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Natural Gas Vehicles for America

NGVAmerica Volkswagen Settlement Webinar

July 19, 2018

Agenda

- ✓ Welcome from NGVAmerica President, Dan Gage
- ✓ Update on state activities related to VW Settlement
- ✓ State VW grant programs and sample project
- ✓ Argonne National Laboratory's HDVEC tool and its use for VW projects
- ✓ Q&A

About NGVAmerica

NGVAmerica is the national organization dedicated to the development of a growing, profitable, and sustainable marketplace for vehicles powered by natural gas and biomethane and for promoting the use of more natural gas in transportation… trucks, trash, transit, and even off-road uses like HHP marine, rail, and construction/mining applications.

200+

NGVAmerica represents 200+ companies, LDCs, fleets, OEMS, environmental and government organizations.

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NGVAmerica Members

Value for NGVAmerica Members

- **Advocacy on policy and regulations that impact NGVs & NG in transport**
  - Federal & state – legislation, regulations, various government agencies
- **Leadership on key technology & safety issues**
  - Modernization of codes & standards, safety/best practices & technical barriers
  - Collaboration with government & industry
  - Incident investigations & cause analysis
  - Ten work groups led by members to address industry priorities
- **Voice of a strong industry**
  - Communicating the value of NGVs
  - Analysis, credible data & case studies
  - Convening industry leaders
  - One-on-one member support

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Join us as a Member!

Visit: www.ngvamerica.org/sign-up/

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Natural Gas Vehicles for America

Status of State VW Plans

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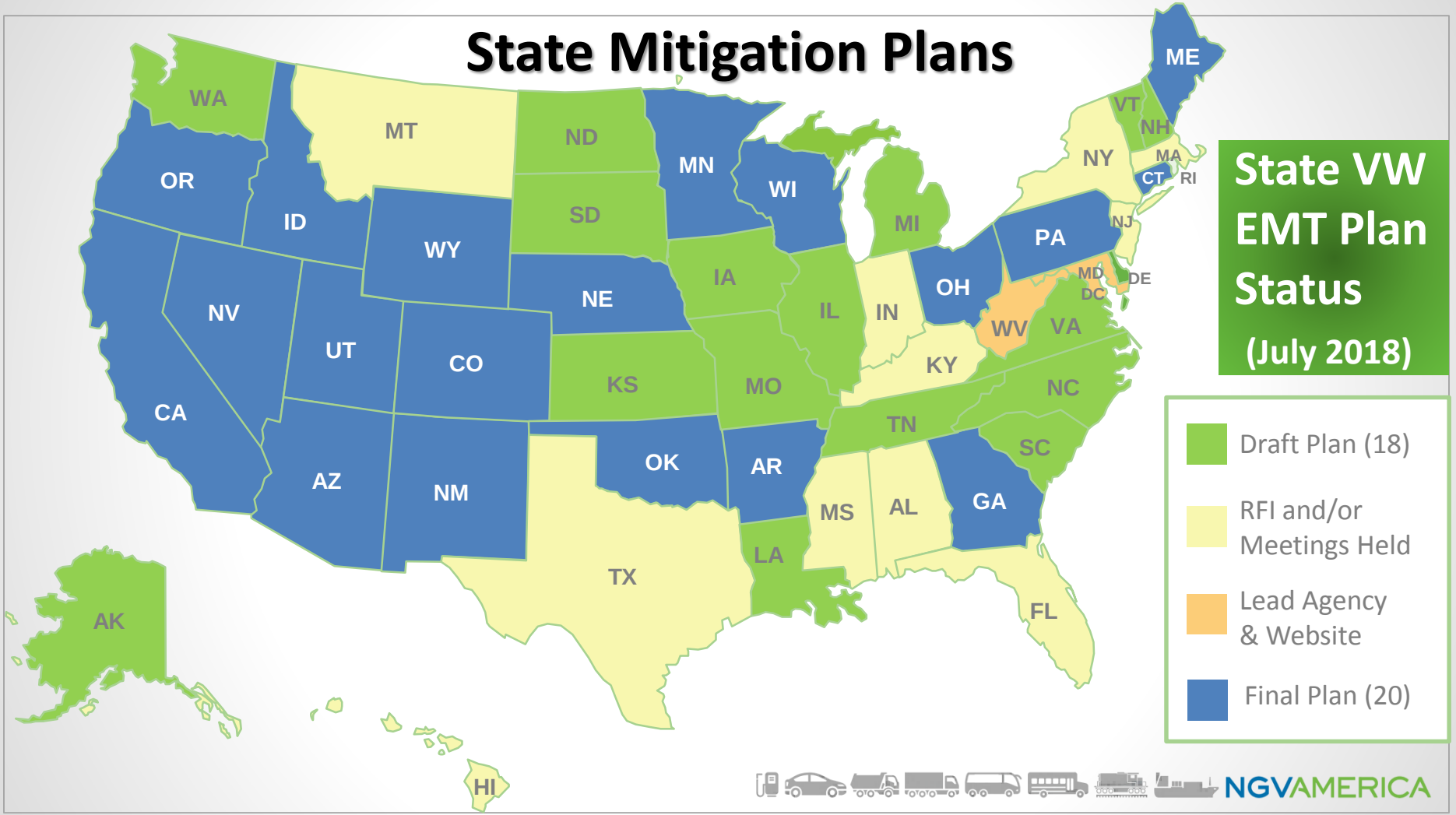
NGVAmerica VW Plan Priorities

- ✓ Fund ***alternative fuel*** vehicle projects that focus on maximizing NOx reduction for the funds spent
- ✓ Provide larger incentives for engines that **deliver greater NOx reductions than currently required**
- ✓ Target funding for technologies that deliver **lower in-use emissions**
- ✓ Fund **commercially available** products that are ready for use
- ✓ Prioritize funding for **clean vehicles rather than fueling infrastructure**
- ✓ **Scale funding** to incentivize the cleanest engines available
- ✓ Incentivize adoption by both **public and private fleets**
- ✓ Prioritize projects that **provide a match**
- ✓ **Accelerate the funding** to maximize the NOx reduction benefits
- ✓ Use vehicles emissions measurement tools that reflect current technologies & actual performance – **AFLEET and HDVEC tools**

State Mitigation Plans



State VW EMT Plan Status (July 2018)

- Draft Plan (18)
- RFI and/or Meetings Held
- Lead Agency & Website
- Final Plan (20)

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State VW Plan Trends

- ✓ Most states have high-level goal of funding the projects that **reduce the most NOx for the funds spent**
- ✓ Most states allow all approved **alternative fuel vehicles**
- ✓ Many states have not designated the **percentages for vehicle funding** – will decide based on the project description, match, leveraged aspects, etc.
- ✓ Several states are prioritizing funding for **government vehicles**
- ✓ Most states will at least match their normal **DERA funding**
- ✓ Some states are beginning to recognize that they need to use the Argonne Lab **Heavy Duty Vehicle Emissions Calculator** (HDVEC – based on the revised AFLEET tool) instead of the outdated EPA Diesel Emission Quantifier (DEQ) tool
- ✓ Most States have opted to fund the 15% EV **Light Duty Charging Option**

Sample State Plan Components

Project Type	AR $14.6M	CO $68.7M	CT $55.7M	DC $8.1M	DE $9.6M	GA $63.6M	ID $17.3M	ME $21M	MI $64.8M	NE $12.2M	NV $24.8M	OH $75.3M	OR $72.9M	PA $118.5M	VT $18.7M	VA $93.6M	WA $112.7M
On-Road	85%	52.50%		53%		100% EV/D Transit	35%	25%		35%		45-50%	25% School Bus	20-40%	43%		≤ 45%
Non-Road							20%	40%				25-25%		35-55%	31% Includes DERA		≤ 5% Equip ≤ 5% RR ≤ 45% Mar
DERA		7.50%		38% D-Freight Switchers			15%	20%	4%	25%	5%			0-20%	11% (RR / Mar)		≤ 5%
Flex Funds		17.50%	85%		85%				72% DERA Type	25%	80%		75%			85%	
EV Light Duty Charging	15%	15%	15%		15%		15%	15%	14%	10%	15%	20-22% Includes Shore Power		15%	15%	15%	15%
Administration		7.50%		9%			15%		10%	5%		6-8%		15%			

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State VW Settlement Grant Programs

✓ **CONNECTICUT** (Funding Opportunity Deadline – July 31, 2018)

DEEP Announces $7.5M in VW Environmental Mitigation Funding: Grants to fund the replacement or repower of older, dirtier diesel vehicles and engines as described in the VW Trust. Grants are eligible to both non-government and government entities.

