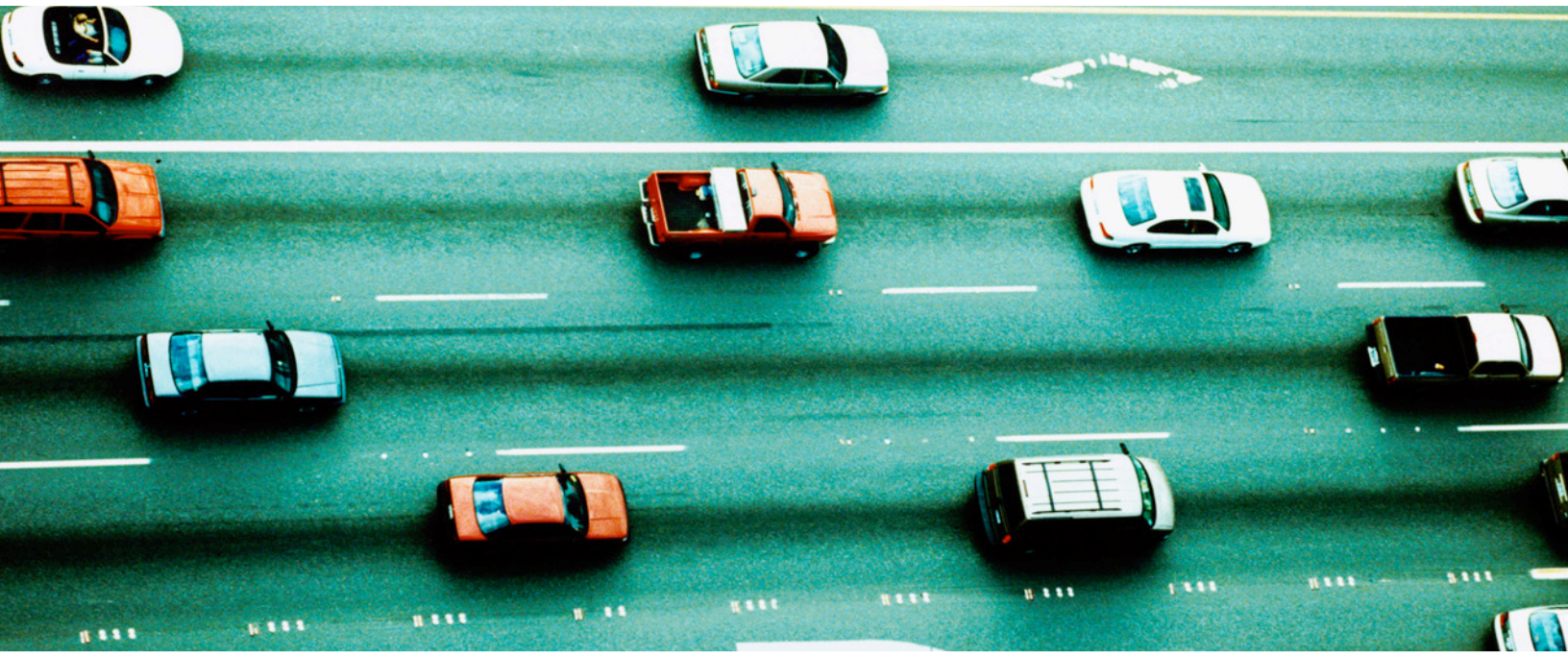
Automaker Rankings 2007

The Environmental Performance *of* Car Companies



Honda • Toyota • Hyundai-Kia • Nissan • Volkswagen • Ford • General Motors • DaimlerChrysler

Union of Concerned Scientists
Citizens and Scientists for Environmental Solutions

Automaker Rankings 2007

The Environmental Performance *of* Car Companies

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Union of Concerned Scientists
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Don MacKenzie is a vehicles engineer in the Union of Concerned Scientists Clean Vehicles Program.

The Union of Concerned Scientists is the leading science-based nonprofit working for a healthy environment and a safer world.

The UCS Clean Vehicles Program develops and promotes strategies to reduce the adverse environmental impact of the U.S. transportation system.

More information about the Union of Concerned Scientists is available on the UCS website at *www.ucsusa.org*.

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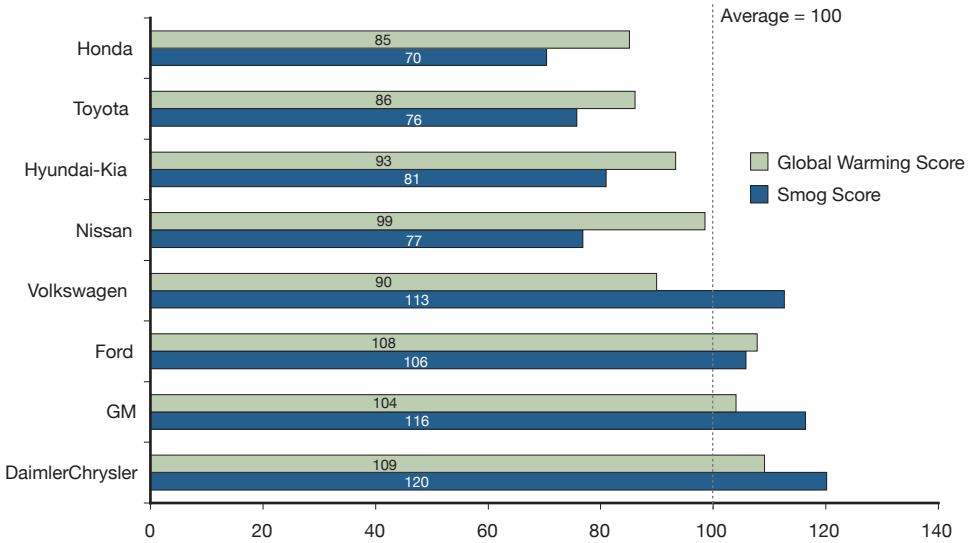
Executive Summary

Vehicles are a significant source of pollution in the United States. The production and use of fuel in cars and light trucks are responsible for 25 percent of the country's global warming pollution, while tailpipe emissions from these vehicles produce 20 percent of the nation's smog-forming pollutants. Despite urgent calls for action, emissions from U.S. vehicles continue to increase and exacerbate global warming, the most serious long-term environmental threat facing this country and the world today. At the same time, more than half of Americans live in areas that continue to fall short of the Environmental Protection Agency's public health standards for smog.

With more vehicles sitting in American driveways than there are people licensed to drive them, sales in the United States account for nearly one-third of the global market. Nearly all of the vehicles sold in the United States are manufactured by just eight companies, all of them in the top 100 of *Fortune's* Global 500. The product planning decisions of this handful of powerful companies have an immense impact on the environmental health of both America and the world.

Automakers are well aware of concerns about the environmental impacts of their products. Honda, for example, advertises something it calls "environmentology"* to promote a green image, while General Motors (GM) has expressed concern over the "perceptual gap between how [its] portfolio is perceived, as opposed to reality" (Tierney 2007). This report puts the automakers' green marketing claims to the test by using government data to measure the environmental performance of each of the Top Eight automakers' product offerings in model year 2005 (MY2005)—the

Figure ES-1. Average Global Warming and Smog Scores of Model Year 2005 Vehicles



* Defined by Honda as its "ongoing commitment to environmentally responsible technology" *(http://corporate.honda.com/environmentology/index.aspx).* Honda has also highlighted in print and television advertisements the pollution ranking it has received from UCS.

latest year for which final data are available. By scoring each automaker on the average emissions of global warming and smog-forming pollutants from the vehicles it actually sells, these analyses provide objective measures of each manufacturer's true environmental performance. In addition to these overall scores, this report explores each automaker's performance within various classes, evaluates each automaker's commitment to offering greener choices, and examines the effects of some technologies currently being marketed as "green." Finally, based on the results, the report offers recommendations about how automakers can improve their environmental performance, rather than just their images.

Results

Honda wins the UCS Greenest Automaker award, a top accolade it has earned in all three previous *Automaker Rankings* reports. Honda's lead is due to consistently good performance in nearly every class in which it produces vehicles. But Toyota is close behind Honda, due to its superior investments in conventional and hybrid technology and phase-in of tighter smog standards. These investments helped Toyota regain ground it previously lost to Nissan on smog-forming emissions. Moreover, it nearly tied Honda on global warming pollution, despite producing vehicles in classes in which Honda does not—large cars, pickups, and large SUVs—classes one might have expected to undermine its gains.

Two new automakers have been added to these rankings: Hyundai-Kia and Volkswagen, whose combined sales totaled nearly one million vehicles in MY2005. Volkswagen's debut is disappointing, in that it beats out only the U.S. automakers. Hyundai-Kia comes in third, despite a more truck-heavy product mix than Volkswagen.

The performance of Ford and GM continues to be lackluster. Ford's performance has gotten a little worse, while GM's is a little better, but both product lines remain among the worst on environmental performance. DaimlerChrysler is back in its traditional spot as the dirtiest of the major automakers, with the worst scores for both smog and global warming pollution. DaimlerChrysler's vehicles emit 70 percent more smog-forming pollutants and nearly 30 percent more global warming pollutants per mile than Honda's vehicles.

Overall, the smog performance of all vehicles has improved due to tighter state and federal smog regulations. But most automakers have been running in place on global warming emissions since 1998. They all must take larger steps if they are to do their part in avoiding the serious consequences of global warming.

Lessons Learned

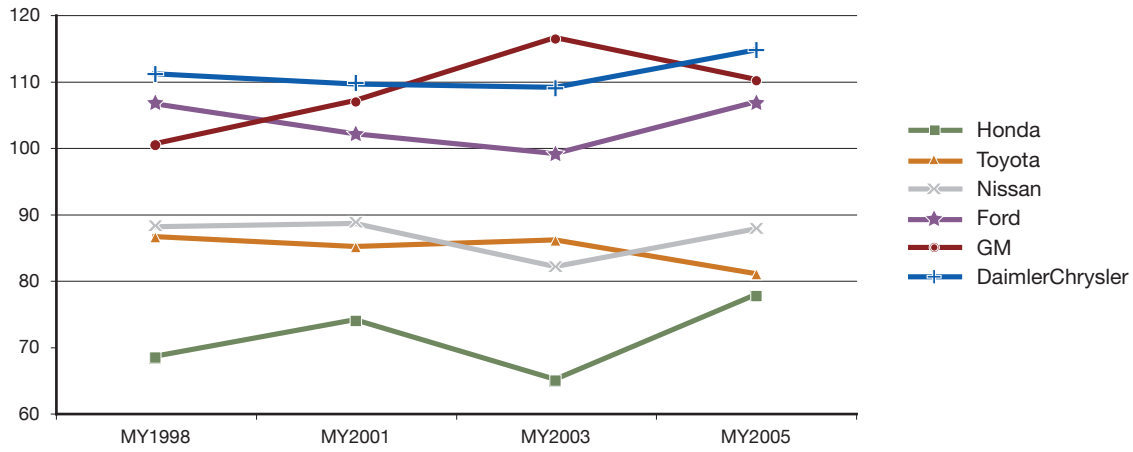
The wide differences among the manufacturers highlight several important lessons as automakers continue to vie for consumers seeking cleaner vehicles:

Full-line manufacturers can compete for the Greenest Automaker award. Toyota produces vehicles in all 10 classes considered in this report, but has drawn to within one point of Honda on global warming emissions.

Consistency is the key to success. Honda and Toyota, the two greenest automakers, are the only two with better-than-average performance in nearly every vehicle class. They also consistently put clean technology in their most popular vehicles. By contrast, seventh-place GM undermines its leadership on global warming performance in four classes with below-average performance in four others. Moreover, it fails to turn its most popular vehicles into class leaders.

Hybrids can help an automaker's score, but only if they are produced in large volume and make good use of the technology. Hybrids improved Toyota's overall global warming score by three

Figure ES-2. Combined Environmental Scores of the Big Six Automakers (1998–2005)



points, and its midsize car global warming score by nine points.

Flexible-fuel vehicles (FFVs) are currently doing more harm than good. A federal loophole allows automakers to claim inflated fuel economy numbers for any FFVs they sell, on the assumption that the vehicles consume ethanol in place of gasoline. But the drop in fuel economy and increase in global warming emissions enabled by this bonus overwhelms any benefits from using today's ethanol. Even worse, these vehicles actually use ethanol less than one percent of the time. Automakers must use FFVs as a complement, not a substitute, for improved fuel economy.

