

EPA/DOT Greenhouse Gas Labeling

First the good news: the US EPA and DOT (National Highway Traffic Safety Administration) are proposing to add greenhouse gas emission data to their fuel economy labels on all new car “stickers” beginning in 2012, so that drivers can assess the impact of their vehicle choices on climate change.

Now the bad news: Incredibly, the EPA is proposing to list *only the vehicle tailpipe* GHG emissions, which would be very misleading and counterproductive, since upstream emissions in producing fuels such as gasoline and particularly the emissions for generating electricity to charge car batteries (most of which run on coal in the US) will reverse the relative GHG rankings of some alternative vehicles. The agencies are promising to develop a web-based program to allow potential car buyers to determine their total well-to-wheels (WTW) GHG emissions. But how many car-buyers will take the time to look up this information?

They are proposing two potential fuel economy labels: the first would incorporate a large letter grade combining the fuel economy and GHG emissions ratings as follows:

Letter Grade Rating (Combined Rating)	CO ₂ Range (grams per mile) (Separate Rating)	Gasoline MPG Equivalent (Separate Rating)
A+	0-76	117 and higher
A	77-152	59-116
A-	153-229	40-58
B+	230-305	30-39
B	306-382	24-29
B-	383-458	20-23
C+	459-535	18-19
C	536-611	16-17
C-	612-688	14-15
D+	689-764	13
D	765-842 and higher	12 and lower

Figure 4. Examples of ratings systems.

This letter grade would dominate the vehicle label for this first option, as shown in Appendix A. The label would also show a sliding scale for tailpipe-only GHG emissions, which would be zero for BEVs and FCEVs, but finite for PHEVs since they will burn some gasoline, diesel, natural gas or E-85.

Proposed EPA/DOT Motor Vehicle Fuel Economy Label

To evaluate the impact of reporting only the tailpipe GHGs, we analyzed a set of alternative fuels and vehicles, using the Department of Energy's latest Argonne National Laboratory GREET 1.8d_0 model¹. We analyzed four fuels:

- Gasoline (Reformulated gasoline- RFG)
- North American natural gas (NG)
- Hydrogen produced by reforming natural gas
- Electricity produced by the average US utility grid mix

And we evaluated four types of passenger vehicles:

- Conventional spark ignition (SI) internal combustion engine vehicles (HEVs)
- Hybrid electric vehicles (HEVs)
- Plug-in hybrid electric vehicles (PHEVs)
- Battery electric vehicles (BEVs)
- Fuel cell electric vehicles (FCEVs)

We evaluated each fuel with each vehicle type, where appropriate, a total of 31 fuel/vehicle combinations in all. Thus PHEVs can be powered by gasoline, natural gas, diesel fuel, and fuel cell electric vehicles can be plugged in.

We evaluated GHGs for PHEVs with four different all electric ranges (AERs): 10, 20, 30 and 40 miles AER.

The results of this evaluation are shown in Table 1 below, sorted by the total WTW GHGs, and in Table 2, sorted by the tailpipe GHGs as proposed for the EPA/DOT fuel economy stickers. The lowest WTW GHGs are produced by a hydrogen-powered FCEV, which reduces WTW GHGs by 51.3% below WTW GHG emissions from a conventional (non-hybrid) ICV. The second-best option is a natural gas-powered PHEV with 10 miles AER, which would cut WTW GHGs by 44.4% compared to an RFG ICV.

Note from Table 2, however, that this second-best option in terms of total GHGs is ranked as the 12th vehicle in terms of tailpipe-only GHG emissions.

Finally, Figure 1 plots the tailpipe-only GHG ranking versus the WTW GHG ranking for all 31 options. If the tailpipe-only GHG measurement were a reliable estimate of total GHGs, then all these points should lie on the straight line. Instead, it looks like a random scatter diagram with the exception of the best option (the hydrogen-powered FCEV, the four worst options (The NGV bi-fuel vehicle, the non-hybrid Diesel CIDI, the E-85 ICV and the gasoline ICV) and, (probably coincidentally), the diesel PHEV with 30 miles AER is ranked 14th on both charts.

In other words, **there is no significant correlation between tailpipe GHGs and the WTW GHGs emissions**, and therefore the tailpipe GHG emissions figure-of-merit should not be used as the main indicator in the proposed EPA/DOT vehicle sticker.