✓ **MINNESOTA** (Funding Opportunity Deadline – July 19, 2018)

MPCA Funding Announcement $2.1 Million Grant Opportunity: The Minnesota VW Settlement Diesel Replacement Program RFP provides grants of $15,000 or $20,000 to school bus owners or their representatives around the state to replace old diesel school buses with new diesel, natural gas, propane or electric school buses. Grants will be awarded based on selection criteria that include emissions reduction, cost effectiveness, health effects, and environmental justice ramifications.

✓ **NEVADA** (Funding Opportunity Deadline – July 31, 2018)

Funding Announcement up to $11 Million Grant Opportunity: The DEP has indicated that fleets seeking Volkswagen Environmental Mitigation Trust Fund monies from Nevada will need to complete and submit the application form. Applicable vehicles and engines generally follow the VW Trust designations.

State VW Settlement Grant Programs

✓ NEW MEXICO – (Funding Opportunity Deadline – September 14, 2018)

Funding Opportunity: The NMED has announced that it is now accepting applications for projects relating to the Volkswagen Settlement Agreement. Qualifying projects must demonstrate a reduction in NOx, and meet the criteria outlined in the Settlement Agreement. The NMED requires that all applicants use the Argonne National Laboratory's Heavy-Duty Vehicle Emissions Calculator found at: https://afleet-web.es.anl.gov/hdv-emissions-calculator/.

✓ OHIO (Funding Opportunity Deadline – August 3, 2018)

EPA Funding Opportunity - $15M: Applications are open for funding from the new Diesel Mitigation Trust Fund (DMTF) for replacement or repower of medium and heavy duty on-road and off-road vehicles. The EPA website indicates that owners of eligible medium and heavy diesel fleets in 26 Ohio priority counties are invited to apply for grants to repower or replace diesel vehicles and equipment with new clean diesel or alternative fuel (CNG, LNG, propane, diesel electric hybrid) or all-electric vehicles and equipment. A total of $15 million is available for grant awards between $50,000 and $2 million. All projects require a minimum match of 25 percent, with larger matches required for some project categories.

✓ PENNSYLVANIA (Funding Opportunity Deadline – July 19, 2018)

VW Funding Notice/Opportunity: A new initiative undertaken by the state named, *Driving PA Forward*, provides information on the timing of future funding announcements and indicates that the first projects to be awarded funding will be eligible actions under the $8.9 million DERA Program.

Sample Project

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Typical Project Application Data

- ✓ **Recipient Information**
  - Organization
  - Name / Title
  - Address / Email / Phone

- ✓ **Project Information**
  - Target Fleet / # of Vehicles
  - Location of Vehicles
  - Funding Amount Requested
  - Additional Funding Source/Amount
  - Project Leverage
    - (station availability, etc.)
  - Estimated Emissions Reductions
  - Other Benefits from Project

- ✓ **Current Vehicle Information**
  - Eligible Mitigation Action
  - Class/Equipment
  - Make, Model Year
  - Fuel Type / MPG
  - Annual Miles/Vehicle
  - Operation Hours/Vehicle

- ✓ **New Vehicle/Technology Information**
  - Year of Action
  - Class/Equipment Make, MY, Fuel Type
  - Serial or VIN Number
  - Emissions Reductions per Vehicle or Engine
  - Cost per Vehicle or Engine

Short/Regional Haul Truck Comparison – 100% Funding Scenario

Natural Gas

Technology Cost $150,000

NOx Reduced 5,582 lbs

Electric

Technology Cost $290,000

NOx Reduced 5,715 lbs

Diesel

Technology Cost $100,000

NOx Reduced 1,716 lbs

Data Source: Emission comparisons based on ANL - HDVEC tool with low-NOx engines and higher in-use diesel emissions taken into account. Useful life, cost and mileage vary by applications. Additional details available from NGVA upon request.

Dollar-for-Dollar, NGVs Deliver the Largest & Most Cost-Effective NOx Emissions Reductions

Class 8 Truck Sample Project

Target Fleet / # of Vehicles	Regional goods hauling / 10 trucks
Vehicle Class, Make, Model Year	Class 8 / Cummins Westport Inc. / 2018 MY
Fuel Type / MPG / Annual Miles	CNG / 6.7 mpg / 80,000 annual miles
Location of Vehicles	In the state / non-attainment? disadvantaged? sensitive?
Funding Amount Requested	$375,000
Additional Funding Source/Amount	Fleet 2018 Budget / $1,125,000
Project Leverage (station availability, etc.)	CNG station on route / CNG station to be built station will provide fueling for other vehicles?
Estimated Emissions Reductions	Reduces: 27.9 tons NOx / 1,804 tons CO2e / 49.4 PM
Cost per Vehicle	NG Truck Cost: $150,000
Other Benefits from Project	Quieter / American fuel / economic (lower price of fuel) / creates jobs (producing fuel and for the NGV industry / other local benefits

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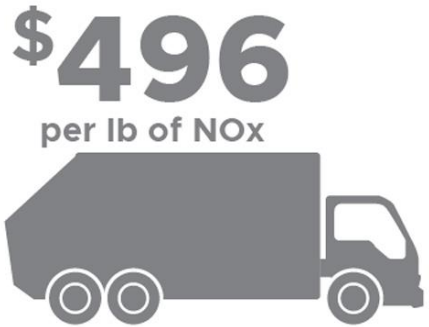
Refuse Comparison – 100% Funding Scenario

Natural Gas

Technology Cost $300,000
NOx Reduced 4,375 lbs

Electric

Technology Cost $670,000
NOx Reduced 4,423 lbs



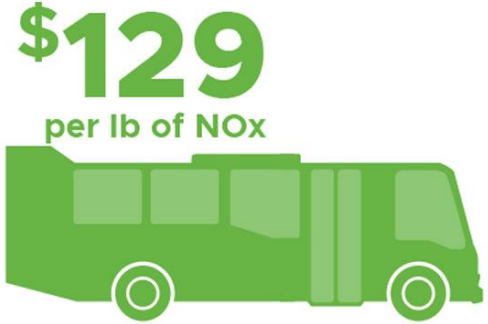
Diesel

Technology Cost $270,000
NOx Reduced 544 lbs

Data Source: Emission comparisons based on ANL - HDVEC tool with low-NOx engines and higher in-use diesel emissions taken into account. Useful life, cost and mileage vary by applications. Additional details available from NGVA upon request.