Diesel has the potential to cut global warming pollution, but significant reductions in smog-forming emissions are needed before it can help an automaker's overall environmental score. Volkswagen's diesels improved its global warming score by three points, but sank its smog score by 19 points.

Tighter regulations are vital to driving pollution progress. More stringent state and federal smog standards have forced all automakers to reduce their impact on public health. This progress has not been repeated on global warming emissions, because automakers have not been required to meet targets, or on fuel economy, where standards have been stagnant for two decades. California recently took the lead, requiring automakers to start cutting global warming emissions in 2009. These standards must be adopted nationwide to ensure that the auto industry does its part to address global warming.

Methodology

Each automaker has been scored on the average per-mile emissions of global warming and smog-forming pollutants from the new vehicles it sold in MY2005. The emission average across all eight manufacturers is defined as a score of 100, and each automaker is assigned a score indexed to this average. Thus a score of 80 indicates that an automaker's average emissions across all the vehicles it produces is 80 percent of the industry average. Lower scores indicate lower emissions. Separate scores have been computed for global warming and smog-forming pollution, and the overall rankings weight these two scores equally.

Key Results by Automaker

1. Honda retains the title of Greenest Automaker, with the lowest levels of global warming and smog-forming emissions. Honda is one of only two automakers that have better-than-average global warming scores in every class in which they produce vehicles. However, Honda's lead on smog has slipped from a commanding 22 points in MY2003 to just six points, while its lead on global warming emissions has dwindled to just one point. To remain the Greenest Automaker, Honda must exceed its current commitment to increasing fuel economy and go beyond existing smog standards.

2. Toyota regains second place overall in these rankings and is the only automaker to make consistent improvements on its global warming score since 2001. Toyota has the best global warming performance in six out of 10 classes and better-than-average performance in the rest. If past trends continue, Toyota may overtake Honda's global warming score within two years. Doing so will require continued investments in hybrids and expanded leadership across more vehicle classes.

3. Hyundai-Kia debuts with a third-place combined pollution score, thanks to balanced fourth-place finishes in both the smog and global warming categories. While Hyundai-Kia does not lead any class, it is the worst in only one class in each pollution category.

4. Nissan has slipped from the second place it held in the previous *Automaker Rankings* report. Its smog scores still nearly tie Toyota's, but its poor performance on global warming emissions costs it third place. If, instead of exploiting the FFV loophole, Nissan actually produced vehicles as efficient as it has been given credit for, it would move into third place in the overall scores.

5. Volkswagen finishes fifth in combined performance, but has the worst global warming scores in three of the five classes in which it produces vehicles, and the worst smog and combined scores in four out of five classes. Volkswagen is the only automaker that failed to offer a single model that led its class in any environmental category (global warming, smog, or combined).

6. Ford continues to be the best of the Big Three automakers—although it has fallen back from better than average in MY2003 to worse than average in MY2005. If Ford had cut global warming emissions in its American fleet since 1997 by the same percentage it has cut them in its European fleet over that time, it would tie for third place in the global warming scores and move into fifth place overall.

7. GM has made significant progress on smog since the last *Automaker Rankings* report, which, along with a flat global warming score, is sufficient to pull it out of last place. But it undermines its class-leading global warming scores in some classes with lackluster performance elsewhere. GM touts its position as the leading manufacturer of vehicles that get more than 30 miles per gallon (highway), but a closer look reveals that it is also the top producer of vehicles that get 15 mpg or less (city).

8. DaimlerChrysler returns to its position as dirtiest among the major automakers, with the worst scores on both global warming and smog-forming emissions. DaimlerChrysler has the worst global warming scores in five out of 10 classes, and its small pickup trucks have the worst smog score of any vehicle class evaluated.

The Automotive Industry and the Environment

The auto industry and its products are inextricably linked with Americans' way of life, the U.S. economy, and the environment. The automobile endures as both a practical necessity and a cultural icon in the United States, where more cars and light trucks are registered than there are licensed drivers (FHWA 2005). In fact, the U.S. market accounts for nearly one-third of global vehicle sales (Ward's 2006). The eight companies evaluated in this analysis—whose combined revenues topped one trillion dollars in 2005—are all in the top 100 of the *Fortune* Global 500, and four are in the top 10 (Fortune 2005). An additional four of the top 10 spots are occupied by companies that supply fuel for these vehicles, reflecting the enormous volume of petroleum that these cars and trucks demand and hinting at the magnitude of the environmental impacts that come with that consumption.

The auto industry is well aware of the environmental impacts of its products, and many manufacturers have made a point of touting their progress on reducing these impacts. Toyota, for example, bought billboard space to tally the gallons of gasoline saved by people driving its hybrids. GM introduced its "Live Green, Go Yellow" campaign to draw attention to its ethanol-capable flexible-fuel vehicles. Honda has been advertising something it calls "environmentology."[1] Consumers face a barrage of sometimes contradictory claims about the greenness of automakers' vehicles and technology offerings. In a recent interview, Mark LaNeve, head of North American sales for GM, highlighted this issue: "There's definitely a perceptual gap between how our portfolio is perceived, as opposed to reality, in terms of fuel economy" (Tierney 2007).

This report helps resolve that "perceptual gap" by providing consumers and industry observers with a definitive, transparent measure of the environmental performance of the Top Eight automakers in the U.S. market. It replaces marketing spin and promises with quantitative analyses of the vehicle fleets actually sold by each automaker, based on government data. The analyses in this report examine not only the overall environmental performance of the automakers, but also their average performance in each of 10 classes and their commitment to offering customers green choices in popular models. The report culminates with suggestions about how automakers might improve their environmental performance, rather than just their marketing images.

Passenger Vehicle Pollution

The manufacture, use, and disposal of motor vehicles have substantial environmental impacts, including water pollution, land use, urban congestion, noise, smog, toxics, and global warming. Of these, smog and global warming form the basis of the ranking provided here.

Smog

The key ingredient in smog is ground-level ozone, an irritant that impairs lung function, exacerbates asthma, and damages the lining of the lungs (EPA 2002). Repeated exposure to ozone can lead to permanent lung damage (ATS 1996). As of December 2006, 56 percent of Americans lived in areas that failed to meet public heath standards for smog (EPA 2006).

[1] Defined by Honda as its "ongoing commitment to environmentally responsible technology" *(http://corporate.honda.com/environmentology/index.aspx).*

Ground-level ozone is formed by the reaction of two pollutants—volatile organic compounds (VOCs) and nitrogen oxides (NO_x)—in the presence of sunlight. Regulations in the United States have greatly reduced the permissible emissions of NO_x and VOCs from automobiles, but tailpipe emissions from cars and light trucks still account for approximately 20 percent of smog-forming pollution nationwide. A key reason for this is that since 1970, when tailpipe emissions were first regulated, the number of vehicles on American roads has more than doubled and the total miles those vehicles travel each year has nearly tripled. These changes have eroded the benefits of new emission control technologies designed in response to tighter tailpipe standards.

Global Warming

Climate change, the result of global warming, is a serious threat to both the environment and the economy. The overwhelming international consensus is "unequivocal" that climate change is real and already occurring. The *Fourth Assessment Report* from the Intergovernmental Panel on Climate Change concludes that climate change has already caused an increase in the length, severity, and area of droughts since the 1970s and that, in the future, it is very likely to cause increases in the peak wind speeds and heavier precipitation of hurricanes and typhoons, among many other effects (IPCC 2007). In addition, a recent review commissioned by the British government concluded that a failure to stem climate change could end up costing as much as 20 percent of global GDP (Stern 2006).

The production and use of gasoline by cars and light trucks in the United States is responsible for more emissions of carbon dioxide, the principal global warming pollutant, than all but two countries[2] emit from all sources combined. This need not be so. Emissions of global warming pollutants from vehicles can be reduced through greater fuel economy, the use of less carbon-intensive fuels, and improvements in air conditioning and emission control systems.

Ranking Method

This report is the Union of Concerned Scientists' fourth evaluation of the environmental performance of the major automakers in the United States. As in the previous reports (Morey, Hwang, Kliesch, and DeCicco 2000; Mark 2002; Friedman and MacKenzie 2004), it is based on the relative environmental performance of the leading automakers, using the most recent data available about their product lines. Selling a few clean models is not good enough to win the title of Greenest Automaker: the best scores go to those that show strong environmental performance across their product lines. These rankings focus on the average emissions of global warming and smog-forming pollutants from the operation of all an automaker's products.

Average per-mile global warming emissions for each automaker are calculated based on the fuel economy, fuel type, and sales of each vehicle type sold by the automaker in model year 2005 (MY2005). The global warming pollutants considered include both tailpipe emissions and upstream emissions from fuel production and distribution, which together account for more than 85 percent of the global warming pollution a vehicle produces across its entire lifecycle (Burnham, Wang, and Moon 2006; Weiss et al. 2000). A sales-weighted average emission level is calculated for each manufacturer and for all eight together. The industry-average emission rate is given a score of 100; then each automaker is assigned a score based on its average emission rate indexed to the industry-average emission

[2] Only China and Russia release more CO_2 from fossil fuel combustion (EIA 2006a).

rate. Thus a score of 80 indicates an emission level equal to 80 percent of the industry average. A score of less than 100 indicates better than average performance, and a score of more than 100 indicates worse than average performance.

Average tailpipe smog-forming emissions are calculated based on the sum of the emission certification levels for NO_x and non-methane organic gases (NMOG, a measure of VOC emissions) and on the sales of each type of vehicle sold by each manufacturer. The industry average is again assigned a score of 100, and each automaker's individual results are indexed to this average score.

The overall rankings are determined by averaging each manufacturer's global warming score with its smog score to create a combined score that weights global warming emissions 50 percent and smog-forming emissions 50 percent. Additional details on the methodology appear in Appendix A.

Ranking Results

This report assesses the environmental performance of the Top Eight automakers using a variety of analyses to determine not only *which* automaker is the greenest, but *why* it is the greenest. These analyses also help illuminate the differences between vehicle classes, the marketability of green models, and the impacts of certain emerging technologies on environmental performance. The key criteria in the overall rankings are each automaker's emissions of global warming and smog-forming pollutants, averaged across all of the vehicles that company sold in MY2005. Average performance within various vehicle classes and other analyses serve to put the overall scores in context.

Fleet Comparisons

In MY2005, Honda holds on to its position as the greenest of the major automakers, with the lowest emissions overall in both the global warming and smog categories. Table 1 shows the global warming and smog scores for each of the Top Eight automakers. The scores are proportional to the per-mile emission level of each automaker's average vehicle, with 100 defined as the average emission level across all eight manufacturers in MY2005; the lower the score, the cleaner the car.