¹ "The Greenhouse gases, regulated emissions and energy use in transportation model", by the Argonne National laboratory, available at <http://greet.es.anl.gov/main>

Proposed EPA/DOT Motor Vehicle Fuel Economy Label

Using this indicator of GHG emissions would be misleading to car buyers, and judging from Figure 1, **would be no better than using a dartboard to pick GHG winners and losers!**

Table 1. GHG emissions in grams/mile sorted by total well-to-wheels (WTW) GHGs

	sort by: WTW GHGs	Ranking based on WTW GHGs	Tailpipe only GHGs	WTW GHG reductions below Gasoline ICVs	WTW GHG ratio to FCEV
FCEV	197	1	0	-51.3%	1.00
NG PHEV-10	225	2	145	-44.4%	1.14
NG PHEV-20	232	3	130	-42.6%	1.18
E-85 PHEV-10	233	4	194	-42.4%	1.18
NG HEV	233	5	182	-42.4%	1.18
E-85 PHEV-20	239	6	174	-40.8%	1.22
FC PHEV-10	247	7	0	-39.0%	1.25
FC PHEV-20	255	8	0	-37.0%	1.29
BEV	257	9	0	-36.5%	1.30
FC PHEV-30	259	10	0	-36.1%	1.31
FC PHEV-40	262	11	0	-35.2%	1.33
Diesel HEV	262	12	210	-35.2%	1.33
Gasoline PHEV-10	269	13	185	-33.4%	1.37
Diesel PHEV-30	271	14	162	-33.0%	1.38
Gasoline PHEV-20	271	15	164	-32.9%	1.38
Diesel PHEV-10	277	16	189	-31.6%	1.40
NG PHEV-30	278	17	129	-31.2%	1.41
NG PHEV-40	278	18	109	-31.2%	1.41
Diesel PHEV-20	280	19	169	-30.8%	1.42
E-85 HEV	284	20	232	-29.8%	1.44
E-85 PHEV-40	285	21	146	-29.5%	1.45
E-85 PHEV-30	286	22	173	-29.3%	1.45
Gasoline HEV	290	23	233	-28.3%	1.47
Gasoline PHEV-40	310	24	137	-23.4%	1.57
Diesel PHEV-40	312	25	137	-22.8%	1.59
NGV-Dedicated	316	26	247	-21.8%	1.61
Gasoline PHEV-30	317	27	163	-21.7%	1.61
NGV-Bifuel	346	28	270	-14.5%	1.76
Diesel CIDI	348	29	279	-13.9%	1.77
E-85 ICV	396	30	324	-2.1%	2.01
Gasoline ICV	405	31	324	0.0%	2.05

Proposed EPA/DOT Motor Vehicle Fuel Economy Label

Table 2. GHGs in grams/mile sorted by the tailpipe-only GHGs

	WTW GHGs	Ranking based on tailpipe-only GHGs	Sorted by Tailpipe only GHGs:	WTW GHG reductions below Gasoline ICVs	WTW GHG ratio to FCEV
FCEV	197	1	0	-51.3%	1.00
FC PHEV-10	247	2	0	-39.0%	1.25
FC PHEV-20	255	3	0	-37.0%	1.29
BEV	257	4	0	-36.5%	1.30
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E-85 HEV	284	25	232	-29.8%	1.44
Gasoline HEV	290	26	233	-28.3%	1.47
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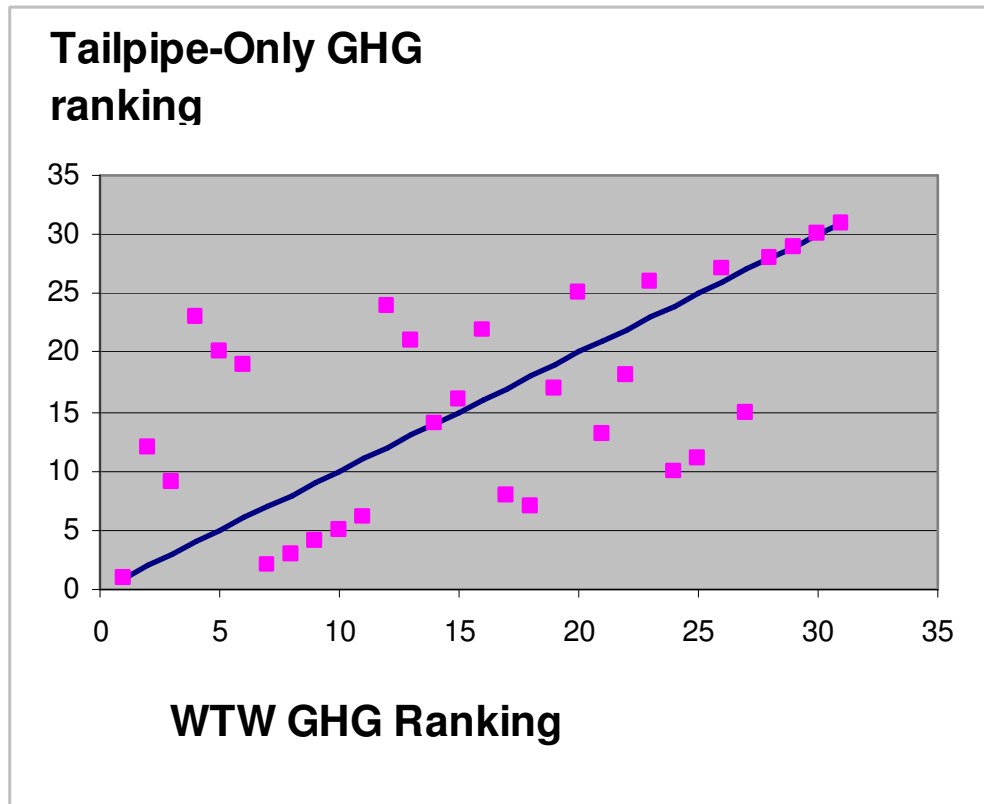