Dollar-for-Dollar, NGVs Deliver the Largest & Most Cost-Effective NOx Emissions Reductions

Transit Comparison – 100% Funding Scenario



Natural Gas

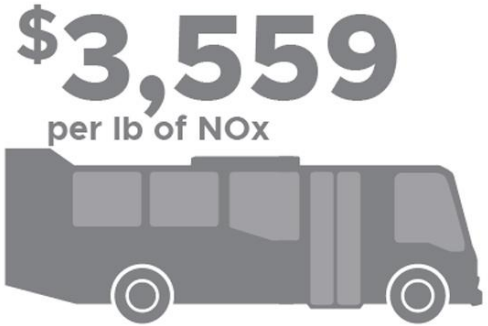
Technology Cost $526,500

NOx Reduced 4,078 lbs

Electric

Technology Cost $836,330

NOx Reduced 4,128 lbs



Diesel

Technology Cost $477,775

NOx Reduced 134 lbs

Data Source: Emission comparisons based on ANL - HDVEC tool with low-NOx engines and higher in-use diesel emissions taken into account. Useful life, cost and mileage vary by applications. Additional details available from NGVA upon request.

Dollar-for-Dollar, NGVs Deliver the Largest & Most Cost-Effective NOx Emissions Reductions

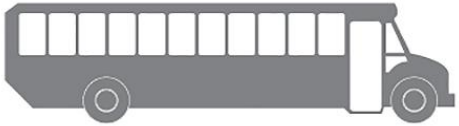
Type-C Bus Comparison – 100% Funding Scenario

$90
per lb of NOx

Natural Gas

Technology Cost $125,000
NOx Reduced 1,391 lbs

$190
per lb of NOx



Electric

Technology Cost $300,000
NOx Reduced 1,583 lbs

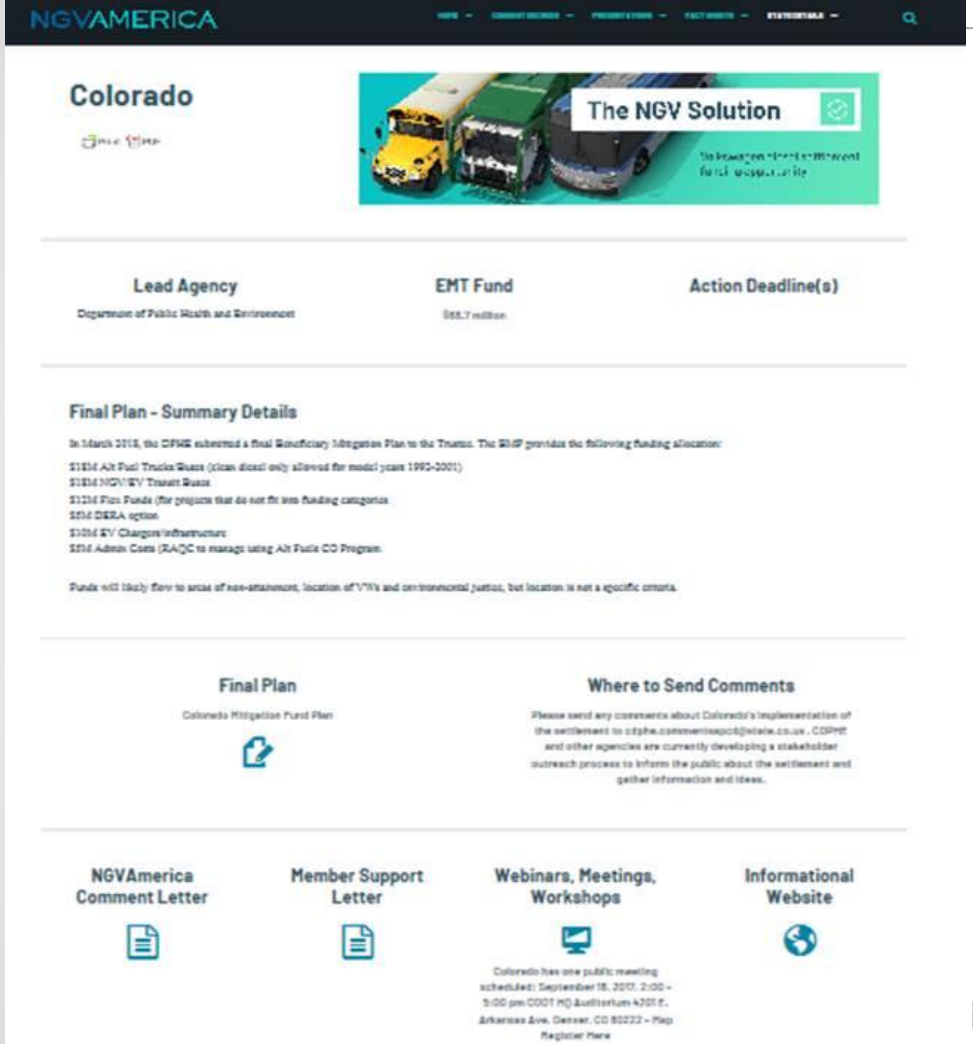
$1,764
per lb of NOx

Diesel

Technology Cost $100,000
NOx Reduced 57 lbs

Data Source: Emission comparisons based on ANL - HDVEC tool with low-NOx engines and higher in-use diesel emissions taken into account. Useful life, cost and mileage vary by applications. Additional details available from NGVA upon request.

Dollar-for-Dollar, NGVs Deliver the Largest & Most Cost-Effective NOx Emissions Reductions



NGVAmerica VW Trust Action Center

(NGVAmerica.org/vw-trust-action-center)

- ✓ Consent Decrees
- ✓ Presentations
- ✓ Fact Sheets
- ✓ HDVEC Tool Access
- ✓ State Details
  - Lead Agency / Actions
  - Plans & Summaries
  - NGVA Submissions

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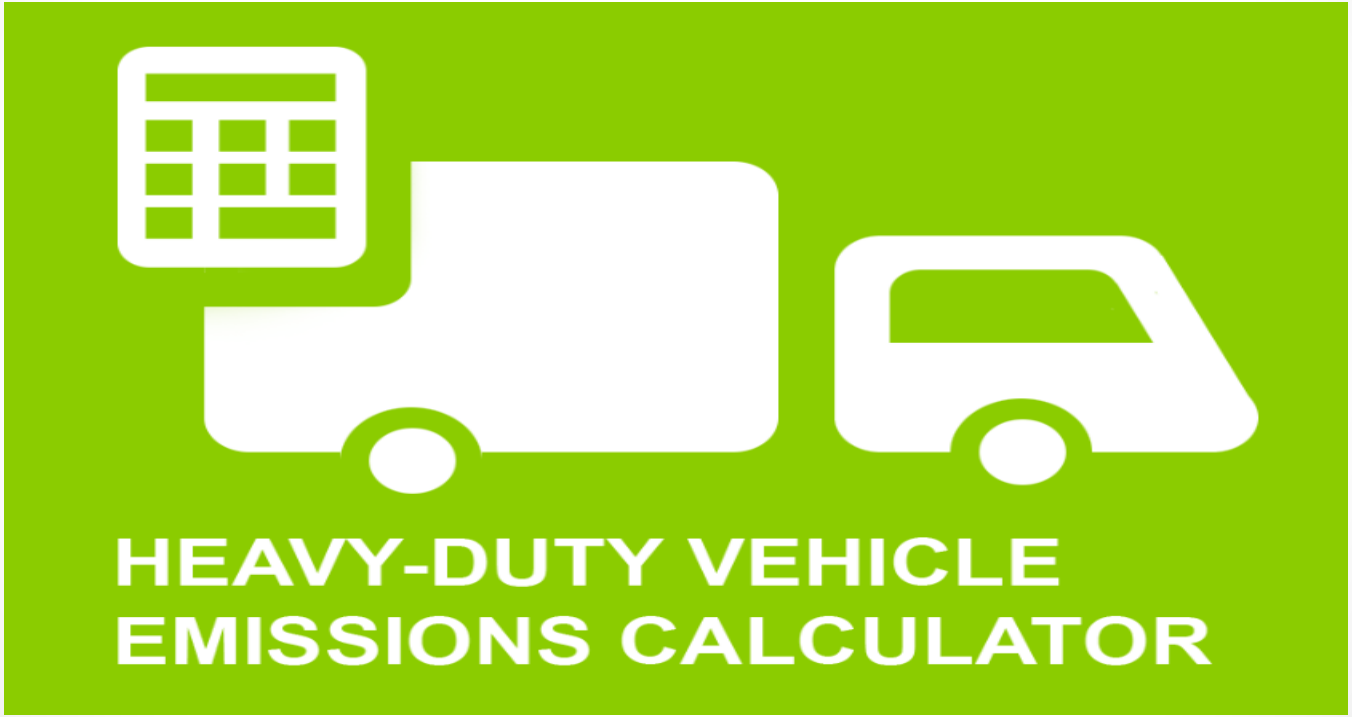
Argonne National Laboratory (ANL)