Honda's lead has eroded somewhat since the UCS ranking of MY2003 vehicles. Honda has slipped a couple of points on global warming, while Toyota has improved, closing the gap to just one point. Honda continues to be the clear leader in reducing smog-forming emissions, though here too its lead has diminished considerably. Hyundai-Kia debuts in third place, trailing Toyota in both smog and global warming performance. Nissan is comfortably in the fourth spot, with only average global warming performance

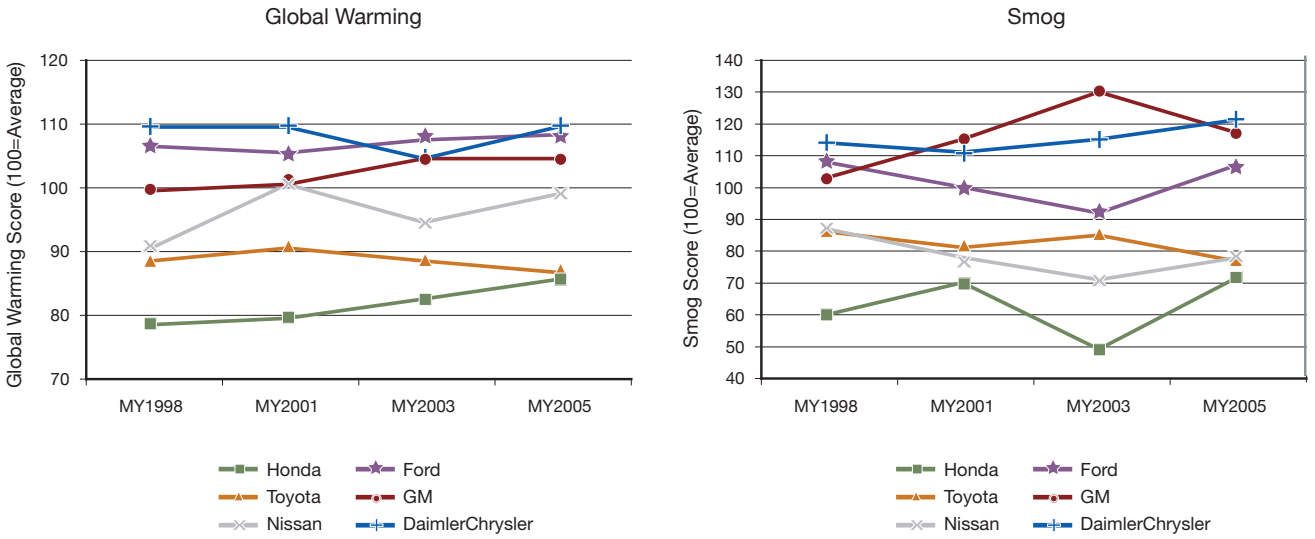
Table 1: Environmental Scores (by Automaker)

Automaker	Global Warming	Smog	Combined
Honda	85	70	78
Toyota	86	76	81
Hyundai-Kia	93	81	87
Nissan	99	77	88
Volkswagen	90	113	101
Ford	108	106	107
GM	104	116	110
DaimlerChrysler	109	120	115
Average	**100**	**100**	**100**

but a smog score that nearly matches Toyota's. Volkswagen is in fifth place overall, behind Hyundai-Kia and Nissan. Volkswagen has a solid third place on global warming, thanks in large part to its diesels, which accounted for 11 percent of its sales in MY2005 and produced 22 percent less global warming pollution per mile than Honda's average vehicle. However, its diesels also produced more than double the smog-forming pollution of last-place DaimlerChrysler, and this poor smog performance hurt Volkswagen's overall ranking considerably. By including diesels in its product line, Volkswagen gains three points on global warming, but loses 19 on smog.

Ford, in sixth place, holds on to its title as the cleanest of the Big Three automakers due to its continued lead in reducing smog-forming emissions. However, that lead is slipping because it is making slower progress on smog than GM and DaimlerChrysler and no progress at all on global warming. Ford's position shows that it has the capability and willingness to apply technology to reduce smog-forming pollution. Moreover, Ford is one of only a handful of companies recently judged to be nearly on track to

Figure 1. Relative Environmental Performance of the Big Six Automakers (1998–2005)



comply with Europe's voluntary global warming standards for automobiles (T&E 2006).[3] If Ford had reduced global warming emissions from its American fleet since 1997 the same way it has cut emissions from its European fleet, it would tie Volkswagen for third place on global warming, instead of finishing seventh as shown here. And with its cleaner smog score, it would move ahead of Volkswagen into fifth place in the overall rankings. In this context, Ford's continued lack of progress on global warming emissions from its American vehicle fleet is especially dismaying.

GM, in seventh place overall, has the best global warming score of the Big Three, though there is little to choose between them in this regard. The three are clustered, closer to each other than to any of their competitors. DaimlerChrysler is dead last on both smog and global warming emissions, cementing its position as the dirtiest of the Top Eight manufacturers.

Trends in Pollution Scores

This report is the fourth UCS analysis of the pollution performance of the major automakers, stretching back to MY1998. Figure 1 shows the trends in relative pollution scores from the Big Six automakers over these four reports. (Since Volkswagen and Hyundai-Kia were not evaluated in past reports, they do not appear in this figure.) The scores graphed in Figure 1 illustrate each automaker's pollution performance relative to the average for each year. All of the automakers improved their smog-forming emissions between MY2003 and MY2005, but only Toyota and GM improved by more than the average. Thus their lines turn down, indicating greater progress toward lower emissions. The other automakers improved more slowly than the average, and so their scores were worse in MY2005 than in MY2003, even though their actual emissions were better. The automakers are essentially being graded on a curve: each one's score depends not only on how well it does, but also on how well its competitors do.

Overall, progress in reducing global warming emissions has been minimal since the first UCS ranking, as the average global warming emissions of the Big Six automakers have improved by less

[3] Between 1997 and 2005, Ford cut the average tailpipe CO_2 emissions of its European new vehicle fleet from 180 g/km to 151 g/km, which was 95 percent of the reduction needed to be on track for the 2008 target of 140 g/km.

than two percent between MY1998 and MY2005. Most companies' global warming scores worsened over this period; only Toyota consistently improved its relative performance between MY2001 and MY2005. Honda's lead on global warming, which was 11 points in MY2001, dwindles to just one point by MY2005. Honda has committed to reducing the average global warming emissions of its vehicles by five percent between 2005 and 2010 (Honda 2006). But Toyota decreased its global warming emissions by eight percent between MY2001 and MY2005. If those reductions continue, Toyota could overtake Honda's five percent reduction pathway by the time UCS ranks MY2007 vehicles.

Other automakers are falling behind. Between MY2003 and MY2005, Nissan lost most of the progress it had made on global warming since the previous ranking. This slip in performance coincides with the introduction of the full-size Titan pickup and Armada SUV. DaimlerChrysler, after moving ahead of Ford to tie with GM on global warming in MY2003, dropped back to the same position it occupied in the first two UCS rankings: last place among the Big Six, with global warming emissions nine points worse than the average.

On smog, the field tightened up in MY2005 compared with MY2003. This demonstrates the success of the Environmental Protection Agency's (EPA) Tier 2 program and California's LEV II program, which require all manufacturers to clean up their acts, thereby reducing the differences between them. In MY2003, Ford, Honda, and Nissan made gains on their smog scores, as they began implementing Tier 2 emission standards ahead of schedule. The gap closed between MY2003 and MY2005, as Toyota and GM rolled out more Tier 2 vehicles. The spread between the best and worst performers narrows from 80 points in MY2003 to 50 points in MY2005, and the gap between first and second place narrows from 22 to just six points. When fully implemented, Tier 2 standards will eliminate differences in smog standards for different classes of cars and light trucks, and all manufacturers will be expected to meet the same average standard. Honda, or any company that wants to show leadership on smog, will therefore need to go beyond the requirements of Tier 2 to differentiate itself from the pack.

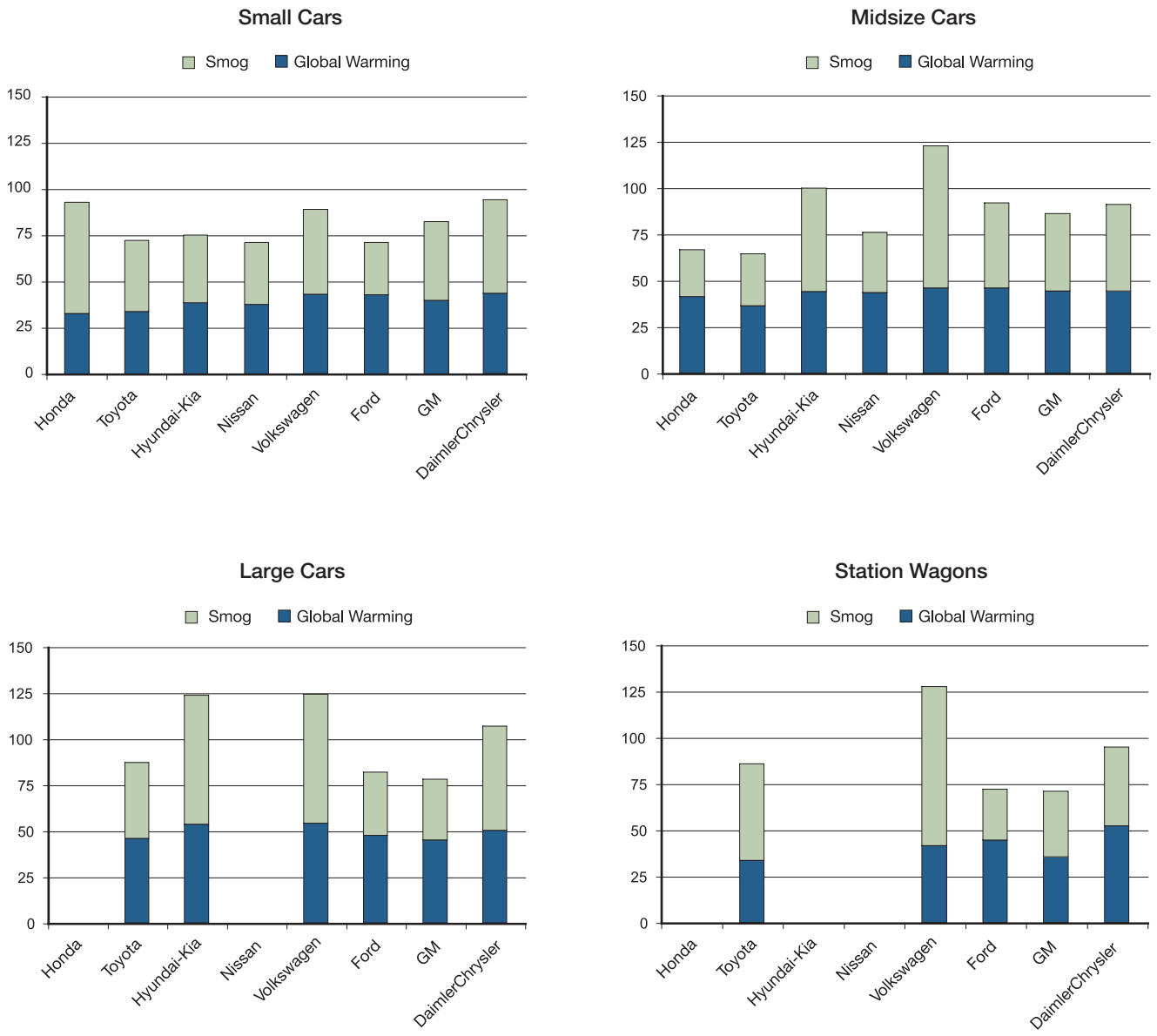
Class Comparisons

Figure 2 (p. 11) shows the combined pollution scores for various car classes, and the relative contributions of the smog and global warming scores. These scores are the average results for all of a manufacturer's vehicles in the class. For example, Honda's midsize cars in MY2005 included the Accord, Accord Hybrid, Acura RL, and Acura TL. Honda's midsize car score was therefore calculated as a sales-weighted average of the scores for each of these models.

Ford's small cars are the cleanest overall in their class. Despite a relatively poor global warming score, its industry-leading performance on smog pulls it in front. Honda's small cars, on the other hand, lead the class in global warming performance but score dead last on smog. This poor performance on smog ties Honda with DaimlerChrysler for last place overall in the class—an anomaly for the Greenest Automaker. This is probably the result of the Civic's outdated design as it approached the end of its product cycle. (Its MY2006 redesign cut smog-forming emissions by approximately 60 percent.)

