

TOOLS TO EXAMINE EMISSIONS AND COSTS OF AFVS



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“AFLEET TOOL” TO ANALYZE AFV COSTS & BENEFITS

- **Examines light-duty & heavy-duty vehicle:**

- Petroleum use
- GHG emissions
- Air pollutant emissions
- Cost of ownership

- **Contains 18 fuel/vehicle technologies**

- Conventional
- Hybrids
- Plug-in electrics
- Alternative fuels: CNG, LNG, LPG, H₂, ethanol, biodiesel, renewable diesel

- **Includes 7 Major Vehicle Types**

- Cost, MPG, & VMT data on 26 vocations

- **Estimates refueling infrastructure costs for each fuel type**

- **AFLEET Tool 2017 & user manual: greet.es.anl.gov/afleet**



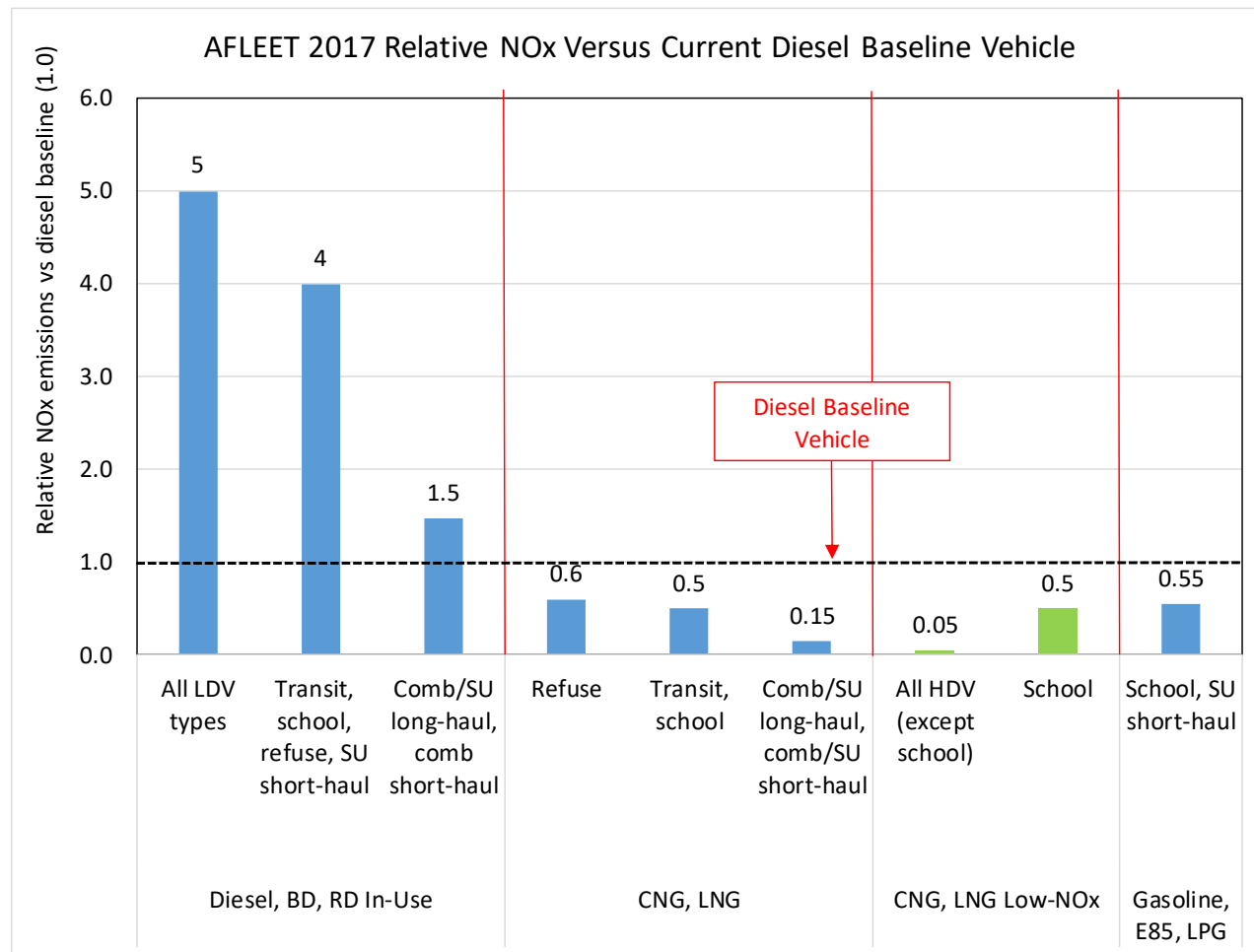
AFLEET TOOL 2017 UPDATES – DIESEL IN-USE EMISSIONS & LOW-NO_x ENGINES

- **Added feature to examine diesel in-use NO_x emission estimates**

- Factors based on Anenberg (2017)
- MOVES needs to revise diesel NO_x

- **Added feature to examine HD NGV Low-NO_x engines**

- Factors based on Cai (2017)