HDVEC Tool



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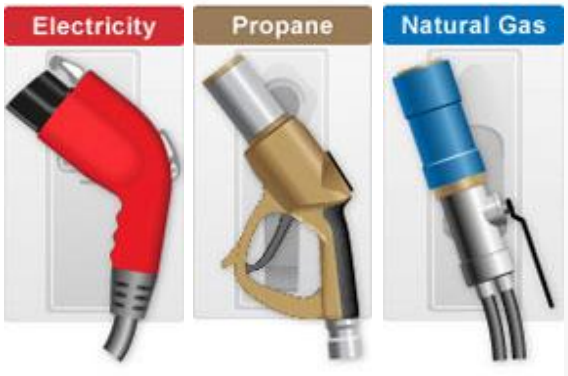
Heavy-Duty Vehicle Emissions Calculator

- Simple online tool based on AFLEET to help analyze AFVs for funding opportunities
- Examines medium-duty & heavy-duty vehicle:
  - Vehicle operation NO_x & $PM_{2.5}$
  - WTW GHGs
  - Emission reduction cost effectiveness
- Contains 4 fuel/vehicle technologies:
  - Diesel
  - Electric vehicle
  - Propane
  - Natural Gas
- HDVEC available at:

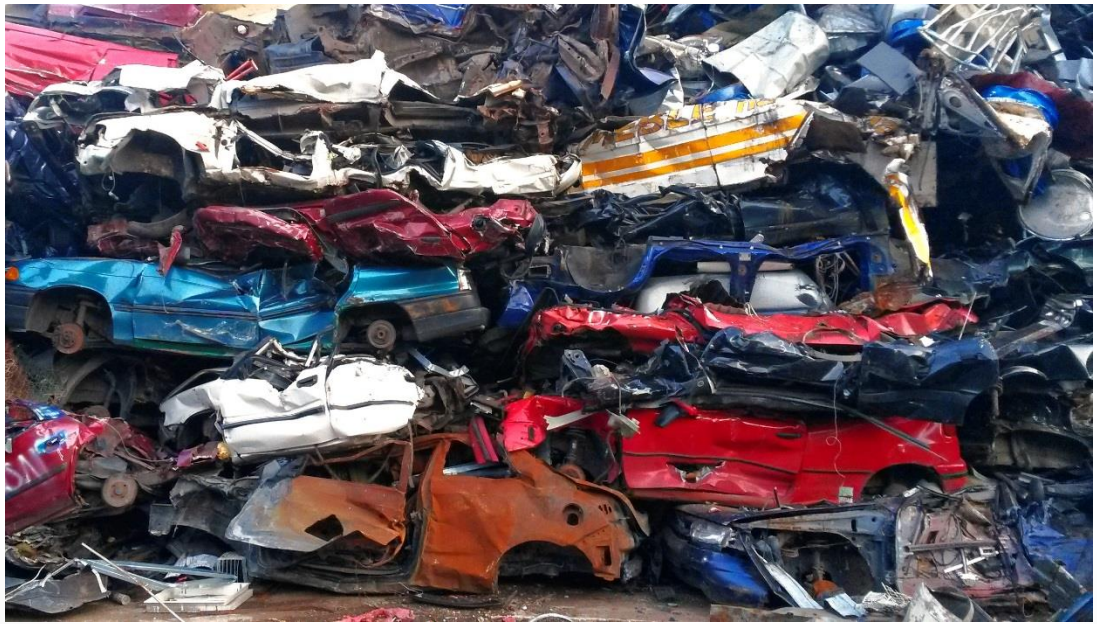
  afleet-web.es.anl.gov/hdv-emissions-calculator/