Toyota comes out on top in the key midsize car class, thanks to a global warming score that is 10 points better than its nearest rival in this class—the biggest lead in any of the classes evaluated—and a smog score that nearly matches Honda's. Toyota's lead on global warming performance in the midsize car class is due in large part to the Prius. If hybrids are omitted from

Figure 2. Smog and Global Warming Scores of Cars (by Class)

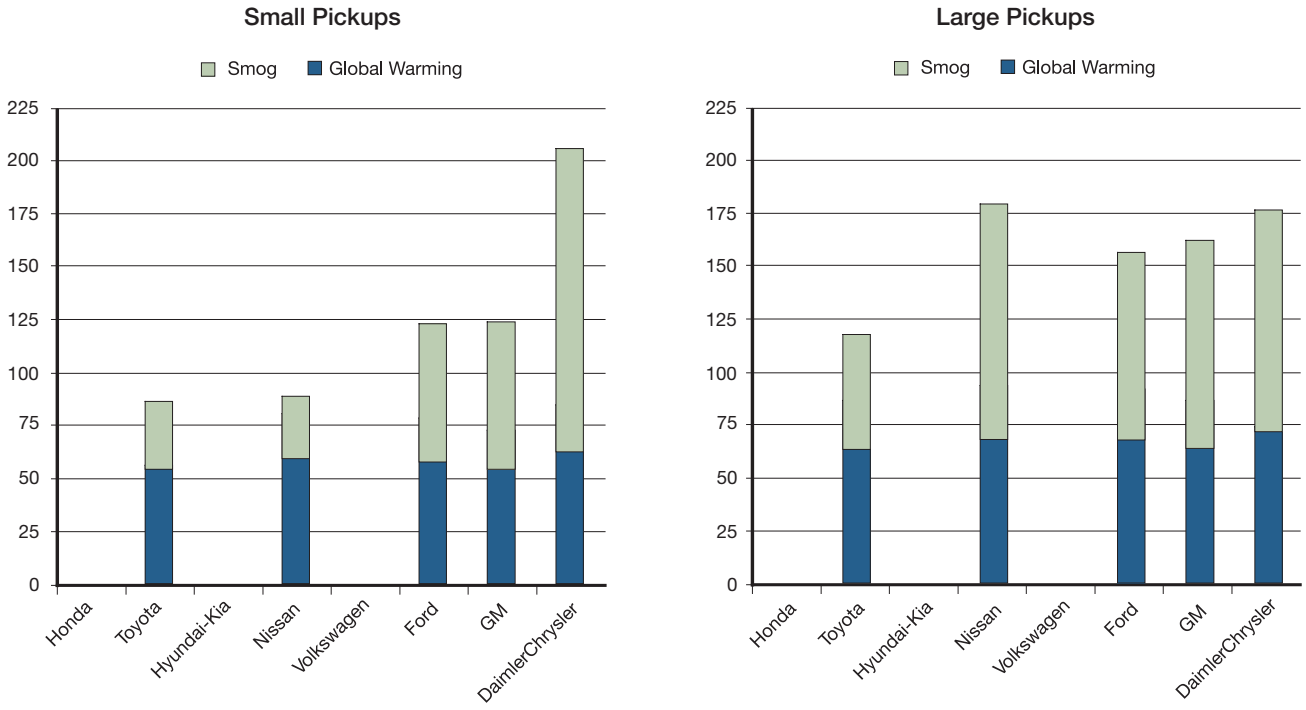


the analysis, Toyota edges out Honda by only two points on global warming, instead of 10. Volkswagen is the clear loser in the midsize car class, with the worst score on both global warming and smog.

In the large car class, GM scores the best on both global warming and smog, though the field is smaller since Honda and Nissan sell no vehicles in this class. Volkswagen and Hyundai-Kia essentially tie for dirtiest-in-class on both smog and global warming. In fact, the average large car from Volkswagen and Hyundai-Kia produced more than twice the smog-forming pollution per mile as the average large car from GM or Ford.

In general, as Figure 2 shows, those automakers that are cleaner in the overall fleet ranking

Figure 3. Smog and Global Warming Scores of Pickups (by Class)



(further to the left in the graphs) tend to have better emission scores within individual classes. This is particularly evident for the small and midsize car classes, which together account for 80 percent of car sales. Thus poor environmental performance cannot be blamed simply on product mix, since the cleanest automakers overall are also the ones producing cars that lead within their classes.

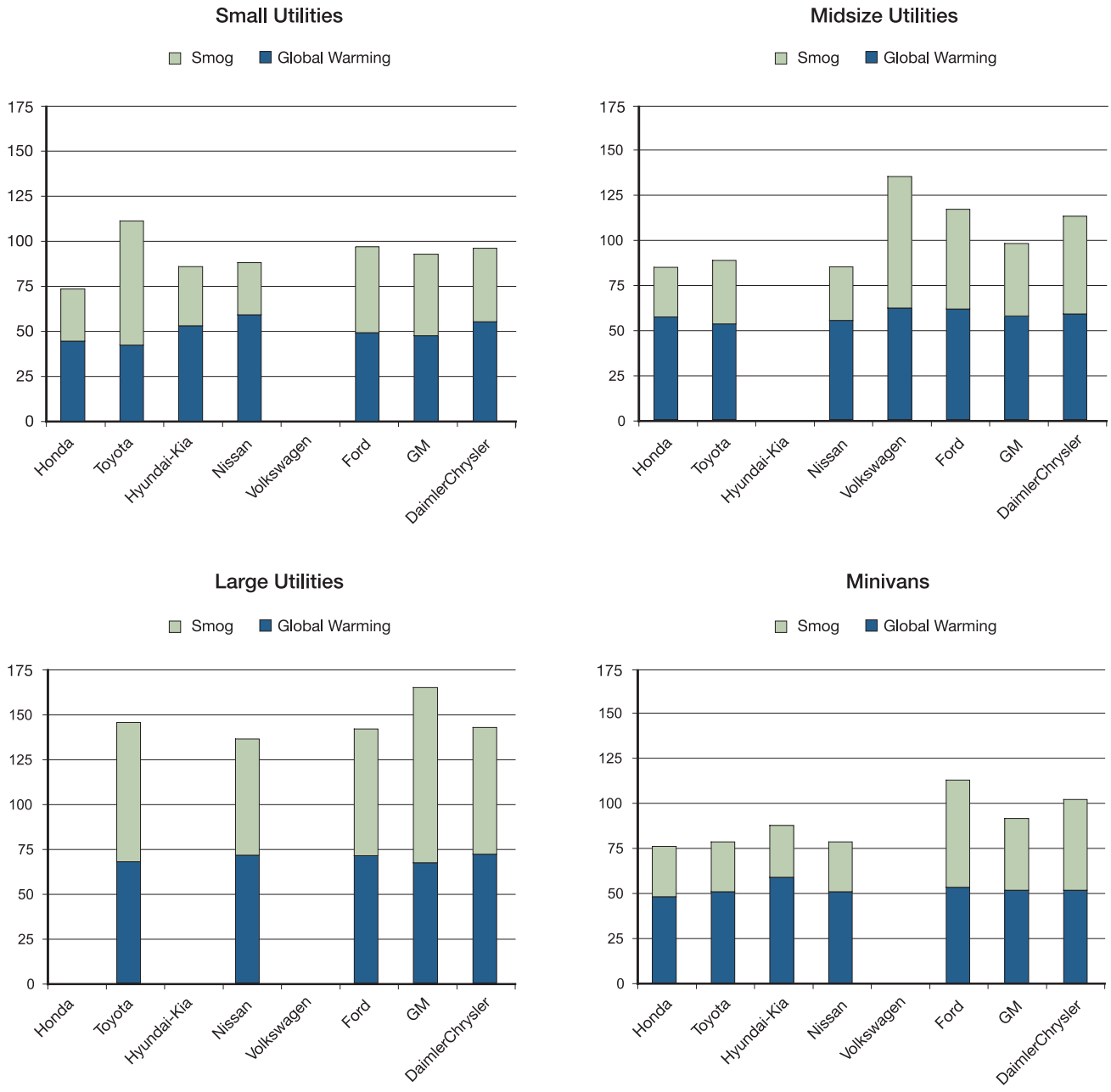
Figure 3 shows the pollution scores of the average small and large pickup trucks from each manufacturer. Toyota and GM essentially tie as the leaders on global warming performance from both small pickups and large pickups. (GM's global warming scores are actually about 1/20 of a point less than Toyota's for the small pickup class, and 1/6 of a point less for large pickups.) But Toyota beats GM decisively when smog-forming emissions are considered. In the small pickup class, Nissan edges Toyota slightly on smog, and its overall score is only slightly worse than Toyota's.

DaimlerChrysler's small pickups are the worst in their class on both global warming and smog, producing more than double the smog-forming pollution per mile of their nearest competitors and five times more per mile than class-leader Nissan's small pickups. They also have the ignominious distinction of being the dirtiest group of vehicles in any class from any of the manufacturers evaluated for this analysis.

In the large pickup class, Toyota is the overall winner by a large margin, as Nissan fails to show the same leadership it does in the small pickup class. In fact, Nissan's large pickups are the dirtiest overall in their class.

Figure 4 (p. 13) shows the average pollution scores for various classes of sport utility and crossover utility vehicles (SUVs and CUVs) and minivans. In the small utility class, Honda has the

Figure 4. Smog and Global Warming Scores of Utilities and Minivans (by Class)



best smog performance and the best combined emission score. Nissan also has class-leading smog performance, but its global warming score is nearly 30 points higher than Honda's, keeping it out of the winner's circle. Toyota has the lowest average global warming emissions, but its worst-in-class smog score puts it in last place overall.

Honda and Nissan tie for top spot in the popular midsize utility class, with similar scores on both global warming and smog. Toyota narrowly wins on global warming performance, but is slightly dirtier on smog, pushing it into

third place overall. The Big Three's midsize utilities are considerably dirtier than Toyota's, but Volkswagen once again takes last place on both smog and global warming.

Nissan's large SUVs have the best scores overall in their class, though the spread between best and worst in the large SUV class is less pronounced than in other classes. In short, all of the automakers' large SUVs have very poor pollution performance. GM has the best global warming score in the class, narrowly beating out Toyota, but GM's poor smog performance puts it squarely in last place overall.

Minivans from Honda, Toyota, and Nissan all have identical smog scores, and Hyundai-Kia is only slightly worse. However, Honda edges out Toyota and Nissan on global warming to claim the best combined score in the minivan class.

As with cars, performance in the truck classes indicates that, with a few exceptions, the automakers that score well in the overall rankings are the same ones that have better-than-average performance within each individual class.

Leaders and Losers

Further insights into each automaker's performance are gained by considering which consistently earn top marks across multiple classes and which consistently rank last. Table 2 summarizes the number of classes in which each manufacturer has either the best or the worst average performance. In cases where two automakers are separated by less than one point, they are deemed to be tied. This avoids giving undue credit for minimal differences. When considering these numbers, remember that only four companies—Toyota, Ford, GM, and DaimlerChrysler—are "full-line" manufacturers, producing vehicles in all 10 classes. Nissan produces vehicles in eight classes, but does not produce a large car or a station wagon. Honda, Hyundai-Kia, and Volkswagen each produce vehicles in five classes.

Toyota is the clear leader on in-class global warming performance, with the best average global warming scores in six out of 10 classes. GM and Honda each lead on global warming emissions in 40 percent of the classes in which they produced vehicles—GM in four out of 10 and Honda in two out of five. Toyota, GM, and Honda are the only automakers to occupy class-leading positions in average global warming performance.

Volkswagen and DaimlerChrysler are the biggest losers on in-class global warming

Table 2: Number of Classes with Best or Worst Pollution Scores (by Automaker)

Automaker	Global Warming		Smog		Combined		Classes Competing
	Best	Worst	Best	Worst	Best	Worst	
Honda	2	0	4	1	3	1	5
Toyota	6	0	2	1	3	1	10
Hyundai-Kia	0	1	0	1	0	1	5
Nissan	0	1	4	1	3	1	8
Volkswagen	0	3	0	4	0	4	5
Ford	0	2	2	1	1	1	10
GM	4	0	1	1	2	1	10
DaimlerChrysler	0	5	0	1	0	2	10

Note: Column totals exceed 10 where ties occur.

performance. Volkswagen has the worst average global warming scores in three out of five classes (60 percent), while DaimlerChrysler is the worst in five out of 10 classes (50 percent).

Honda's leadership in reducing smog-forming pollution is clearly demonstrated by its best-in-class smog scores in four out of five classes. However, all the automakers have at least one mark of shame in the form of a class in which they have the worst smog performance. Volkswagen stands out as the in-class loser on smog, with the worst average smog scores in four out of five—80 percent—of the classes in which it produced vehicles in MY2005.

Honda's leadership on smog earns it the top spot in combined pollution scores in four out of five classes. Volkswagen stands out as the dirtiest automaker in four out of the five classes in which it produced vehicles. Only in the small car class do Volkswagen products not have the dirtiest combined environmental performance, on average.