Figure 1. Plot of Tailpipe-only GHG rankings vs.WTW GHG rankings for all 31 vehicle/fuel options

Proposed EPA/DOT Motor Vehicle Fuel Economy Label

Appendix A: proposed EPA/DOT Motor Vehicle Fuel Economy Labels

Label 1 for electric vehicle, A+ grade

(Figure III-2 in the Federal Register notice)

Any vehicle, regardless of technology or fuel type, would be eligible for any letter grade, as long as it met the specified greenhouse gas/fuel economy levels for that grade.

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EPA
DOT
**Fuel Economy and
Environmental Comparison**



The above grade reflects fuel economy and greenhouse gases. Grading system ranges from A+ to D.

Smartphone



[website.here](#)

Over five years, this vehicle

saves \$6,900 in fuel costs compared to the average vehicle.

Electric Vehicle

Range (miles)	kW-hrs/100 Miles	MPGe City	MPGe Highway	CO ₂ g/mile (tailpipe only)	Annual fuel cost
99	34	102	94	0	\$618



Combined MPGe



CO₂ g/mile



Other Air Pollutants

- Fuel economy for all midsize cars ranges from 12 to 103 MPGequivalent. MPGequivalent: 33.7 kW-hrs = 1 gallon gasoline energy.
- Annual fuel cost based on 15,000 miles per year at 12 cents per kW-hr.

Visit [website.here](#) to calculate estimates personalized for your driving, and to download the Fuel Economy Guide (also available at dealers).

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Proposed EPA/DOT Motor Vehicle Fuel Economy Label

Label 1 for PHEV, A grade

(Figure III-3 in the Federal Register notice)

Any vehicle, regardless of technology or fuel type, would be eligible for any letter grade, as long as it met the specified greenhouse gas/fuel economy levels for that grade.

**EPA
DOT**
**Fuel Economy and
Environmental Comparison**



The above grade reflects fuel economy and greenhouse gases. Grading system ranges from A+ to D.

Smartphone



[website.here](#)

Over five years, this vehicle **saves \$5,700** in fuel costs compared to the average vehicle.

🔌 **Dual Fuel Vehicle: Plug-in Hybrid Electric** 🔌

Blended Electric+Gas (first 50 miles only)		Gas Only		Blended & Gas Only Combined	
eGallons/ 100 Miles	Combined MPGe	Gallons/ 100 Miles	Combined MPG	CO ₂ g/mile (tailpipe only)	Annual fuel cost
1.5	65	2.7	38	137	\$855

10 Worst

53

103 Best

950 Worst

0 Best

1 Worst

10 Best

Combined MPGe **CO₂ g/mile** **Other Air Pollutants**

- Fuel economy for all midsize station wagons ranges from 18 to 75 MPGequivalent. MPGequivalent: 33.7 kW-hrs = 1 gallon gasoline energy.
- Annual fuel cost based on 15,000 miles per year at \$2.80 per gallon and 12 cents per kW-hr.