HEAVY-DUTY VEHICLE EMISSIONS CALCULATOR

HEAVY-DUTY VEHICLE EMISSIONS CALCULATOR

- Simple online tool based on AFLEET to help analyze AFVs for funding opportunities
- Examines medium-duty & heavy-duty vehicle:
 - Vehicle operation NO_x & $\text{PM}_{2.5}$
 - WTW GHGs
 - Emission reduction cost effectiveness
- Contains 4 fuel/vehicle technologies:
 - Diesel
 - Electric vehicle
 - Propane
 - Natural Gas
- HDVEC available at:
afleet-web.es.anl.gov/hdv-emissions-calculator/



HDVEC'S CALCULATION METHODS

- **Tool has 3 calculation methods & which to use depends on project type**
- **Environmental Mitigation w/ Scrappage**
 - New AFV vs. new diesel, plus additional benefit from early retirement of scrapped vehicle
- **Environmental Mitigation w/ Repower**
 - Vehicle after repower vs. diesel vehicle before repower
- **Clean Vehicle Replacement**
 - New AFV vs. new diesel





HEAVY-DUTY VEHICLE EMISSIONS CALCULATOR

About

Vehicle Options

Results

HEAVY-DUTY VEHICLE EMISSIONS CALCULATOR

The Heavy-Duty Vehicle Emissions Calculator was developed to estimate the vehicle operation nitrogen oxide (NO_x) and particulate matter (PM_{2.5}), as well as the well-to-wheel greenhouse gas emissions (GHGs) of commercially available alternative fuel medium- and heavy-duty vehicles. This tool is ideally suited to aid fleets and decision makers compare vehicle technologies for emission reductions and consider allocation of funding.

The tool can calculate results for 3 project types:

- **Environmental Mitigation w/ Scrappage**
 - New alternative fuel versus new diesel, plus additional benefit from early retirement of scrapped vehicle.
- **Environmental Mitigation w/ Repower**
 - Vehicle after repower versus diesel vehicle before repower.
- **Clean Vehicle Replacement**
 - New alternative fuel versus new diesel.

The first two are specifically for environmental mitigation projects such as those funded under the *Clean Diesel Settlement* or the *Diesel Emission Reduction Program*, while the third provides results without the scrappage benefit. The Heavy-Duty Vehicle Emissions Calculator was developed using the AFLEET Tool 2017, available at: <https://greet.es.anl.gov/afleet>. AFLEET Tool 2017 uses emissions data from both the EPA's MOVES and Argonne's GREET models.

Get Started

Vehicle Options

Vehicle Type

School Bus

Number of Vehicles

10

Model Year of Repowered Vehicle

2006

Estimate Lifetime of New Vehicle (Years)