One of the most compelling conclusions from this analysis is that a full-line manufacturer can compete for the title of Greenest Automaker, if it puts technology to work on its vehicles. Although all of the automakers could be doing much better at lowering global warming emissions, Toyota's in-class leadership allows it to nearly match Honda's overall global warming score, despite the fact that Toyota produces vehicles in a number of classes where Honda does not, including large cars, large SUVs, and small and large pickups. Critically, Toyota outperforms Honda by 10 points on global warming in the midsize car class and by eight points in the midsize utility class. These two key classes accounted for 42 percent of Toyota's sales and 49 percent of Honda's sales in MY2005. This strong performance helps make up for Toyota's sales of dirtier vehicles in other classes, allowing it to nearly tie Honda's overall global warming score. If Toyota applies the same effort to reducing its smog-forming emissions, it could tie with Honda for the overall Greenest Automaker. Other automakers should follow Toyota's lead in putting technology to work across all vehicle classes.

The case of GM illustrates an additional important lesson: it is not enough for an automaker to lead only in certain classes; to improve its overall pollution performance, an automaker must perform well in all classes and lead some by a substantial margin. While GM has the best average global warming scores in four classes, its performance is worse than average in four others. Even in the classes where it leads, its scores are only three to six points better than the class averages. In contrast, Honda and Toyota have better-than-average global warming performance in every class, even in those where they are not the very best. In classes where they do lead, Honda's and Toyota's vehicles are 6 to 17 points better than the class averages. Consistent, strong performance across all vehicle classes is therefore a characteristic of the greenest automakers.

Consumer Choice

Another measure of an automaker's environmental commitment is the environmental choices it offers consumers. In contrast to the preceding section, which compared the automaker's *average* performance in each class, this section compares the best of the best, pitting each automaker's cleanest individual models against one another. Which automakers offered their customers models that were the greenest in their classes (according to global warming, smog, or combined pollution performance)? And which automakers combined environmental excellence with other desirable characteristics, to produce vehicles that were not only green, but also appealing to customers?

Table 3 lists the number of classes in which each manufacturer offered least-polluting models

Table 3: Number and Sales of Class-leading Models (by Automaker)

Automaker	Number of classes in which each manufacturer offers the class leader			Classes Competing	Sales of Class Leaders	Share of Manufacturer's Total Sales
	Global Warming Leaders	Smog Leaders	Combined Leaders			
Honda	1	2	1	5	364,738	26%
Toyota	4	6	5	10	1,075,341	47%
Hyundai-Kia	0	1	1	5	132,495	18%
Nissan	0	2	1	8	43,303	4%
Volkswagen	0	0	0	5	-	0%
Ford	2	3	3	10	120,010	4%
GM	2	0	2	10	138,140	3%
DaimlerChrysler	1	1	0	10	16,989	1%

Note: Column totals exceed 10 where ties occur.

and the total sales of class-leading vehicles. A class-by-class breakdown of the leading models appears in Appendix B.

Toyota is the clear leader in offering its customers the best environmental choices. Toyota offered the model with the best global warming score in four out of 10 classes, and the model with the best smog score in six out of 10 classes. It also had the model with the best combination of smog and global warming performance in five out of 10 classes. Toyota's greener vehicle choices were popular sellers as well, accounting for more than one million vehicles—nearly half of Toyota's total sales—in MY2005. Indeed, Toyota sold more class-leading vehicles than the other seven automakers combined.

Toyota's leadership on smog-forming emissions is interesting, because despite offering leading models in six classes, Toyota's average smog performance was best in only two classes. This indicates that these class leaders were offset by models with poorer performance. Toyota clearly has the ability to produce low-smog vehicles; if it puts this technology to work on more of its vehicles, it could earn the best average scores in more classes. Combined with continued progress on global warming emissions, such a move could put Toyota into first place overall in future rankings.

Honda was also successful at marketing its greener choices, with more than one in four of Honda's vehicles having best-in-class performance on smog, global warming, or combined pollution scores. Although Honda did not have the greenest models in many classes, its consistency in applying clean technologies to nearly all its vehicles allows it to capture the top spot in average performance in many classes (see Table 2, p. 14). This consistency helps land Honda in the top spot in these rankings and makes Honda a relatively safe bet for someone who wants to buy a green vehicle but has little time for research.

GM and Ford each had a number of class-leading models, but they failed to put green technologies to work on their most popular models. Although five models from Ford led their classes on one or more environmental criteria, these vehicles accounted for just four percent of Ford's

total sales. To improve their overall environmental performance, Ford and GM need to offer green technologies on their most popular models.

Volkswagen did not have a single class-leading model in MY2005. This failure to produce even a few clean vehicles cements Volkswagen's position as the worst in average performance in many classes, revealing a lack of commitment to providing American customers with top-notch environmental choices.

The Role of Popular Technologies

Several technologies are currently garnering attention from the public, the media, and policy makers for their perceived ability to reduce petroleum demand and global warming pollution. These technologies are affecting automakers' global warming scores, though not necessarily in the expected manner. This section examines two hot technologies—hybrid electric drivetrains and flexible-fuel capability—to evaluate their effects on automakers' scores.

Hybrids

Toyota's progress on global warming was helped in MY2005 by strong sales of the Prius hybrid. If hybrids are excluded from the analysis, Toyota's overall global warming score is three points worse than when they are included, and its score for midsize cars is nine points worse. Table 4 shows the average per-mile global warming emissions for each manufacturer, calculated both with and without hybrids. These results show that hybrids can make a real difference in a company's average global warming emissions, but only if a manufacturer applies hybrid technology well and on a large number of vehicles. Prius sales in MY2005 were approximately 120,000, while Honda's hybrid sales were just under 50,000. The Ford Escape Hybrid is a full hybrid that can cut global warming pollution substantially on a vehicle-by-vehicle basis, but Ford sold fewer than 11,000 Escape Hybrids in MY2005, thus limiting their benefit for Ford's overall global warming score. GM, which sold fewer than 1,200 of its "hollow" hybrids (vehicles that claim the hybrid name but fail to deliver the technology), saw no noticeable reduction to its global warming emission score due to these vehicles.

Table 4: Effect of Hybrids on Per-Mile Emissions of Global Warming Pollutants

Automaker	Global Warming Emissions g CO_2-equivalent / mile*		Improvement in Global Warming Score
	Without Hybrids	With Hybrids	
Honda	390	385	1.1
Toyota	401	389	2.7
Hyundai-Kia	422	422	0.0
Nissan	445	445	0.0
Volkswagen	407	407	0.0
Ford	488	487	0.2
GM	470	470	0.0
DaimlerChrysler	493	493	0.0

*Per-mile emission values are based on CAFE test fuel economy, which is approximately 25% greater than real-world results, on average. Actual per-mile emissions will be higher than the above values for most drivers.

Flexible-fuel Vehicles

In contrast to hybrids, which even in small numbers are already reducing global warming emissions, flexible-fuel vehicle (FFV) sales are currently increasing global warming emissions. A loophole in the fuel economy law allows automakers to produce FFVs as a way of earning credit toward meeting Corporate Average Fuel Economy (CAFE) requirements. An automaker may produce a fleet of vehicles that gets less than the prescribed miles-per-gallon standard, if it produces a sufficient number of FFVs. In MY2005, all of the FFVs sold were vehicles that could run on either gasoline or E85 (a fuel containing 85 percent denatured ethanol and 15 percent gasoline). The government assumes that FFVs operate on alternative fuels 50 percent

of the time, but FFVs actually use E85 less than one percent of the time (MacKenzie, Bedsworth, and Friedman 2005; EIA 2006b).

Table 5 shows the effect of flexible-fuel vehicle sales on each manufacturer's global warming emission average. Global warming emission averages were calculated for various levels of E85 usage: two percent (somewhat higher than actual usage[4]), 50 percent (the level assumed by the government in the assignment of CAFE credits), and 100 percent (the maximum possible).

The tiny reduction in global warming pollution that is realized from vehicles using E85 does not come close to making up for the increase in global warming pollution due to the FFV loophole. The E85 currently available provides only a 16 percent reduction in global warming emissions compared with the gasoline it replaces, but automakers receive a 65 percent bonus on the credited fuel economy of FFVs. As a result, even if FFVs used E85 100 percent of the time, this would still not compensate for the fuel economy loophole. Manufacturers would do much more to reduce global warming emissions if they satisfied fuel economy standards by selling more efficient vehicles, rather than exploiting the dual-fuel loophole. In fact, if Nissan had actually produced a fleet of vehicles as efficient as it was given credit for, its global warming score would have been good enough to put it ahead of Hyundai-Kia in combined scores, into third place overall.

Table 5: Effect of Flexible-Fuel Vehicles on Per-Mile Emissions of Global Warming Pollutants

Automaker	Global Warming Emissions, g CO_2-equivalent / mile*			
	E85 Usage			If manufacturers actually earned credited MPG
	Actual (2%)	Government Assumption (50%)	Maximum (100%)	
Honda	n/a	n/a	n/a	385
Toyota	n/a	n/a	n/a	389
Hyundai-Kia	n/a	n/a	n/a	422
Nissan	445	444	442	438
Volkswagen	n/a	n/a	n/a	407
Ford	487	484	479	467
GM	470	468	465	456
DaimlerChrysler	493	493	492	491

* Per-mile emission values are based on CAFE test fuel economy (which is approximately 25% greater than real-world results, on average) and on the listed alternative fuel use assumptions. Actual per-mile emissions will be higher than the above values for most drivers.

[4] The global warming scores were based on two percent E85 usage in order to give the benefit of the doubt to FFV manufacturers and in recognition of the fact that E85 fueling infrastructure has recently been growing, although E85 is still available at less than one percent of gas stations nationwide (AFDC 2007).

"30 mpg" Claims

Automakers, particularly GM, frequently make claims in marketing and PR materials* about the number of vehicles they make that get more than 30 miles per gallon (mpg). For MY2007, GM claims to offer 23 models that get more than 30 mpg, but arriving at this number takes some creative counting. First, GM counts the hatchback, sedan, and convertible versions of the same vehicle as multiple models. For example, it counts the Aveo, a sedan, and the Aveo 5, its sister hatchback, as two distinct models. The Malibu and Malibu Maxx are counted separately even though the latter is a modified hatchback version of the former. Finally, GM counts the Saab 9-3 sedan, convertible, and SportCombi as three distinct models. In this way, three models balloon into seven.

Second, the "fine print" in these claims is that the 30+ mpg figure is the EPA highway rating, which for nearly all vehicles is higher than the city rating. The highway rating is cited despite the fact that more than half of all driving is done in the city. Toyota manipulates this difference in reverse for the Prius, opportunistically citing in TV ads the 60 mpg city estimate, which is higher than the highway estimate.

When considering vehicles that get more than 30 mpg in combined EPA fuel economy—a more appropriate measure of fuel economy leadership—Toyota is the clear industry leader, responsible for nearly half of the vehicles in this category (see Table 6).

Finally, GM also touts the fact that its Chevrolet brand sells more 30+ mpg (highway) vehicles than Ford, Honda, Nissan, or Chrysler.** While it is true that in MY2005 GM sold more of these vehicles in the United States than any other automaker, they accounted for less than one-third of GM's sales. In contrast, nearly two-thirds of the vehicles sold by Volkswagen in MY2005 and half of those sold by Honda and Toyota met this criterion. At the other end of the spectrum, GM also sold more than one million vehicles that had an EPA rating of 15 mpg or worse in city driving—more than any other automaker (though Ford was not far behind). In fact, the Big Three sold 62 percent of all vehicles considered in this study, but they sold 88 percent of the vehicles rated at 15 mpg or less in the city.

Table 6: Sales of Vehicles with Fuel Economy ≥ 30 mpg and ≤ 15 mpg

Automaker	Vehicles ≥ 30 mpg (highway)		Vehicles ≥ 30 mpg (combined)		Vehicles ≤ 15 mpg (city)		Automaker's Total Sales
	Sales	Percent of Automaker Total	Sales	Percent of Automaker Total	Sales	Percent of Automaker Total	
Honda	716,419	52%	306,546	22%	0	0%	1,390,671
Toyota	1,122,775	49%	656,807	28%	141,117	6%	2,309,788
Hyundai-Kia	314,441	43%	28,920	4%	24,103	3%	725,646
Nissan	172,185	15%	110,082	10%	200,041	18%	1,119,308
Volkswagen	174,256	64%	29,320	11%	17,459	6%	270,952
Ford	347,760	12%	16,885	1%	1,015,491	35%	2,872,584
GM	1,222,536	31%	88,669	2%	1,055,728	27%	3,948,804
DaimlerChrysler	269,660	10%	139,168	5%	630,188	24%	2,609,736
Top Eight	**4,340,032**	**28%**	**1,376,397**	**9%**	**3,084,127**	**20%**	**15,247,489**

* For example, see *http://www.theautochannel.com/news/2006/10/18/025385.html.*

** "30 MPG is Pretty Common at Chevy," as published on *http://www.chevrolet.com/fueleconomy* on January 30, 2007.

Conclusions

With the operation of cars and light trucks accounting for 25 percent of global warming pollution and 20 percent of smog-forming pollution in the United States, the environmental performance of these vehicles has a significant effect on public and environmental health. Considerable progress has been made recently on reducing tailpipe emissions of smog-forming pollutants, but there is still room for improvement, and sadly little has been done to reduce global warming emissions from vehicles.