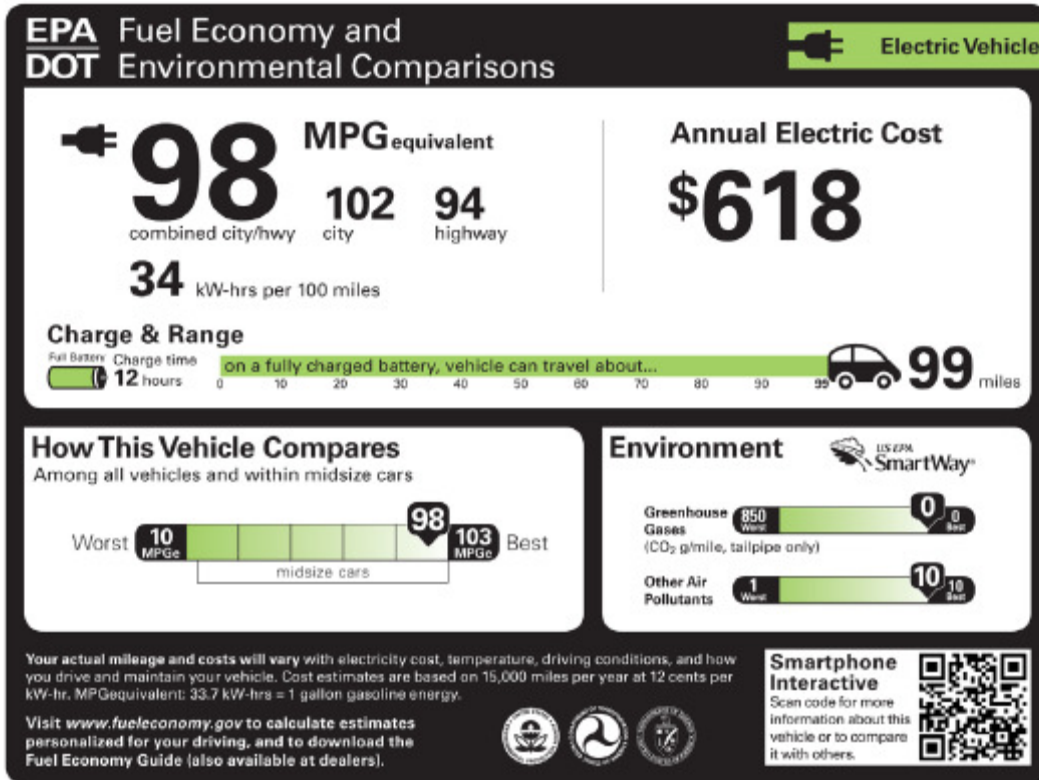
Visit [website.here](#) to calculate estimates personalized for your driving, and to download the Fuel Economy Guide (also available at dealers).





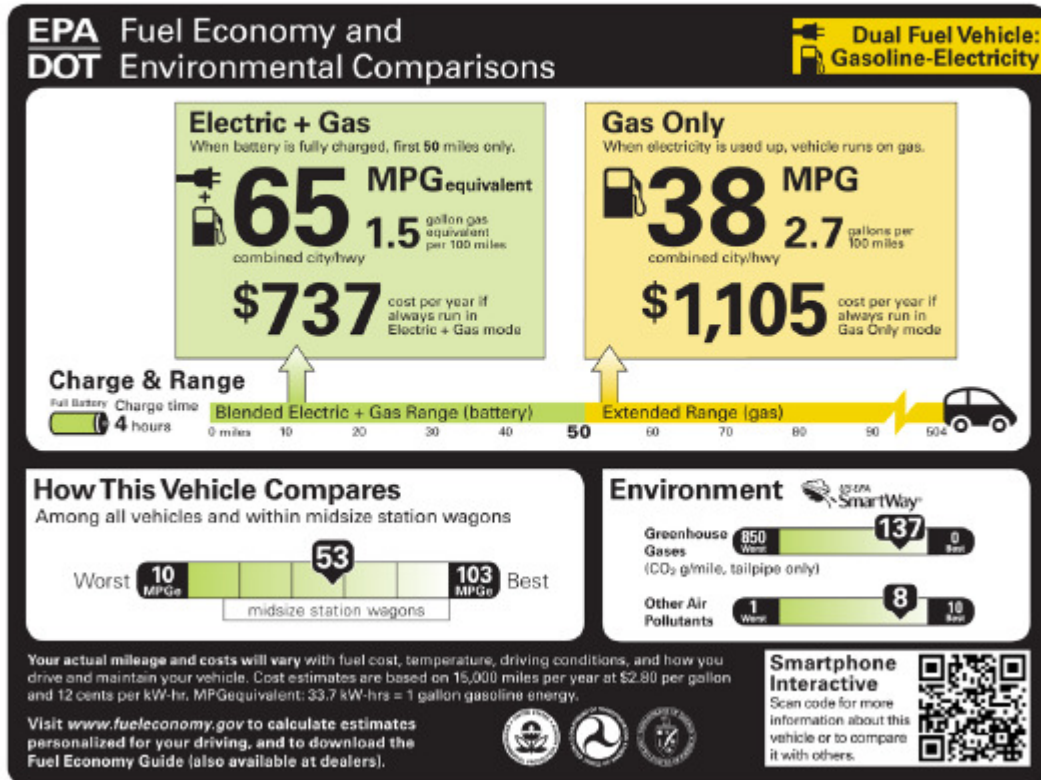
Proposed EPA/DOT Motor Vehicle Fuel Economy Label

