

## AFLEET Tool - Version History

**Andrew Burnham**  
**Argonne National Laboratory**

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**2013** - Released October 28, 2013

**2016** - Released May 5, 2016

- Updated results to match GREET 1 2015 - <https://greet.es.anl.gov/files/summary-updates-2015>
  - Incorporated GREET 1 2015 heavy-duty module fuel economy and emissions data
  - Added gaseous hydrogen fuel cell vehicles
  - Added renewable natural gas – wastewater treatment and hydrogen SMR, H2 electrolysis pathways
  - Also incorporated changes from GREET 1 2013 to GREET 1 2014 - <https://greet.es.anl.gov/files/greet1-2014-memo>
- Added private station pricing from 2015 Clean Cities Alternative Fuel Price Report - <http://www.afdc.energy.gov/fuels/prices.html>
  - Updated public and private station pricing to be state-based rather than national average
  - Added feature to investigate a range of fuel prices for simple payback
- Added refueling station and EVSE infrastructure construction, operation, and maintenance costs using various literature sources including:
  - Gasoline and ethanol - [http://www.afdc.energy.gov/uploads/publication/increasing\\_biofuel\\_deployment.pdf](http://www.afdc.energy.gov/uploads/publication/increasing_biofuel_deployment.pdf)
  - Gaseous hydrogen - [https://www.hydrogen.energy.gov/h2a\\_delivery.html](https://www.hydrogen.energy.gov/h2a_delivery.html)
  - Propane - [http://www.afdc.energy.gov/uploads/publication/propane\\_costs.pdf](http://www.afdc.energy.gov/uploads/publication/propane_costs.pdf)
  - Compressed natural gas - [http://www.afdc.energy.gov/uploads/publication/cng\\_infrastructure\\_costs.pdf](http://www.afdc.energy.gov/uploads/publication/cng_infrastructure_costs.pdf)
  - Added option to investigate other infrastructure-related costs such as public station out-of-route mileage and fueling labor costs
- Updated vehicle air pollutant emission factors from EPA's MOVES 2014a - <https://www3.epa.gov/otaq/models/moves/index.htm>
- Updated light-duty vehicle costs - <https://www.truecar.com>
- Added national petroleum use and GHG emissions externality costs and county-specific air pollutant emission externality costs
  - Petroleum - <http://www.pnas.org/content/108/40/16554>

- GHGs - <https://www.whitehouse.gov/sites/default/files/omb/inforeg/scc-tsd-final-july-2015.pdf>
- Air pollutants - <https://sites.google.com/site/nickmullershhomepage/home/ap2-apeek-model-2>
- Added new “Output” charts incorporating externality costs

#### **2016 rev 1 - Released May 12, 2016**

- Fixed light-duty vehicle EV fuel economy formulas in TCO Sheet – Row 556, which were linked to Inputs page cell Inputs\$E\$14 (FCV), changed to the correct one Inputs\$E\$13 (EV).

#### **2017 - Released August 28, 2017**

- Updated results to match GREET 1 2016 - <https://greet.es.anl.gov/files/summary-updates-2016>
  - Added well-to-pump (upstream) air pollutants
  - Added sulfur oxides (SOx) to all air pollutant calculations
  - Added renewable diesel vehicles (soy, tallow, and palm pathways)
  - Updated biodiesel pathways (soy, canola, corn, tallow)
  - Updated ethanol pathways (soy, canola, corn, tallow)
  - Updated CNG/LNG pathways (North American NG, landfill gas, AD (anaerobic digester) gas of animal waste, AD gas of wastewater sludge, AD gas of MSW (municipal solid waste))
  - Updated LDV fuel economy data
- Incorporated data from GREET 2 2016 - [https://greet.es.anl.gov/greet\\_2\\_series](https://greet.es.anl.gov/greet_2_series)
  - Added vehicle cycle (vehicle production) petroleum use, GHGs, and air pollutants for passenger car, SUV and pickup truck vehicles
  - No data for heavy duty vehicles at this point
- Added Idle Reduction (IR) Calculator to estimate the idling petroleum use, emissions, and costs for both light-duty and heavy-duty vehicles
  - Added key inputs for IR Calculator on Inputs sheet and 2 new sheets: IR sheet, which has calculations, and IR Outputs, which has results and graphs
  - Air pollutant emission factors and fuel consumption from EPA’s MOVES 2014a - <https://www3.epa.gov/otaq/models/moves/index.htm>
  - Technology costs from forthcoming Idling Reduction Equipment and Manufacturers Compendium developed by Energetics and Argonne
- Added low-NOx engine option for CNG and LNG heavy-duty vehicles
  - Based on: Cai, Burnham, Chen, Wang, 2017, “Wells to Wheels: Environmental Implications of Natural Gas As A Transportation Fuel,” Energy Policy 109: 565 - 578
- Added diesel in-use emissions multiplier sensitivity case (focus on NOx as of now)
  - Based on: Cai, Burnham, Chen, Wang, 2017, “Wells to Wheels: Environmental Implications of Natural Gas As A Transportation Fuel,” Energy Policy 109: 565 – 578, MOVES 2014a, Sandhu et al., 2017, In-Use Emission Rates for MY 2010+ Heavy-Duty