In response to tightening regulations (LEV II in California and other states that follow its lead, and the EPA's Tier 2 in the rest of the country), the average tailpipe emissions of smog-forming pollutants from the Big Six automakers were cut by more than 50 percent between MY2003 and MY2005. While the incoming regulations spurred some automakers—notably Honda, Nissan, and Ford—to early compliance in MY2003, other automakers have since closed the gap considerably. In fact, the spread between the best and worst automakers shrank from 81 points in MY2003 to 50 points in MY2005. When the new smog regulations are fully phased in, all automakers will be required to meet the same average smog-forming emission standards, regardless of their product mixes.

Compared with smog-forming emissions, progress on global warming emissions has been almost nonexistent. Although the average global warming emissions of the Big Six automakers were three percent lower in MY2005 than in MY2003, MY2001 emissions were in fact higher than in MY1998. As a result, average emissions decreased by only one percent over the seven years from 1998 to 2005. In contrast, average emissions of global warming gases from new vehicles in Europe decreased by 12 percent between 1997 and 2005 (though 12 percent is still an extremely modest reduction). All automakers, including the leaders in these rankings, can and should be doing much more to cut global warming emissions from their fleets.

Individual Automaker Results

Honda retains its title as the Greenest Automaker in the U.S. market, with its cars and trucks producing the least pollution of all the major automakers in both the global warming and smog categories. However, Honda's lead has eroded somewhat since the previous *Automaker Rankings* report, as it fails to maintain its former commanding lead on smog and continues its slide on global warming emissions. In fact, Honda's lead over Toyota in global warming scores slipped from 11 points in MY2001 to just one point in MY2005. Despite this, Honda is one of only two automakers to have better-than-average global warming scores in every class of vehicles it sold in MY2005. In addition, Honda continues to have the best smog score in four out of the five classes. In MY2005, 26 percent of Honda's sales were from vehicles that took best-in-class on global warming, smog, or combined environmental performance.

Toyota regains second place overall in the rankings. It is the only one of the Big Six automakers to have made consistent progress on cutting global warming emissions between MY2001 and MY2005, reducing them by eight percent over that time. It has closed to within one point of Honda on global warming scores, despite

producing vehicles in a number of classes where Honda does not, including pickups, large cars, and large SUVs. If past trends continue, Toyota could overtake Honda for the top spot in global warming emissions by the time of the next *Automaker Rankings* report. Toyota has also started to catch up on smog-forming emissions, reducing its levels to edge out Nissan for second place on smog performance. Toyota has the best global warming scores in six out of 10 classes and better-than-average performance in the other four. As a result, it nearly ties Honda on global warming performance, showing that a full-line manufacturer can compete for the title of Greenest Automaker if it puts technology to work throughout its fleet. Toyota offers its consumers excellent environmental choices: it offers the individual model with the best global warming score in four out of 10 classes, the best smog score in six out of 10 classes, and the best combined score in five out of 10 classes. Nearly half of Toyota's MY2005 sales were of vehicles that took best-in-class on one or more environmental scores.

Hyundai-Kia parlays fourth-place finishes in both smog and global warming into a third-place combined pollution score. It beats out Nissan on global warming and Volkswagen on smog, and this balanced performance is enough to just edge out Nissan on the combined score. While Hyundai-Kia does not have the best scores in any class, it is the worst in only one class in each pollution category. Only one Hyundai model—the Elantra—offered best-in-class performance on smog and combined emissions, but this model accounted for nearly one of every five vehicles Hyundai-Kia sold in MY2005.

Nissan slips from second place in the previous rankings, as it lost ground on both smog and global warming scores. Although its smog scores still nearly tie Toyota's, its poor performance on global warming allows Hyundai-Kia to slip in ahead. While its global warming performance is mediocre, Nissan has the best smog scores and the best combined scores in three out of eight classes and comes in last in only one class.

Volkswagen finishes fifth in combined performance, with a solid third place on global warming but a sixth place on smog-forming emissions—the most widely divergent smog and global warming scores of any automaker considered in this report. Volkswagen is the unmitigated loser in terms of in-class pollution performance. It has the worst global warming scores in three of the five classes and the worst smog and combined scores in four out of the five classes in which it produced vehicles in MY2005. In addition, Volkswagen is the only automaker that failed to offer a single model that led its class in any pollution category (global warming, smog, or combined) in MY2005. Volkswagen's diesels hurt its score more than they help, as they improve its global warming score by three points but hurt its smog score by 19 points.

Ford continues to be the cleanest of the Big Three automakers, although it has fallen back from better than average in MY2003 to worse than average in MY2005 and lost considerable ground to GM. Despite being recognized as one of the few automakers making adequate progress on its European global warming emission reduction targets, Ford's U.S. global warming performance remains among the worst. Despite offering models with the best global warming performance in two vehicle classes, Ford does not have the best global warming scores in any class. This is because Ford's class-leading models accounted for only four percent of its overall sales in MY2005. This failure to put green technologies to work on popular models is what separated Ford from

the likes of Honda and Toyota. Ford's Escape Hybrid helped its global warming performance in MY2005, but limited sales meant limited benefits, as Ford gains only a 0.2 point improvement in its global warming score due to its hybrids.

GM has made significant progress on smog since the last *Automaker Rankings* report, which, when combined with a flat global warming score, is sufficient to pull it out of last place. GM is one of only three automakers (the others being Honda and Toyota) to achieve class-leading global warming scores. However, its leads in four classes are small—only three to six points better than the class averages. This modest leadership is undermined by worse-than-average performance in four other classes. GM touts its position as the leading manufacturer of vehicles that get more than 30 mpg (highway), but a closer look at the numbers shows that it is also the number one producer of vehicles that get 15 mpg or less (city)—though Ford is not far behind. This lack of consistency hurts GM, dragging down its overall averages. Like Ford, GM offers several best-in-class models, but it has failed to turn its most popular models into environmental class-leaders.

DaimlerChrysler returns to the spot it occupied in the first two *Automaker Rankings* reports: dirtiest among the major automakers, with the worst scores on global warming, smog, and combined environmental performance. DaimlerChrysler has the worst global warming scores in five of 10 classes, and its small pickup trucks have the worst smog score of any class of vehicles from any of the manufacturers evaluated in this report. In addition, in MY2005, DaimlerChrysler offered its customers only one model that led its class in anything: the 6-cylinder Dodge Durango, which accounted for less than one percent of DaimlerChrysler's sales, was the best of the worst in the large SUV class.

Lessons Learned

Comparison of the manufacturers highlights several important lessons as automakers continue to vie for consumers seeking cleaner vehicles.

Full-line manufacturers can compete for the title of Greenest Automaker. Toyota offers vehicles in all 10 of the market segments considered in this report, but that did not stop it from drawing to within one point of Honda on global warming emissions even though Honda produces vehicles in only five classes of generally smaller vehicles. Toyota's global warming leadership in key classes, and better-than-average performance across the board, drives this trend. Toyota has also produced a number of models that lead their classes on smog performance; if it expanded its use of these technologies, it would rival Honda for first place.

Consistency is key to strong environmental performance. Honda and Toyota stand out from the pack for their consistent good performance in most vehicle classes. While GM has the best global warming scores in four classes, its scores are worse than average in four other classes. As a result, its overall global warming performance is relatively poor. Similarly, despite having the best individual models for smog in a number of classes, Toyota's overall performance in those classes is not the best. Automakers need to apply technology consistently to all their vehicles, addressing both smog and global warming, in order to score near the top.

Hybrid vehicles can cut global warming pollution, but only if they make good use of technology and are produced in volume. Much of Toyota's commanding lead on global warming in the midsize car class can be attributed to strong sales of the Prius: hybrid sales improved Toyota's global warming score by three points. Honda, which produced about two-thirds as

many hybrids as Toyota (as a fraction of total sales), saw just a one point improvement in its global warming score. This occurred because many of the hybrids Honda sold were Accord muscle hybrids, which use the hybrid technology more to boost horsepower than to improve fuel economy. Although Ford's Escape Hybrid makes good use of hybrid technology, few of them were made, so they improved Ford's global warming score by only 0.2 point.

Diesel has the potential to cut global warming emissions, but must include technology to control smog-forming pollution before it can help an automaker's overall environmental score. Diesels accounted for 11 percent of Volkswagen's sales in MY2005. These vehicles improve Volkswagen's global warming score by three points compared with its score when diesels were omitted, but they also worsen its smog score by 19 points. To improve an automaker's overall score, diesels must use modern smog control technology to at least match industry-average smog performance. This will allow diesel's global warming benefits to shine.

Flexible-fuel vehicles are currently doing more harm than good. The increase in global warming pollution due to the fuel economy loophole for FFVs more than outweighs the theoretical savings due to alternative fuel usage. This problem is exacerbated by the fact that, 99 percent of the time, today's FFVs aren't even using E85. Automakers must use FFVs as a complement to, not a substitute for, improved fuel economy.

Regulations have driven progress on curbing pollution, but automakers will need to go beyond these standards to distinguish themselves. California's LEV II and the EPA's Tier 2 emission standards have driven significant reductions in smog-forming emissions from vehicles. Ford, Honda, and Nissan distinguished themselves in the last *Automaker Rankings* report by complying with new standards ahead of schedule, but the gap between best and worst narrowed from 80 points to 50 points as the regulations forced the laggards to begin catching up. The introduction of uniform standards for all vehicle classes means that all automakers will score the same on smog if all they do is comply with the standards.

Driving Progress

These rankings show that there are clear differences among automakers on pollution performance. But whether they are the greenest or the meanest, the fact that America's cars and trucks produce 25 percent of the country's global warming pollution and 20 percent of the smog-forming pollution shows that there is considerable room for all automakers to clean up their acts.

As automakers, the government, and the public look for ways to cut pollution from vehicles, they should each take important steps to ensure that existing technologies are put to work to solve these problems. Since the best vehicles on the road are nearly 90 percent cleaner on smog than the industry average, it's clear that a lot of technology to protect public health is already available. Similarly, analyses by UCS have shown that conventional technology available now could cut global warming emissions from cars and trucks by at least 40 percent, while hybrids could bring that to more than 50 percent (Friedman 2003). Appropriate alternative fuels can further reduce global warming emissions, but only if they are widely employed.

Below are the key steps automakers must take if they are to pull themselves up in these rankings and deliver on the technologies already available to address public health and global warming. In addition, government, consumers, and investors must play key roles.

Automakers

Put technology to work across the fleet. Honda and Toyota score as well as they do because they perform strongly in nearly every vehicle class. Large numbers of their vehicles took best-in-class in one or more pollutant categories. While Ford, GM, and DaimlerChrysler do offer some leading environmental choices, they fail to put green technologies to work on their most popular models. All automakers should be doing a better job of putting existing technologies to work to improve fuel economy, cut global warming emissions, and save their customers money at the pump.

Adopt a cooperative, can-do attitude toward improving environmental standards. Automakers came to the table and worked with the EPA to develop the Tier 2 regulations in a form that would work well for them. The result has been significant progress on cutting smog-forming emissions from new vehicles. Now, automakers need to stop lobbying and suing to block progress on global warming. Instead, they should work with governments to develop workable goals that will deliver real reductions in global warming emissions and put their engineers to work meeting those goals.

