr>
<th>Vehicle Type</th>
<th>Baseline NOx (tons/yr)</th>
<th>Potential NOx Reductions (tons/yr)</th>
<th>Percent NOx Reduction (%)</th>
<th>Baseline PM2.5 (tons/yr)</th>
<th>Potential PM2.5 Reductions (tons/yr)</th>
<th>Percent PM2.5 Reduction (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Long Haul – Combination</td>
<td>12.873</td>
<td>9.178</td>
<td>71.3</td>
<td>0.824</td>
<td>0.797</td>
<td>96.8</td>
</tr>
<tr>
<td>Transit Bus</td>
<td>4.864</td>
<td>4.373</td>
<td>89.9</td>
<td>0.171</td>
<td>0.163</td>
<td>95.2</td>
</tr>
<tr>
<td>Short Haul – Combination</td>
<td>3.375</td>
<td>3.034</td>
<td>89.9</td>
<td>0.180</td>
<td>0.176</td>
<td>97.7</td>
</tr>
<tr>
<td>Refuse Hauler</td>
<td>2.417</td>
<td>2.143</td>
<td>88.7</td>
<td>0.184</td>
<td>0.179</td>
<td>97.0</td>
</tr>
<tr>
<td>Long Haul – Single Unit</td>
<td>1.336</td>
<td>1.183</td>
<td>88.6</td>
<td>0.137</td>
<td>0.133</td>
<td>97.6</td>
</tr>
<tr>
<td>Short Haul – Single Unit</td>
<td>1.033</td>
<td>0.926</td>
<td>89.6</td>
<td>0.079</td>
<td>0.078</td>
<td>98.0</td>
</tr>
<tr>
<td>School Bus</td>
<td>0.967</td>
<td>0.866</td>
<td>89.6</td>
<td>0.079</td>
<td>0.078</td>
<td>98.0</td>
</tr>
</tbody>
</table>

*Estimated emission reduction calculations are for comparisons only based on default activity factors by vehicle type.
# Sample Potential Emissions Reductions (Nonroad Projects)

<table>
<thead>
<tr>
<th>Vehicle Type</th>
<th>Baseline NOx (tons/yr)</th>
<th>Potential NOx Reductions (tons/yr)</th>
<th>Percent NOx Reduction (%)</th>
<th>Potential PM2.5 Reduction (tons/yr)</th>
<th>Reduced PM2.5 (tons/yr)</th>
<th>Percent PM2.5 Reduced (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tugboat</td>
<td>54.188</td>
<td>30.29</td>
<td>55.9</td>
<td>1.330</td>
<td>1.000</td>
<td>75.3</td>
</tr>
<tr>
<td>Switcher Locomotive</td>
<td>19.355</td>
<td>14.342</td>
<td>74.1</td>
<td>0.478</td>
<td>0.389</td>
<td>81.4</td>
</tr>
<tr>
<td>Small Tugboat</td>
<td>15.803</td>
<td>8.597</td>
<td>54.4</td>
<td>0.301</td>
<td>0.204</td>
<td>67.8</td>
</tr>
<tr>
<td>Terminal Tractor</td>
<td>5.537</td>
<td>5.144</td>
<td>92.9</td>
<td>0.385</td>
<td>0.372</td>
<td>96.6</td>
</tr>
<tr>
<td>Forklift</td>
<td>3.797</td>
<td>3.568</td>
<td>94.0</td>
<td>0.521</td>
<td>0.514</td>
<td>98.5</td>
</tr>
<tr>
<td>Airport Support Equipment</td>
<td>3.200</td>
<td>2.970</td>
<td>92.8</td>
<td>0.169</td>
<td>0.162</td>
<td>95.5</td>
</tr>
</tbody>
</table>
Benefits of Large Engine Repowers

- Tier 3, Tier 4 engine replacements yield substantial benefits

- Workboat repower is similar to 96 dray truck replacements (30 tons NOx per year)

- Switch locomotive repower is similar to 36 dray truck replacements (9 tons NOx per year)
Questions?

Put your questions in the chatbox and we’ll get to as many as we can!
Upcoming Webinars in Sustainable Transportation

Electric Vehicles
Thursday, September 24 at 1 p.m. CDT

Electric Vehicle Charging Infrastructure
Thursday, October 1 at 1 p.m. CDT

Sustainable Truck & Bus Solutions
Thursday, October 8 at 1 p.m. CDT

Operating & Maintaining Alternative Fuel Vehicles
Thursday, October 15 at 1 p.m. CDT
Join us June 10, 2021 for the Transportation & Innovation Expo!

A sustainable transportation, infrastructure, technology and fleet vehicle conference and expo