

## What's Afoot in DOE's Clean Cities? AFLEET!

AFLEET is a free tool from the U.S. Department of Energy (DOE) that fleet managers can use to quantify the environmental and economic impacts of new fuels and vehicle technologies.

Researchers at Argonne National Laboratory have developed the Alternative Fuel Life-Cycle Environmental and Economic Transportation (AFLEET) tool for DOE's Clean Cities Program. Using simple spreadsheet inputs, it estimates petroleum use, greenhouse gas emissions, air pollutant emissions, and cost of ownership of light-duty and heavy-duty vehicles. AFLEET examines both the environmental and economic costs and benefits of alternative fuel and advanced vehicles.

### Transportation's Role in Consumption

Fleet managers can be “force multipliers” for change given that the U.S. transportation sector uses almost 70% of petroleum consumed in the United States<sup>1</sup>; therefore, lowering petroleum consumption by vehicles can substantially contribute to our country’s positive trend toward energy independence.<sup>2</sup> Challenges remain because, as of 2014, the United States as a whole (not only the transportation sector) consumed more than twice its petroleum production.<sup>3</sup> In addition, as of 2013, transportation accounts for 33.6% of the carbon dioxide (CO<sub>2</sub>) emissions that the United States produces from fossil fuel combustion.<sup>4</sup>

However, as early adopters of new vehicle technologies, fleet managers of both publicly and privately owned fleets are playing a pivotal role in the success of advanced and alternative fuels vehicle (AFV) initiatives. That’s why DOE has developed programs to support these managers in fleet-related decisionmaking.

Having the right information to understand the benefits of reducing petroleum use and greenhouse gas (GHG) emissions for different AFVs can help fleet managers make informed vehicle acquisition decisions, enabling them to meet a variety of organizational goals and legal requirements.

**AFLEET has been downloaded more than 6,000 times since its launch.**



Fleet managers are key stakeholders in the U.S. Department of Energy's Clean Cities Program.

### AFLEET Uses the Best Data Available

The tool uses data from Argonne’s highly regarded Greenhouse gases, Regulated Emissions, and Energy use in Transportation (GREET) fuel-cycle model to generate the necessary wells-to-wheels petroleum use and GHG emission coefficients for key fuel production pathways and vehicle types. In addition, AFLEET uses the U.S. Environmental Protection Agency’s MOtor Vehicle Emission Simulator (MOVES) to estimate tailpipe air pollutant emissions. Various sources contribute default cost data, including the Clean Cities Alternative Fuel Price Report.

### Key Features of AFLEET

Within the AFLEET spreadsheet tool reside extensive data on AFVs and fueling infrastructure. After users input fleet-specific information, AFLEET calculates the costs and benefits of AFVs in that application—to help fleet managers compare and contrast conventional and AFV options.

AFLEET analyzes 16 fuel/vehicle technologies:

- Conventional: gasoline, diesel
- Hybrid: gasoline hybrid electric vehicle (HEV), diesel HEV, diesel hydraulic hybrid vehicle (HHV)
- Plug-in electric: plug-in HEV (PHEV), extended-range EV (EREV), EV
- Alternative fuel: biodiesel (B20), B100, ethanol (E85), hydrogen (H<sub>2</sub>), liquefied petroleum gas (LPG), compressed natural gas (CNG), liquefied natural gas (LNG), LNG/diesel pilot ignition

Light-duty and medium-/heavy-duty vehicles can thus be examined in terms of their:

- Petroleum use (Figure 1)
- GHG emissions (Figure 1)
- Air pollutant emissions
- Cost of ownership (Figure 2)

1 [http://www.eia.gov/energyexplained/index.cfm?page=oil\\_imports](http://www.eia.gov/energyexplained/index.cfm?page=oil_imports).

2 Ibid.

3 [http://cta.ornl.gov/data/tedb34/Edition34\\_Full\\_Doc.pdf](http://cta.ornl.gov/data/tedb34/Edition34_Full_Doc.pdf) (Chapter 1).

4 Ibid (Chapter 11).

## Results Tailored to Individual Fleets

### Evaluate Both Existing Fleets and New Vehicle Purchases

AFLEET simplifies the difficult task of estimating the environmental and economic impacts of numerous conventional and alternative fuel vehicles. Fleet managers can use it to understand their current environmental footprint. In addition, they can compare potential vehicle purchases to see what AFVs make sense based on the fleet's operations. This tool is also useful for setting company goals and applying for financial assistance.