Diesel Vehicles, CRC On-Road Vehicle Emissions Workshop, and Anenberg et al., 2017, "Impacts and mitigation of excess diesel-related NOx emissions in 11 major vehicle markets," Nature 545: 467-471

- Updated vehicle air pollutant emission factors from EPA's MOVES 2014a for calendar year 2017 - <https://www3.epa.gov/otaq/models/moves/index.htm>
- Added default data in look up tables on Background Data sheet for 4 new vocations (fire truck, ambulance, tow truck, and police SUV)
- Updated vehicle costs using various sources including:  
<https://www.fueleconomy.gov/feg/hybridCompare.jsp>; <https://www.truecar.com>
- Updated county-specific air pollutant emission externality costs using:
  - Ground level data from Marginal Damages (2011) from Holland, Mansur, Muller, Yates AER forthcoming.xlsx  
<https://sites.google.com/site/nickmullershhomepage/home/ap2-apeep-model-2>
  - Smoke stack level data from: Jaramillo and Muller, 2016, "Air pollution emissions and damages from energy production in the U.S.: 2002—2011," Energy Policy 90: 202 - 211.

**2018 - Released November 12, 2018**

- Updated results to match GREET 1 2018 - <https://greet.es.anl.gov/publication-greet-2018-summary>
- Updated results to match GREET 2 2018 - <https://greet.es.anl.gov/publication-greet-2018-summary>
- Updated vehicle air pollutant emission factors from EPA's MOVES 2014a for calendar year 2018 - <https://www3.epa.gov/otaq/models/moves/index.htm>
- Updated fuel price data to match latest Clean Cities Alternative Fuel Price Report data - <http://www.afdc.energy.gov/fuels/prices.html>
  - State-based public and private station data average pricing for the past 4 quarterly reports

**2019 - Released March 2, 2020**

- Updated results to match GREET 1 2019 - <https://greet.es.anl.gov/publication-greet-2019-summary>
- Updated results to match GREET 2 2019 - <https://greet.es.anl.gov/publication-greet-2019-summary>
- Added Electric Vehicle Charging Calculator to estimate the petroleum use, GHG, and air pollutant benefits of utilizing public electric vehicle charging infrastructure
  - Added key inputs for Charging Calculator on Inputs sheet and 2 new sheets: Charging sheet, which has calculations, and Charging Outputs, which has results and graphs
- Added Off-Road Fleet Footprint Calculator to estimate petroleum use, GHGs, and air pollutant emissions of existing and new off-road equipment

- Added equipment air pollutant emission factors, annual hourly usage, rated horsepower, lifetime, and load factors for 22 equipment types from EPA's MOVES 2014b - <https://www3.epa.gov/otaq/models/moves/index.htm>
- Added low-NOx engine option for propane heavy-duty vehicles
  - Based on: Ryskamp, 2020, Chassis Dynamometer Evaluation of Propane Powered MD to HD Vehicles, West Virginia University
- Updated maintenance cost data for lifetime weighted cost per mile
  - Added annual cost per mile changes as the vehicle ages for the TCO calculator
- Updated vehicle air pollutant emission factors from EPA's MOVES 2014b for calendar year 2019 - <https://www3.epa.gov/otaq/models/moves/index.htm>
- Updated fuel price data to match latest Clean Cities Alternative Fuel Price Report data - <http://www.afdc.energy.gov/fuels/prices.html>
  - State-based public and private station data average pricing for the past 4 quarterly reports