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

HDVEC Tutorial - Demo #1 - Environmental Mitigation w/ Scrappage



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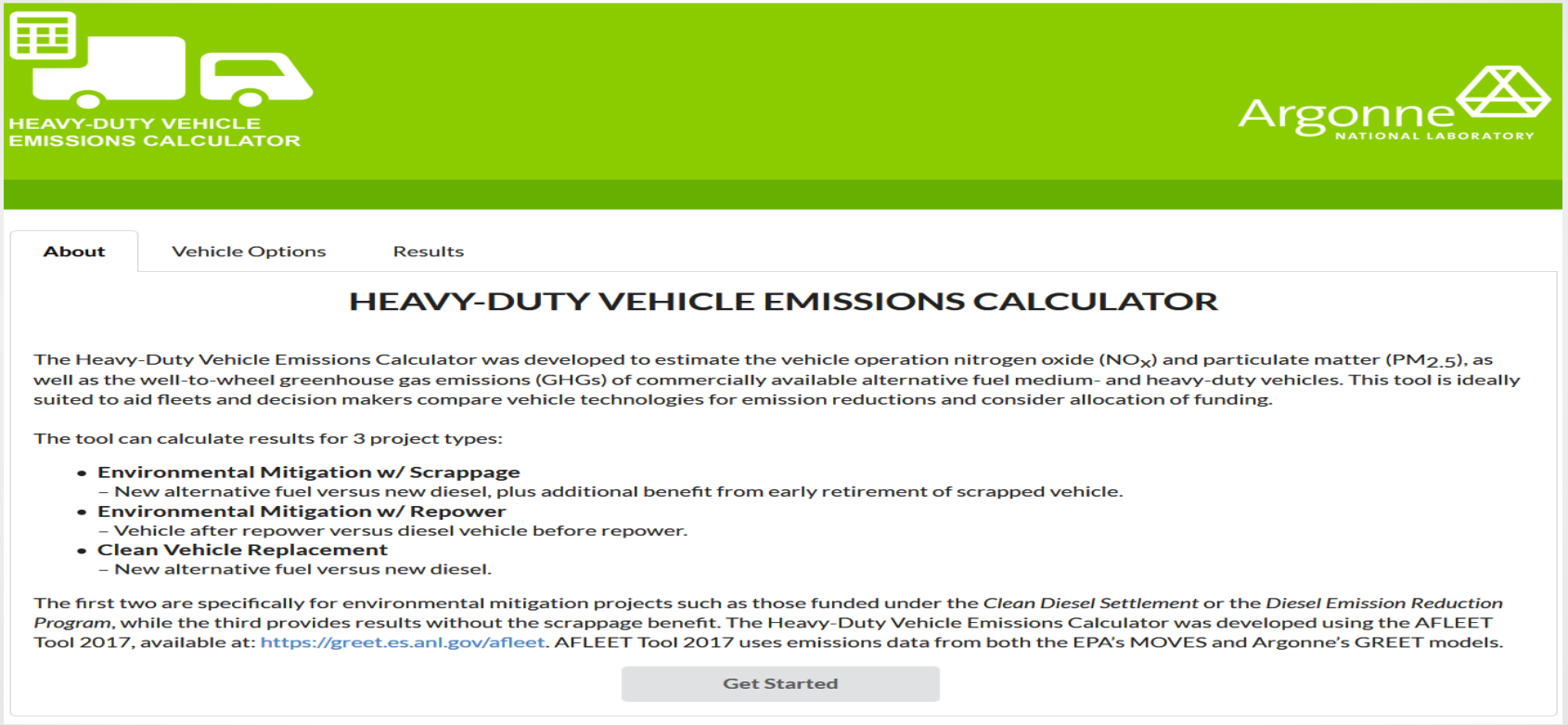
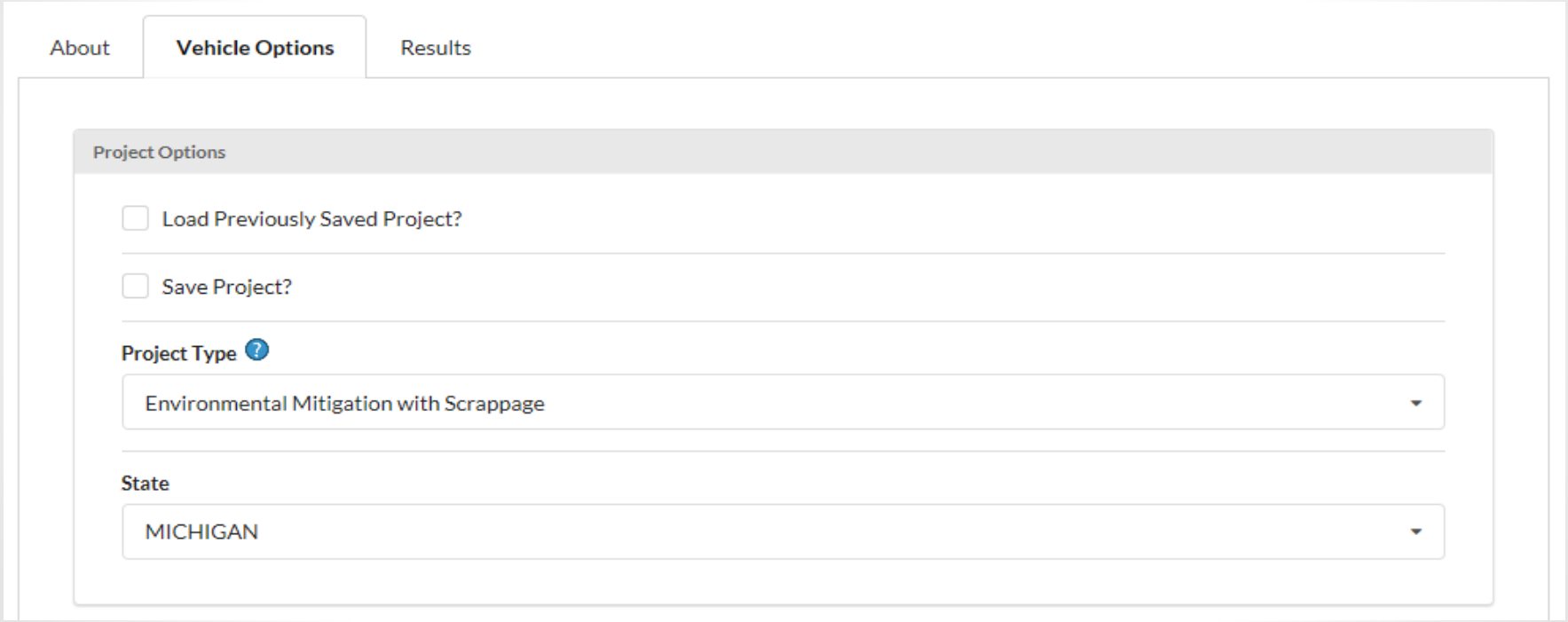
HDVEC Tutorial - Environmental Mitigation w/ Scrappage

- **3 tabs: About, Vehicle Options, & Results**



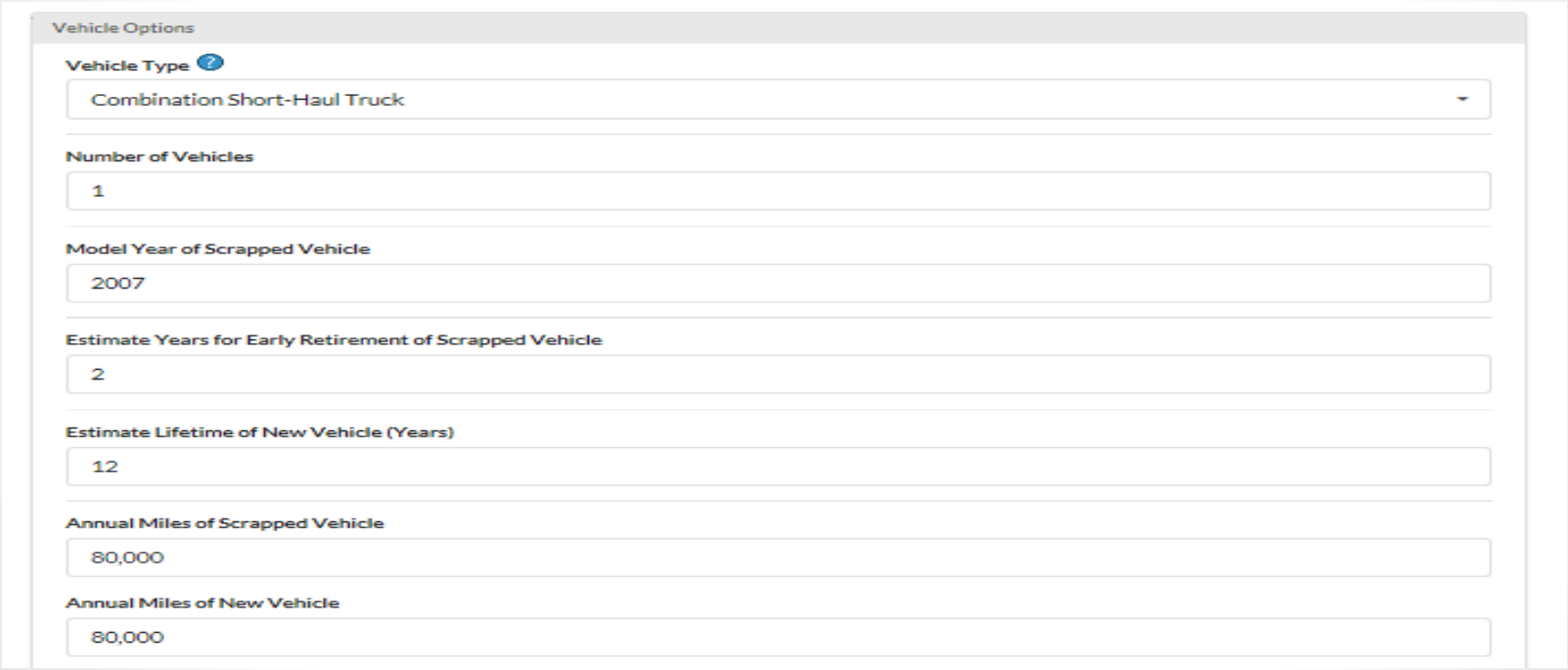
HDVEC Tutorial - Environmental Mitigation w/ Scrappage