### Footprint Your Existing Fleet

To examine an existing fleet's environmental footprint, first enter vehicle location and fuel production assumptions, like the electricity mix for electric vehicles, on the **Inputs** sheet. Then enter the vehicle type, model year, miles traveled, and fuel use for each vehicle in the fleet on the **Footprint** sheet. The fleet's total petroleum use, GHG emissions, and air pollutant emissions can be viewed in the tables and graphs on the **Footprint Outputs** sheet (Figure 1).

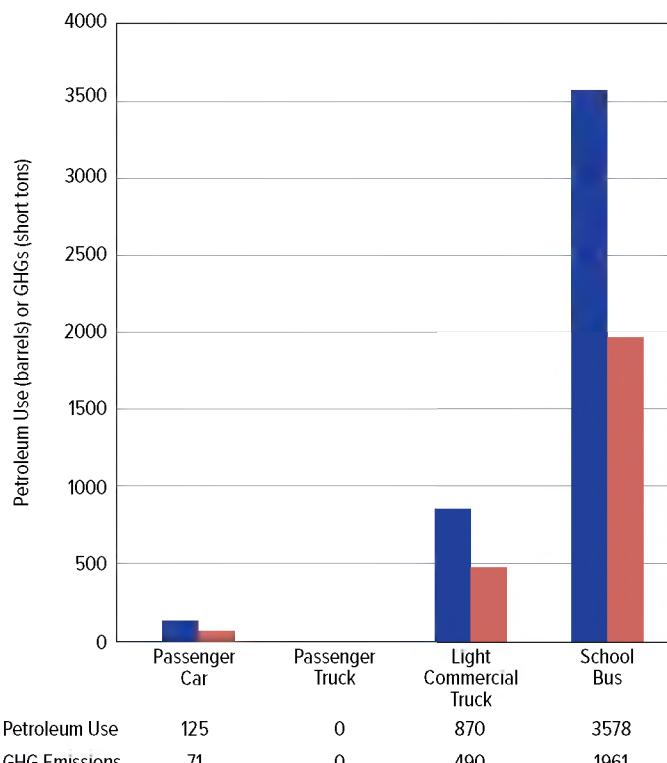


Figure 1. Sample Output from AFLEET's Footprint Output Sheet

### Compare Potential Vehicle Purchases

To perform a simple payback analysis, start again on the **Inputs** sheet, adding vehicle location, vehicle type, number of vehicles, miles traveled, fuel economy, purchase price, and fuel price data — to generate a comparison of *annual* costs, energy use, and emissions. To examine total cost of ownership (TCO), enter additional details such as years of planned ownership, loan terms, and discount factor, which generates a comparison of *lifetime* costs, energy use, and emissions. Adjust fuel production assumptions on the **Inputs** sheet and other assumptions (like maintenance, repair, and infrastructure costs) on the **Payback** sheet. Results are presented on the **Simple Payback Outputs** and **TCO Outputs** sheets, respectively (Figure 2).

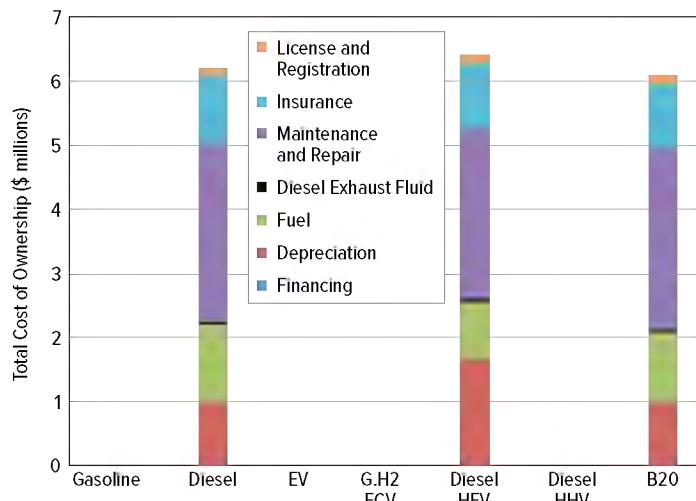


Figure 2. Sample Output from AFLEET's Total Cost of Ownership Output Sheet

### Accessing AFLEET

AFLEET is available for public use at no charge. AFLEET's main page, including data on version history, is here: <https://greet.es.anl.gov/afleet>.

Those interested in using the tool are asked to register at this link: <https://greet.es.anl.gov/register>. Note that Argonne will use registration information to send out news about updates; registration information will never be shared with third parties.

### DOE's Clean Cities Program

This tool and more than 20 others from the U.S. Department of Energy's Clean Cities program are available at <http://www.afdc.energy.gov/tools>.

To find your nearest Clean Cities coordinator for advice and local data and information on alternative fuels, type in your zip code at the Clean Cities home page: <https://cleancities.energy.gov>.



Energy Efficiency &  
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