

Measuring GHG Emissions

In the last few decades under laws like the federal Clean Air Act and the California Environmental Quality Act, “Criteria pollutants” like sulfur dioxide and carbon monoxide have been closely monitored and highly regulated, and better technology has greatly improved today’s average vehicle from what it was forty years ago.

By contrast, carbon dioxide, or CO₂, is a colorless, odorless gas that is essential to life on Earth. It is also the primary GHG that by scientific consensus is responsible for potentially catastrophic climate change. In 2004, California adopted its landmark Greenhouse Gas Regulation that, for the first time, requires automakers to begin selling vehicles with reduced greenhouse gas emissions by model year 2009. The historic regulation sets limits on the amount of greenhouse gas emissions that can be released from new passenger cars, SUVs and pickup trucks sold in California starting in model year 2009. The new regulation is based on a state of the art assessment of the various technologies and fuels that can reduce motor vehicle global warming pollutants. The California Air Resources Board is expected to issue shortly full fuel cycle ratings of GHG for all vehicles sold in California. When this happens, the Taxi Commission should consider incorporation these ratings into our regulations.

Currently, the best source for estimating GHG emissions is the Federal Department of Energy/Environmental Protection Agency website, fueleconomy.gov, which uses a full fuel cycle analysis developed by the Argonne National Laboratory, called the GREET (Greenhouse Gases, Regulated Emissions and Energy Use in Transportation) model. For any given vehicle, this site will give a combined MPG, annual fuel cost and “carbon footprint”. This carbon footprint is the number used by the Taxi Commission to determine a vehicle’s GHG Rating. According to the fueleconomy.gov website, the carbon footprint measures GHG emissions expressed in CO₂ equivalents. The estimates are full fuel cycle estimates and include the three major GHG emitted by motor vehicles: carbon dioxide, nitrous oxide and methane. Full fuel-cycle estimates consider all steps in the use of a fuel, from production and refining to distribution and final use. Vehicle manufacturer us excluded.

Determining A GHG Target for the San Francisco Taxi industry

Recently adopted San Francisco Ordinance 2008-026 will reduce GHG emissions by 20% from 1990 levels by 2012. In order to determine this goal quantitatively, it was established that there were 811 cabs in San Francisco in 1990. Using maintenance records and industry consensus, it is assumed throughout that a typical San Francisco cab travels 90,000 miles per year, 70% in the city and 30% highway. The vehicle of choice in 1990 was the Ford Crown Victoria police version, in a mix of ½ 1988 and ½ 1990 models for the entire fleet. These assumptions in the GREET model rate an average taxi in 1990 at 87.9 tons of GHG per year. Therefore, to determine a target number:

- $811(\text{cabs in 1990}) \times 87.9 (\text{tons GHG per year per cab}) = 71,287$
(fleet tons per year 1990)
- $71,287 (\text{t/yr/1990}) - 20\% (\text{GHG reduction goal}) = 57,030$
(fleet/t/yr2012)

- $57,030 \text{ (fleet t/yr 2012)} / 1500 \text{ (current\# of cabs)} = 38.02$
(t/yr/vehicle 2012)

Thus the target number for all cabs placed into service after July 1, 2008 is 38 tons per year per vehicle, averaged out over all the cabs in the color scheme. This number corresponds to a gas-powered vehicle rated at approximately 29 mpg combined. Examples of GHG ratings for some currently used cabs are Ford Crown Victoria (64.7 t), Ford Escape Hybrid (33.5 t) and Toyota Prius (23.6 t). It is expected that in the next few years dozens of vehicles will be available that meet or exceed the target.

Greenhouse Gas Reduction by Fleet Average

The GHG reduction goal of 38 tons per vehicle per year is not an absolute maximum amount, but an average of all the cabs in the color scheme fleet. For instance, if a company wanted to use a vehicle that emitted 46 tons per year, it could balance that with two vehicles that emitted 34 tons per year.