- 1st step: on “Vehicle Options” enter project type and state



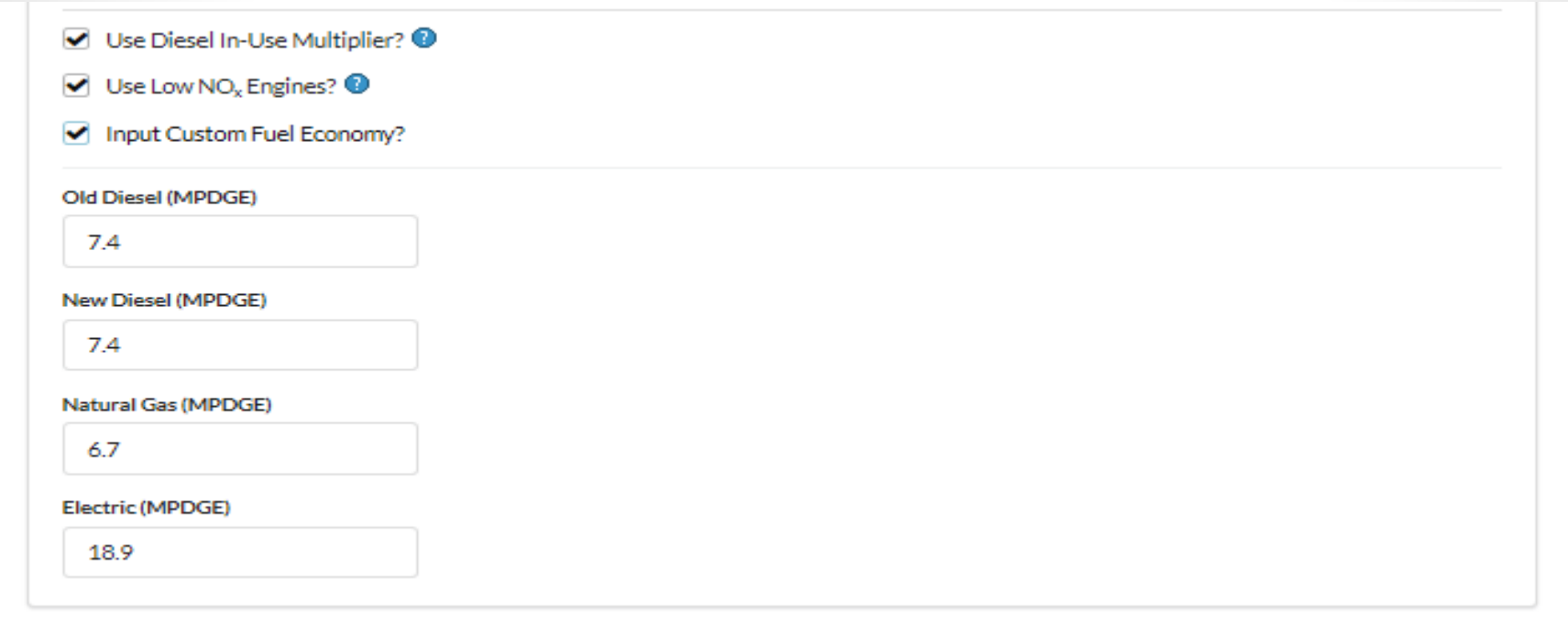
HDVEC Tutorial - Environmental Mitigation w/ Scrappage

- 2nd step: enter vehicle type, # of vehicles, MY of scrapped vehicle, years of early retirement, new vehicle lifetime, and VMT



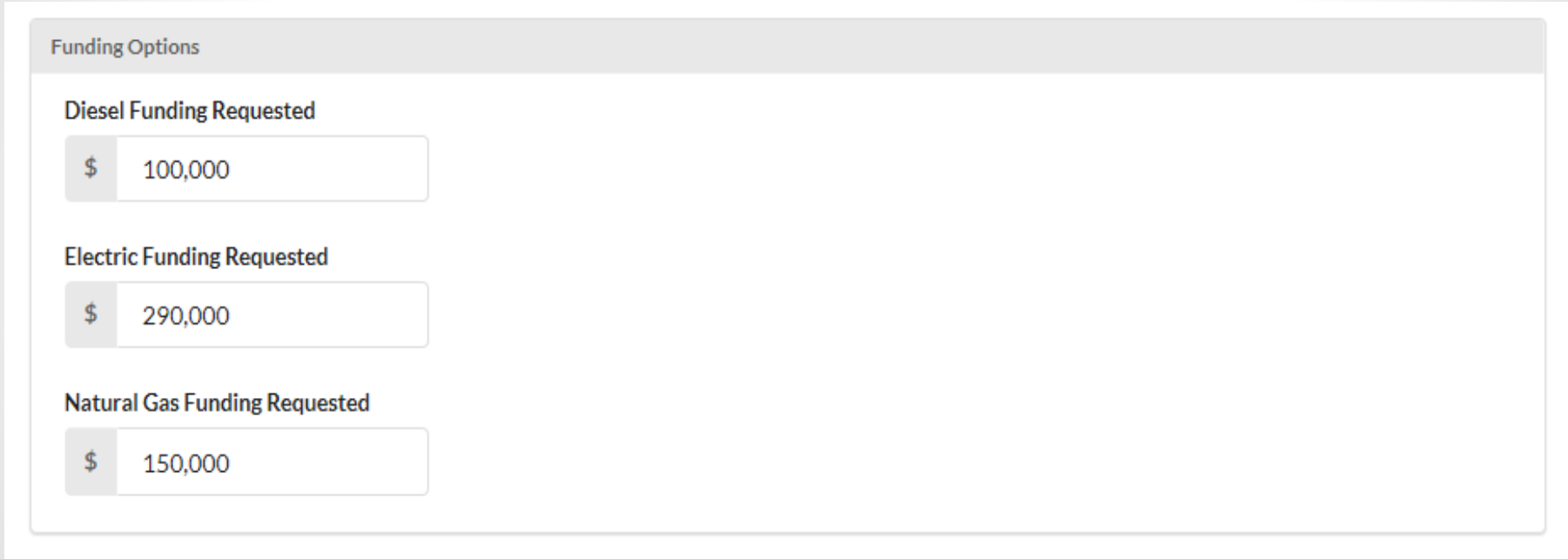
HDVEC Tutorial - Environmental Mitigation w/ Scrappage

- Optional: use diesel in-use multiplier, low NOx engines, custom fuel economy data



HDVEC Tutorial - Environmental Mitigation w/ Scrappage

- 4th step: enter funding requested (for cost effectiveness)



HDVEC Tutorial - Environmental Mitigation w/ Scrappage

- 5th step: enter NG feedstock and EV source (default = state selected) and click "Calculate Results"

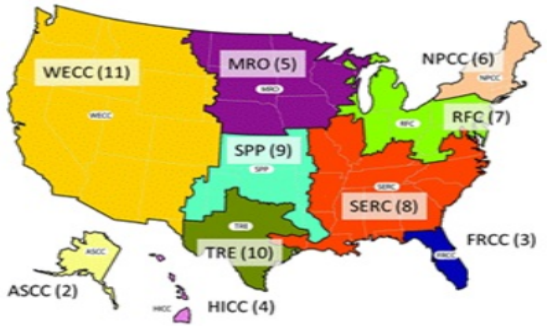
Fuel Options

Natural Gas (NG) Feedstock Source

North American NG

Source of Electricity - Electric Vehicles (EV)