Spare the green spin. Consumers and policy makers are bombarded with talk about how much the automakers are doing for the environment. GM touts its vehicles that get more than 30 mpg, while sweeping under the rug the similar number that get less than 15 mpg. Instead of making promises to improve in the future and misrepresenting performance today, automakers need to start making real improvements on the vehicles they are selling today. That would give them something to talk about.

Government, Consumers, and Investors

Support mandatory standards. Fuel economy standards have proven highly effective at reducing global warming emissions. Low carbon fuel standards can do the same. Similarly, tailpipe standards have dramatically reduced emissions of smog-forming pollutants. Members of the public need to let their legislators know that they expect more out of automakers, and investors need executives to stop shooting themselves in the foot by opposing standards that would require wider adoption of modern technologies.

Demand cleaner cars. Vehicle purchasers have a responsibility to make informed purchases and to choose the cleanest, most efficient vehicles that meet their needs. A wealth of information is available on specific models, particularly from the EPA's website (*http://www.fueleconomy.gov*) and the *Green Book* put out by the American Council for an Energy-Efficient Economy. Consumers should let the dealer know why they're interested in a certain model and not be fooled by assurances that "they're all the same," as the dealer steers them to a different vehicle. As this report shows, most manufacturers offer at least some environmentally leading models, though the top-ranked automakers have done a better job than others at greening their most popular models. These rankings provide a starting point for consumers interested in buying a greener vehicle and can help them choose a company that has demonstrated a more consistent commitment to the environment.

Key Recommendations by Automaker

Honda will need to make faster progress on its pollution performance if it hopes to retain its position as the Greenest Automaker. It has voluntarily committed to reducing the global warming emissions of its vehicles by five percent between 2005 and 2010, but Toyota has been cutting its global warming emissions about twice as fast since 2001—enough to overtake Honda if this progress continues. Smog regulations are forcing all automakers to make progress, so Honda will need to go beyond those regulations if it wants to separate itself from the pack.

Toyota has made steady progress on global warming emissions by establishing leadership across all classes. It must continue to expand its use of conventional and hybrid fuel-saving technologies, in order to surpass Honda in global warming performance. However, poor technology choices in the fuel-thirsty new Tundra pickup threaten to cost Toyota its class leadership and could stall its progress on global warming emissions in the MY2007 ranking. Toyota offered a number of models in MY2005 that had best-in-class performance on smog and must replicate this performance across the rest of its fleet to close the gap with Honda.

Hyundai-Kia is acquiring a new image by offering industry-leading warranty coverage and could repeat that success to stand out on environmental performance. Hyundai-Kia should follow the lead of Toyota and Honda by applying green technologies to more of its popular models so that the Elantra won't be its only class leader. If Hyundai-Kia does not make the environment a priority, it could soon see itself falling in these rankings, as companies that have invested in hybrids and cleaner diesels overtake them.

Nissan should stop following the Big Three model of gas guzzlers and flexible-fuel vehicles and instead make the same commitment to reducing global warming emissions that it has made to reducing smog-forming emissions. Nissan should strive to exceed CAFE standards without making use of the dual-fuel loophole. If it had done so in MY2005, it would have finished in third place instead of fourth.

Volkswagen needs to clean up smog-forming emissions from its diesels and then expand sales, but it cannot forget gasoline. VW is among the best positioned automakers in these rankings to take advantage of diesel's potential, but limits to diesel fuel availability mean that Volkswagen won't be able to catch Toyota or Honda unless it also makes sure its gasoline vehicles are as clean and efficient as possible.

Ford needs to focus on improving its global warming performance in the United States the same way it has improved in the European market. It is one of only a handful of companies that made adequate progress toward meeting Europe's voluntary global warming targets; if it had made similar cuts in global warming emissions of the vehicles it offered on the U.S. market, it would be tied for third place in this category. Ford must also abandon flexible-fuel vehicles as a regulatory compliance strategy and follow Toyota's lead by pumping out hybrids in larger volumes.

GM needs to expand its leadership in global warming in the classes it leads, and intentionally start losing the race to sell vehicles that get less than 15 mpg. It must also abandon flexible-fuel vehicles as a compliance strategy and start putting hundreds of thousands of its promised two-mode hybrids into consumers' hands. GM has made good progress on smog since the last *Automaker Rankings* report; continued progress could see it pass Ford as the cleanest of the domestic automakers.

DaimlerChrysler needs to seriously consider its environmental commitments. As the dirtiest automaker in three out of four UCS *Automaker Rankings* reports, it has failed to offer its customers good environmental choices and has the worst global warming performance in fully half of the classes considered. With such uniformly bad performance, improvements in any class would surely help DaimlerChrysler's score.

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Appendix A: Methodology

Automakers Evaluated

Recent editions of the UCS *Automaker Rankings* report (Mark 2002; Friedman and MacKenzie 2004) focused on the Big Six automakers, which accounted for nearly 90 percent of car and light truck sales in the United States in model year 2005 (MY2005): General Motors (25 percent), Ford (18 percent), DaimlerChrysler (16 percent), Toyota (15 percent), Honda (nine percent), and Nissan (seven percent). For this edition, Hyundai-Kia (five percent) and Volkswagen (two percent) have been added to the mix. These Top Eight manufacturers together account for 96 percent of car and light truck sales in the United States; they also occupy eight of the top 10 spots in global vehicle sales (Treece 2006). The other manufacturers in the global top 10—PSA/Peugeot-Citroen and Renault—do not have a presence in the U.S. market.

The Hyundai-Kia Automotive Group, which comprises Hyundai Motor Company and Kia Motors Corporation, is growing rapidly both in the United States and worldwide. Hyundai-Kia's global sales increased by more than 11 percent from 2004 to 2005, the largest increase of any major (million-plus sales) manufacturer. Hyundai began production at its first U.S. manufacturing plant in 2005, while Kia has recently broken ground on its first U.S. plant (Schweinsberg 2005, 2006)

Volkswagen is the number four manufacturer in the world by sales volume. Although its U.S. market share is somewhat smaller, it is a leader in the sale of diesel-powered cars in the United States. Diesels have been receiving renewed attention recently, because of their high fuel economy and because new standards for diesel fuel will require diesel vehicles to be much cleaner than they have been in the past. J.D. Power and Associates recently ranked Volkswagen first in its Automotive Environmental Index (J.D. Power 2006). For these reasons, Volkswagen has been included in these rankings.

Pollutants Considered

Two main classes of pollutants are considered in this analysis: smog-forming pollutants and global warming pollutants. Vehicles emit numerous other pollutants as well, including particulate matter, carbon monoxide, and carcinogens. However, emissions of smog-forming and global warming pollutants are arguably the most significant challenges facing the automotive industry today.

Global Warming Pollutants

Emissions of the heat-trapping gases that cause global warming continue to grow in the United States and worldwide. In the United States, cars and light trucks are responsible for approximately 25 percent of nationwide global warming emissions. Heat-trapping gases are characterized by their global warming potentials, a measure of their potency for insulating Earth. Table A-1 (p. 29) summarizes the global warming potentials of some major heat-trapping gases associated with vehicles.

Table A-1. Global Warming Potentials of Selected Heat-trapping Gases Emitted by Vehicles

Fuel	Global Warming Potential
Carbon Dioxide	1*
Methane	21
Nitrous Oxide	310
HFC-134a	1,300

* The global warming potential of carbon dioxide is 1, and the rest are indexed to this value.

Carbon dioxide is a byproduct of the combustion of carbon-containing fuels such as gasoline and diesel. Net carbon dioxide emissions can be reduced by reducing the amount of fuel burned per mile of vehicle travel, by reducing the carbon content of the fuel, or by producing fuels from feeds that remove carbon dioxide from the atmosphere (i.e., biofuels).

Methane and nitrous oxide are combustion byproducts that are released from vehicle tailpipes. Emissions of these pollutants can be reduced through better control of the combustion process and by treatment of the exhaust gases.

HFC-134a is the standard refrigerant used in automotive air conditioning systems. Due to its high global warming potential, the release of just one pound of HFC-134a has the same effect on global warming as the carbon dioxide from driving an average vehicle more than 1,000 miles.

A comprehensive evaluation of global warming emissions from a vehicle would include all global warming emissions released by the vehicle in use, as well as from fuel production and vehicle manufacturing and disposal. Unfortunately, the data needed to evaluate all of these contributions are not available. However, data are available to estimate emissions of carbon dioxide from the vehicle's tailpipe as well as the upstream emissions of carbon dioxide and other heat-trapping gases released during fuel production and distribution. Studies from multiple respected authorities have shown that emissions from vehicle use and fuel production and distribution account for more than 85 percent of the global warming emissions attributable to a vehicle over its lifetime (Burnham, Wang, and Moon 2006; Weiss et al. 2000). This is true of conventional gasoline, diesel, and hybrid electric vehicles. This analysis is based on the emissions of global warming pollution from the tailpipe as well as during fuel production, refining, and distribution.

Criteria Pollutants

As a result of regulatory progress, light-duty vehicles in the United States today produce considerably less of the tailpipe pollution that contributes to local air quality problems than they have historically. Despite this progress, these vehicles are still responsible for approximately 20 percent of the pollutants that contribute to the formation of ground-level ozone, otherwise known as smog (EPA 2005a). A key reason for this is that there are today well over twice as many vehicles on American roads as in 1970, when tailpipe emissions were first regulated, and the total annual miles driven by those vehicles has nearly tripled.

Regulations in the United States limit the per-mile emissions of numerous pollutants, including carbon monoxide, particulate matter, formaldehyde, nitrogen oxides (NO_x), and non-methane organic gases (NMOG). The latter two pollutants are particularly noteworthy, since they react in the presence of sunlight to form smog. The emission standards for NO_x and NMOG for a particular vehicle can be added together to produce a composite "smog-forming emissions" value, which is used in determining the smog-forming emission scores in this report.

Classification of Vehicles

The rankings in this report are based on MY2005 sales of cars and light trucks with a gross vehicle weight rating (GVWR) of 8,500 pounds or less. This includes most cars, utilities, vans, and pickups sold by the Top Eight automakers, although GM, Ford, and DaimlerChrysler also sell some SUVs, vans, and pickups with GVWRs in excess of 8,500 pounds. Sales and fuel economy data are not available for vehicles with a GVWR of more than 8,500 pounds, so these vehicles were omitted from the analysis.

In this report, vehicles are divided into size and body-type classes based on the classification schemes of the Environmental Protection Agency (EPA) and Ward's (EPA 2005b; Ward's 2005). Cars are divided into small, midsize, large, and station wagon classes, based on the classification used in the EPA's *Green Vehicle Guide*. Small cars include compacts and all smaller classes. Light-duty trucks are classified according to Ward's categories, with two modifications. First, sport-utility vehicles (SUVs) and crossover utility vehicles (CUVs) have been combined into a "utility" class. Second, the small utility class has been defined to include SUVs and CUVs with a length of 182 inches or less, rather than using Ward's length criterion of less than 170 inches.

Crossover utility vehicles are a relatively new vehicle category, and by their very nature they are difficult to define absolutely. In general, they are vehicles that offer the wagon-like utility of an SUV, but employ a unibody design to give them a more car-like ride and handling characteristics. Because they have capabilities for hauling people and cargo similar to those of SUVs, we have combined them with SUVs in this analysis. Crossovers are generally included in the same class as SUVs in literature from the EPA[5] and are frequently grouped with SUVs by automakers.[6]

Ward's generally includes utilities with a length of less than 170 inches in the small utility classes, but this scheme does not succeed in categorizing vehicles so that competitors all fall into the same classes. Using the Ward's classification, small utilities totaled fewer than 400,000 vehicles—just nine percent of utility sales—in MY2005. Ward's places vehicles such as the Ford Escape, Saturn Vue, Jeep Liberty, and Honda CR-V in the middle SUV/CUV class, along with much larger midsize utilities such as the Honda Pilot, Ford Explorer, and GMC Envoy. In our judgment, these smaller vehicles compete with each other and with other small utilities such as the Toyota RAV4 and Hyundai Tucson more than they compete with larger utilities. For this reason, utilities with a length of 182 inches or less have been reclassified as small utilities.

Sources of Data

Three principal sources of data are used to evaluate the automakers. Two of the key sources are databases held by the federal government;[7] the other is the EPA's *Green Vehicle Guide* (EPA 2005b).