5

Annual Miles of New Vehicle

15000

Funding Options

Diesel Funding Requested

\$ 50000



Electric Funding Requested

\$ 150000



Natural Gas Funding Requested

\$ 75000

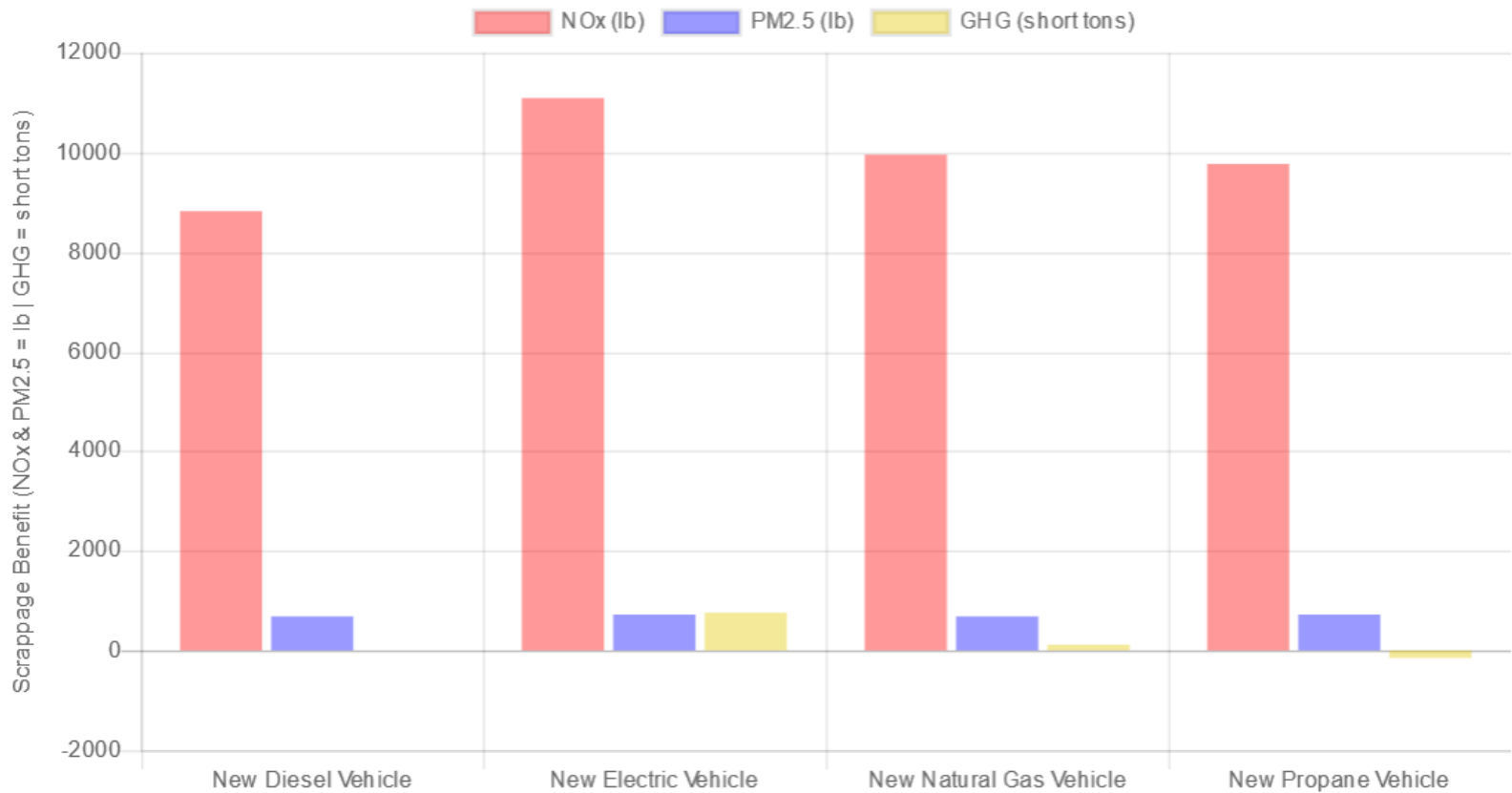


Propane Funding Requested

\$ 60000



Scrappage Emission Reduction Benefit



New Vehicle Emission Benefits ?

Pollutant	Diesel	Electric	Natural Gas	Propane
NO _x (lb)	8,824.23	11,073.59	9,948.91	9,767.45
PM _{2.5} (lb)	701.40	737.12	701.40	707.72
GHG (short tons)	0.00	755.61	105.72	-130.05

DIESEL IN-USE & LOW NO_x OPTIONS IMPACT RESULTS

- Transit bus results: diesel in-use or low-NO_x options not selected

New Vehicle Emission Benefits [?](#)

Pollutant	Diesel	Electric	Natural Gas	Propane
NO _x (lb)	32,521.53	44,946.50	38,734.02	N/A

- Transit bus results: diesel in-use or low-NO_x options selected

New Vehicle Emission Benefits [?](#)

Pollutant	Diesel	Electric	Natural Gas	Propane
NO _x (lb)	21,195.41	70,895.28	70,274.03	N/A

SUMMARY

- **AFLEET Tool estimates NO_x as well as other economic and environmental costs and benefits of AFVs**
 - Still the standard tool for examining all AFV types, environmental impacts, and economic impacts
- **Argonne's HDVEC estimates NO_x, PM_{2.5}, and GHGs and cost effectiveness of med- & heavy-duty vehicles for funding opportunities**
 - Easy to use, online interface
- **HDVEC based on the AFLEET Tool emissions, calculations and data**
 - Includes 4 fuels: diesel, electricity, propane & NG
- **HDVEC Includes 3 calculations options for different projects**
 - Environmental Mitigation w/ Scrappage
 - Environmental Mitigation w/ Repower
 - Clean Vehicle Replacement

THANK YOU!!!

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