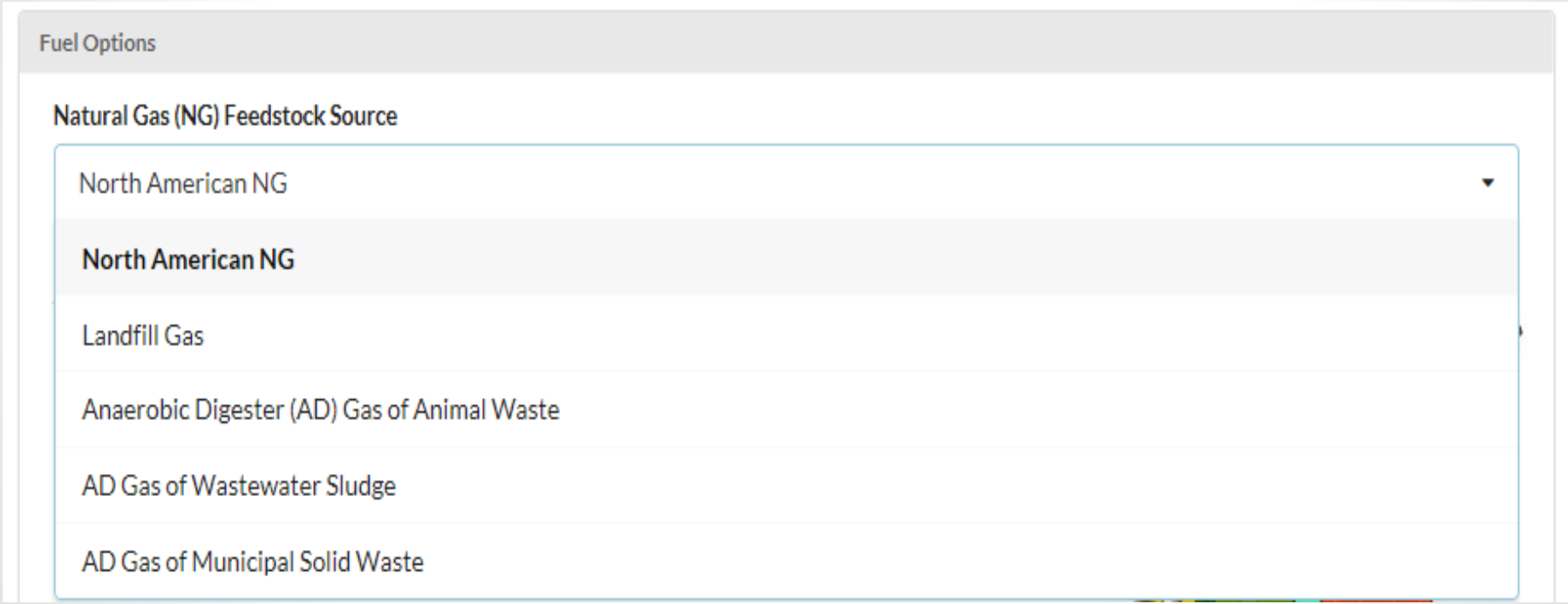
RFC



Calculate Results

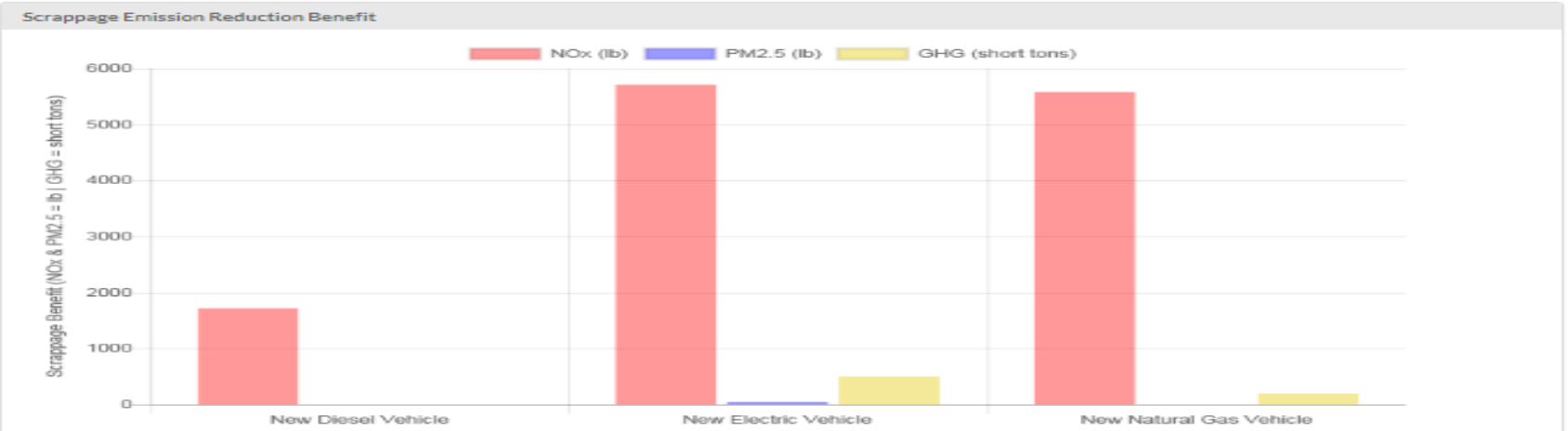
HDVEC Tutorial - Environmental Mitigation w/ Scrappage

- Optional: enter custom electricity mix or NG Feedstock Sources



HDVEC Tutorial - Environmental Mitigation w/ Scrappage

- Results: emission benefits (higher value = more reduction)