Label 2 for electric vehicle
(Figure III-10 in the Federal Register notice)



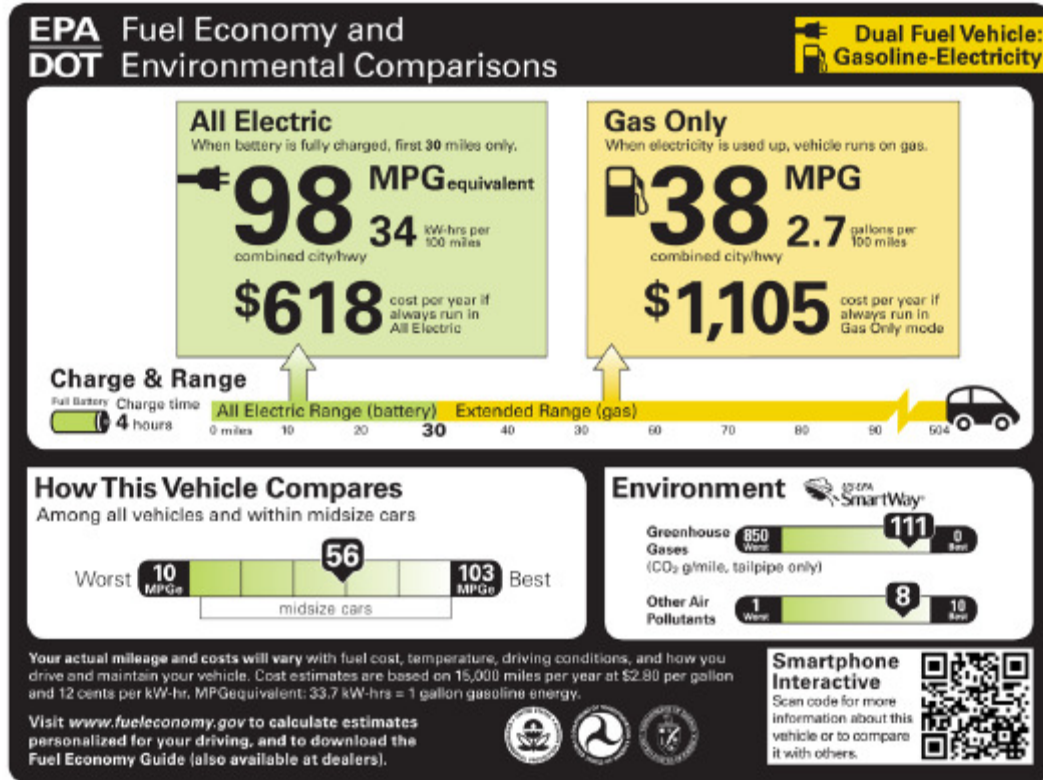
Proposed EPA/DOT Motor Vehicle Fuel Economy Label

Label 2 for PHEV (predominantly blended type)
(Figure III-12 in the Federal Register notice)



Proposed EPA/DOT Motor Vehicle Fuel Economy Label

Label 2 for PHEV, extended range electric (series) type
(Figure III-11 in the Federal Register notice)



Public Participation Opportunities

We welcome your comments on this rule. Comments will be accepted for 60 days beginning when this proposal is published in the Federal Register. All comments should be identified by Docket ID No. EPA-HQ-OAR-2009-0865 and submitted by one of the following methods:

Internet: www.regulations.gov

E-mail: newlabels@epa.gov

Mail:

Environmental Protection Agency
Air and Radiation Docket and Information Center (6102T)
1200 Pennsylvania Avenue NW
Washington, DC 20460

Hand Delivery:

EPA West building
EPA Docket Center (Room 3340)
1301 Constitution Avenue NW
Washington, DC

You should consult the *Federal Register* notice for this proposal for more information about how to submit comments, when the comment period will close, and about where and when public hearings will be held. A copy of *Federal Register* notice can be found on our websites listed below.