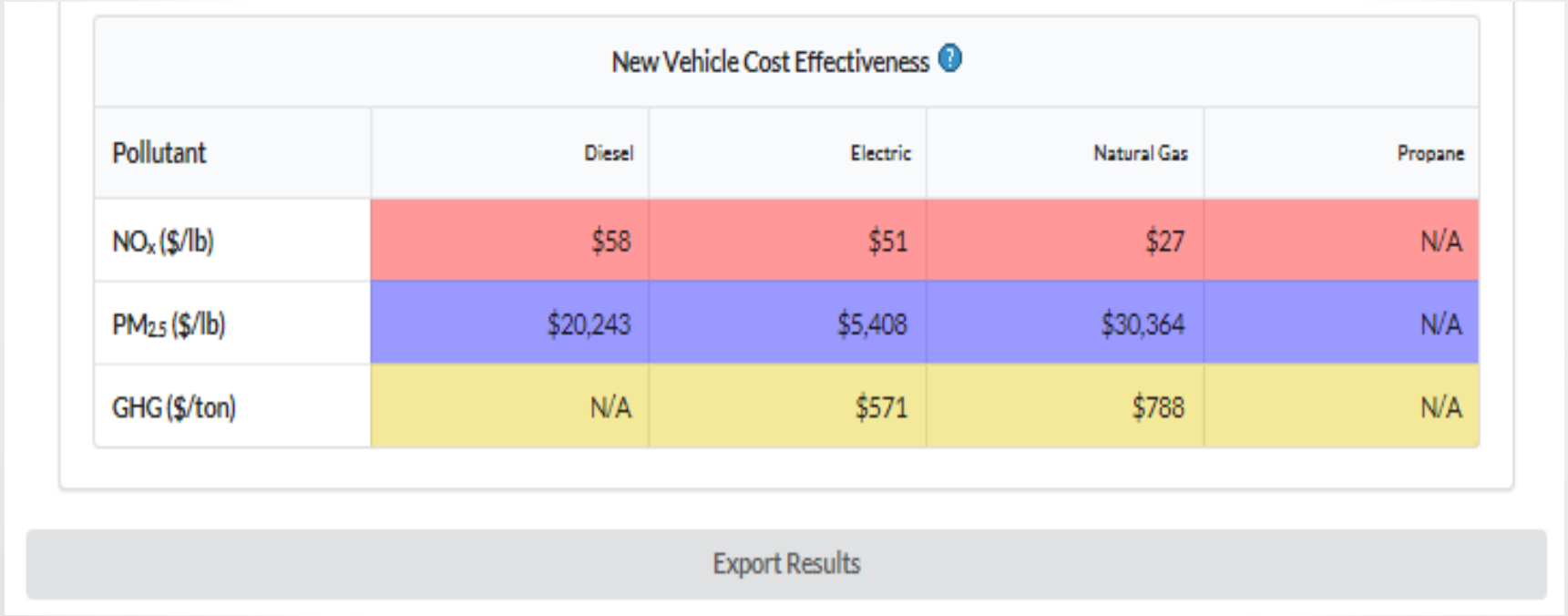


New Vehicle Emission Benefits

Pollutant	Diesel	Electric	Natural Gas	Propane
NO_x (lb)	1,716.43	5,714.86	5,581.58	N/A
$PM_{2.5}$ (lb)	4.94	53.62	4.94	N/A
GHG (short tons)	0.00	507.71	190.34	N/A

HDVEC Tutorial - Environmental Mitigation w/ Scrappage

- Results: cost effectiveness (lower value = more cost effective) & Optional: export results to Excel



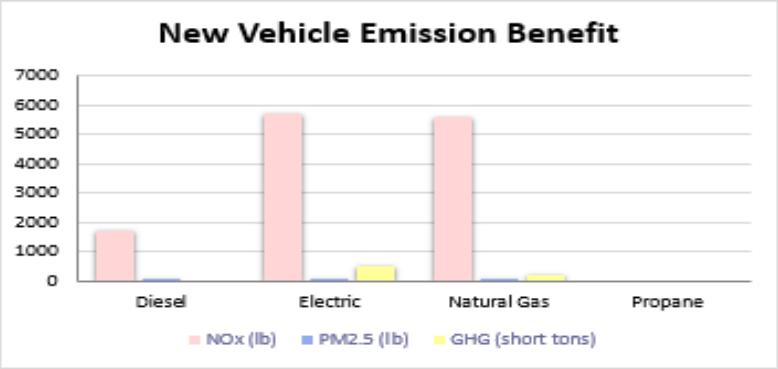
New Vehicle Cost Effectiveness

Pollutant	Diesel	Electric	Natural Gas	Propane
NO_x ($/lb)	$58	$51	$27	N/A
$PM_{2.5}$ ($/lb)	$20,243	$5,408	$30,364	N/A
GHG ($/ton)	N/A	$571	$788	N/A

Export Results

HDVEC Tutorial - Environmental Mitigation w/ Scrappage

- Optional: export to Excel 3 sheets Results, Inputs, Emissions



New Vehicle Emission Benefits				
Pollutant	**Diesel**	**Electric**	**Natural Gas**	**Propane**
NOx (lb)	1716.43	5714.86	5581.58	N/A
PM2.5 (lb)	4.94	53.62	4.94	N/A
GHG (short tons)	0	507.71	190.34	N/A

New Vehicle Cost Effectiveness				
Pollutant	**Diesel**	**Electric**	**Natural Gas**	**Propane**
NOx (lb)	$58	$51	$27	N/A
PM2.5 (lb)	$20,243	$5,408	$30,364	N/A
GHG (short tons)	N/A	$571	$788	N/A

Project Options	
State	MI
Project Type	Environmental Mitigation with Scrappage

Vehicle Options	
Type	Combination Short-Haul Truck
Number of Vehicles	1
Model Year of Scrapped Vehicle	2007
Years for Early Retirement of Scrapped Vehicle	2
Lifetime of New Vehicle (Years) After Scrappage	10
Annual Miles of Scrapped Vehicle	80000
Annual Miles of New Vehicle	80000
Use Diesel In-Use Multiplier?	Yes
Use Low NOx Engines?	Yes

Funding Options ($)	
Diesel Vehicle Funding	$100,000.00
Electric Vehicle Funding	$290,000.00
Natural Gas Vehicle Funding	$150,000.00
Propane Vehicle Funding	$0.00

Fuel Options	
Natural Gas (NG) Feedstock Source	North American NG
Source of Electricity	RFC

HDVEC Tutorial - Environmental Mitigation w/ Scrappage

- Optional: export to Excel 3 sheets Results, Inputs, Emissions

NOx Emissions				
Fuel	Year	Remaining Years	Scrappage Years	Emission Rate (g/mi)
Diesel	2007	N/A	2	6.438
Diesel	2017	N/A	2	1.572
Diesel	2017	10	N/A	1.952670588
Electric	2017	N/A	2	0
Electric	2017	10	N/A	0
Natural Gas	2017	N/A	2	0.0524
Natural Gas	2017	10	N/A	0.06508902
Propane	2017	N/A	2	N/A
Propane	2017	10	N/A	N/A

PM2.5 Emissions				
Fuel	Year	Remaining Years	Scrappage Years	Emission Rate (g/mi)
Diesel	2007	N/A	2	0.033
Diesel	2017	N/A	2	0.019
Diesel	2017	10	N/A	0.0238
Electric	2017	N/A	2	0
Electric	2017	10	N/A	0
Natural Gas	2017	N/A	2	0.019
Natural Gas	2017	10	N/A	0.0238
Propane	2017	N/A	2	N/A
Propane	2017	10	N/A	N/A

GHG Emissions				
Fuel	Year	Remaining Years	Scrappage Years	Emission Rate (g/mi)
Diesel	2007	N/A	2	1741.829136
Diesel	2017	N/A	2	1741.829136
Diesel	2017	10	N/A	1741.829136
Electric	2017	N/A	2	1262.052863
Electric	2017	10	N/A	1262.052863
Natural Gas	2017	N/A	2	1561.964372
Natural Gas	2017	10	N/A	1561.964372
Propane	2017	N/A	2	N/A
Propane	2017	10	N/A	N/A

HDVEC Tutorial - Environmental Mitigation w/ Scrappage

- Short-Haul Truck: diesel in-use or low-NOx options *not selected*

New Vehicle Emission Benefits

Pollutant	Diesel	Electric	Natural Gas	Propane
NO_x (lb)	1,901.27	4,566.89	4,167.04	N/A
NO_x ($/lb)	$53	$64	$36	N/A

- Short-Haul Truck: diesel in-use or low-NOx options *selected*

New Vehicle Emission Benefits

Pollutant	Diesel	Electric	Natural Gas	Propane
NO_x (lb)	1,716.43	5,714.86	5,581.58	N/A
NO_x ($/lb)	$58	$51	$27	N/A

HDVEC Tutorial - Environmental Mitigation w/ Scrappage

- Transit: diesel in-use or low-NOx options *not selected*

New Vehicle Emission Benefits				
Pollutant	Diesel	Electric	Natural Gas	Propane
NO_x (lb)	567.60	1,566.06	1,066.83	N/A
Pollutant	Diesel	Electric	Natural Gas	Propane
NO_x ($/lb)	$842	$534	$494	N/A

- Transit: diesel in-use or low-NOx options *selected*

Pollutant	Diesel	Electric	Natural Gas	Propane
NO_x (lb)	134.26	4,128.09	4,078.17	N/A
Pollutant	Diesel	Electric	Natural Gas	Propane
NO_x ($/lb)	$3,559	$203	$129	N/A

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Natural Gas Vehicles for America

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https://www.ngvamerica.org/vw-trust-action-center/