The first key data source is the National Highway Traffic Safety Administration's (NHTSA) CAFE compliance database. This database contains complete, final sales data for all cars and light-duty trucks sold in the United States in MY2005. The sales data are broken out by manufacturer, model, fuel economy, engine displacement and number of cylinders, engine type (gasoline, diesel, hybrid, etc.), transmission type and number of speeds, drive system (front-wheel drive, etc.), and other important characteristics. These data, which include a

[5] See, for example, the EPA's *Fuel Economy Guide* and *http://www.fueleconomy.gov.*

[6] The websites of Chevrolet, Honda, Toyota, and Nissan show SUVs and CUVs combined into a generic "SUV" class.

[7] The databases were provided to UCS on request.

complete accounting of fuel economy and fuel type for each model, are sufficient to establish a profile of each manufacturer's global warming performance. However, this database includes no data on smog-forming emissions.

The EPA's *Green Vehicle Guide* contains much of the same data on engine, transmission, and drive type for each model as does the NHTSA database. It further breaks out data by engine family,[8] sales area, and emission standard. The emission standard defines the level of NO_x and NMOG emissions produced by a vehicle during a standard set of tests. Both NO_x and NMOG are key precursors to the formation of smog. The *Green Vehicle Guide* does not contain data on the number of vehicles sold, so it is useful for measuring environmental performance only when it is used in combination with another data source.

The final data source used is an EPA database that tracks the sales of engines from each engine family. Certain engine families are installed in multiple vehicles, while many models include engines from more than one engine family (including different engines with the same displacement).

Combining the Data

In order to develop a comprehensive picture of each manufacturer's environmental performance, sales of each vehicle model have been subdivided according not only to fuel economy and fuel type, but also by emission level. The data from the *Green Vehicle Guide* have been merged with the data from NHTSA database, matching engine, fuel, transmission, and other key characteristics. In cases where data are missing from the *Green Vehicle Guide,* the emission standard is assumed to be the same as for the same model in MY2004 or MY2006, whichever was lower. In many cases, a single data row from the NHTSA database has anywhere from two to four corresponding rows in the *Green Vehicle Guide* data, either because a vehicle had been offered for sale with multiple engine families or because it had been offered for sale in multiple regions with differing emission standards. Although these vehicles had different smog-forming emission characteristics, their fuel economy levels were the same, so that they warranted only a single row in the NHTSA database, which is concerned only with fuel economy and fuel type.

In cases where a single model from the NHTSA database was offered in multiple regional configurations with different emission standards, the sales from the NHTSA database have been split according to the fraction of vehicles sold in each region. The fraction of sales in each region is assumed to be equal to the fraction of vehicles of the same type in use in that region in 2004, as summarized in Table A-2.

Table A-2. Fraction of Vehicles in Operation in Each Region (by Type)

	Share of Vehicles in Operation, 2004			
Region	Cars	Pickup	Van	SUV
3	76.7%	86.3%	81.2%	80.5%
7	23.3%	13.7%	18.8%	19.5%
Nationwide	**100%**	**100%**	**100%**	**100%**

Note: Region 7 includes California and the states (Maine, Massachusetts, New York, and Vermont) that had adopted California's emission standards as of 2005. Region 3 includes all other states.

Source: Ward's, 2004.

[8] An engine family is a group of engines with the same primary characteristics. A manufacturer might install a particular engine family in several different vehicle models, and a certain model might contain several different engine families, including different engine families with the same number of cylinders and displacement. Moreover, a particular engine family might be certified to several different emission standards, even in the same vehicle model.

In cases where a single model configuration from the NHTSA database was offered with multiple engine families, the NHTSA sales have been split proportionately to the total sales of each of the engine families involved, as determined from the EPA database.

Calculation of Scores

Scores are based on average emission rates of global warming and smog-forming pollutants. The average emission rate across all eight manufacturers is defined as having an emission score of 100. Separate scores have been calculated for global warming and smog-forming emissions. All other scores reported in this analysis are indexed to these industry-wide averages, and scores are directly proportional to emission level, so that a score of 120 corresponds to an emission level that is 120 percent of the industry average.

Global Warming Scores

Sufficient data are not available to permit comparisons of all global warming emissions produced by all new vehicles. However, estimates of the tailpipe global warming emissions and the upstream fuel cycle emissions can be made based on the fuel economy and fuel type of each vehicle. To determine the per-mile global warming emissions of a vehicle, the per-gallon global warming emissions outlined in Table A-3 have been divided by the vehicle's fuel economy (expressed in miles per gasoline gallon equivalent—MPGGE). Diesel fuel economy is first converted into gasoline-equivalent fuel economy by dividing by 1.11.[9] The natural gas fuel economy reported in the NHTSA database is converted into gasoline-equivalent fuel economy by multiplying by 0.15.[10]

Table A-3. Global Warming Emissions from Light-Duty Automotive Fuels*

Fuel	Global Warming Emissions, grams CO_2-equivalent per GGE**
Gasoline	11,203
Diesel	11,356
E85	9,417
CNG	8,953

* Global warming emissions are based on Argonne National Laboratory's GREET 1.7 model.

** A gasoline gallon equivalent (GGE) is a quantity of fuel containing the same amount of energy as a gallon of gasoline.

Flexible-fuel vehicles (FFVs) are capable of operating on gasoline, E85 (a mixture consisting nominally of 85 denatured percent ethanol and 15 percent gasoline), or any mixture in between. Ford, GM, DaimlerChrysler, and recently Nissan have been producing FFVs in order to take advantage of a generous credit toward meeting their CAFE obligations. For CAFE purposes, an FFV is considered to have a fuel economy equal to approximately 1.7 times its actual fuel economy. This permits an automaker to produce a fleet of vehicles with an average fuel economy below the applicable CAFE standard, without being subject to penalty. The 1.7 multiplier is derived from an assumption that FFVs use gasoline 50 percent of the time and E85 50 percent of the time. However, data from the Energy Information Administration (EIA) indicate that FFVs actually use E85 less than one percent of the time, on average.[11] In light of the fact that the number of E85 fueling stations in the United States has been increasingly rapidly, and to give the benefit of the doubt to the manufacturers of FFVs, this analysis assumes that FFVs would use E85 two percent of the time. The global warming

[9] Based on a heating value of 124,167 BTU/gal for gasoline and 138,071 BTU/gal for diesel (EIA 2006b), a gallon of diesel contains 1.11 times the energy of a gallon of gasoline.

[10] 49 U.S.C. 32905(c) dictates that vehicles fueled by natural gas be credited for CAFE purposes with an equivalent fuel economy determined by dividing its gasoline-equivalent fuel economy by 0.15. Therefore, the gasoline-equivalent fuel economy can be calculated by multiplying the credited fuel economy by 0.15.

[11] Based on an EIA estimate of 22.4 million GGE of E85 used in 2004, versus UCS's estimate of 2,870 million GGE of FFV energy demand in the same year. Additionally, Annual Energy Outlook 2006 projects E85 usage between 0.3 percent and 0.4 percent of FFV energy demand, currently and in the future (EIA 2006b).

emissions for FFVs are therefore calculated as a weighted average of 98 percent of the emissions when using gasoline plus two percent of the emissions when using E85.

The global warming emissions calculated in this analysis are based on CAFE test results, which are grossly out of date. Assumptions made by the EIA and a recent rulemaking by the EPA suggest that actual in-use fuel economy is approximately 20 percent less than the CAFE test values, meaning that the corresponding global warming emission levels are actually 25 percent higher than those reported here. However, these discrepancies should not affect the *relative* rankings. By the time of the next *Automaker Rankings* report, the *Green Vehicle Guide* or another EPA source may include data that will permit comparisons based on updated estimates of real-world fuel economy.

Smog Scores

Cars and light trucks are responsible for significant emissions of NO_x and VOCs (throughout all stages of their lifecycle: vehicle manufacture, fuel production, vehicle operation, and disposal (Burnham, Wang, and Moon 2006). Operating emissions are particularly problematic, as they are released from millions of separate point sources, often in densely populated areas where the health effects of the emissions are pronounced. Operating emissions of smog-forming pollutants are the basis for the smog scores in these rankings. Emissions of NO_x and NMOG, expressed in grams per mile, are added together and averaged across vehicle models, classes, and manufacturers. The sales-weighted average for each manufacturer forms the basis of that manufacturer's overall smog score. As with global warming emissions, actual in-use smog-forming emissions are likely to differ significantly from the test results; however, the test standards are assumed to represent a reasonable measure of the *relative* smog-forming emission performance of different vehicles.

Appendix B: Detailed Data Tables

Table B-1. Average Global Warming Emissions (by Automaker and Class)

Automaker	Small Car	Midsize Car	Large Car	Station Wagon	Small Pickup	Large Pickup	Small SUV	Midsize SUV	Large SUV	Minivan	Fleet Average
Honda	299	372	-	-	-	-	400	513	-	431	385
Toyota	308	327	414	303	480	570	380	479	602	454	389
Hyundai-Kia	346	398	485	-	-	-	478	-	-	526	422
Nissan	343	392	-	-	530	615	532	496	633	454	445
Volkswagen	387	414	490	376	-	-	-	558	-	-	407
Ford	390	416	430	402	516	606	443	553	630	477	487
GM	363	401	406	320	479	569	427	520	595	463	470
DaimlerChrysler	393	400	454	471	559	643	496	529	639	462	493
Top Eight Average	**354**	**379**	**424**	**334**	**506**	**595**	**456**	**519**	**610**	**462**	**452**

Note: Results are expressed in grams CO_2-equivalent per mile, based on CAFE test fuel economy and full fuel-cycle emissions. CAFE test fuel economy may be 25 percent greater than real-world fuel economy, so actual in-use emissions will be higher for most drivers.

A blue box indicates the class leader.

Table B-2. Average Smog-Forming Emissions (by Automaker and Class)

Automaker	Small Car	Midsize Car	Large Car	Station Wagon	Small Pickup	Large Pickup	Small SUV	Midsize SUV	Large SUV	Minivan	Fleet Average
Honda	0.334	0.140	-	-	-	-	0.160	0.153	-	0.153	0.196
Toyota	0.214	0.157	0.229	0.291	0.179	0.304	0.383	0.196	0.424	0.153	0.211
Hyundai-Kia	0.204	0.310	0.390	-	-	-	0.181	-	-	0.160	0.225
Nissan	0.187	0.181	-	-	0.159	0.617	0.160	0.166	0.356	0.153	0.214
Volkswagen	0.256	0.428	0.389	0.479	-	-	-	0.405	-	-	0.313
Ford	0.158	0.254	0.191	0.153	0.364	0.497	0.264	0.308	0.387	0.329	0.294
GM	0.237	0.232	0.184	0.197	0.389	0.551	0.251	0.223	0.547	0.219	0.324
DaimlerChrysler	0.280	0.261	0.315	0.238	0.794	0.581	0.227	0.301	0.386	0.279	0.334
Top Eight Average	**0.232**	**0.201**	**0.212**	**0.252**	**0.382**	**0.524**	**0.227**	**0.239**	**0.475**	**0.233**	**0.278**

Note: Results are expressed in grams per mile. Smog-forming emissions are the sum of the 100,000-mile or 120,000-mile certification standards for nitrogen oxides (NO_x) and non-methane organic gases (NMOG), which are key precursors of smog. In-use emission levels will likely vary significantly from these values.

A blue box indicates the class leader.

Table B-3. Average Combined Emissions Scores (by Automaker and Class)

Automaker	Small Car	Midsize Car	Large Car	Station Wagon	Small Pickup	Large Pickup	Small SUV	Midsize SUV	Large SUV	Minivan	Fleet Average
Honda	93	66	-	-	-	-	73	84	-	75	78
Toyota	73	64	87	86	85	118	111	88	143	78	81
Hyundai-Kia	75	100	124	-	-	-	85	-	-	87	87
Nissan	72	76	-	-	87	179	88	85	134	78	88
Volkswagen	89	123	124	128	-	-	-	135	-	-	101
Ford	72	92	82	72	122	156	96	117	139	112	107
GM	83	86	78	71	123	162	92	98	164	91	110
DaimlerChrysler	94	91	107	95	204	175	96	113	140	101	115
Top Eight Average	**81**	**78**	**85**	**82**	**125**	**160**	**91**	**100**	**153**	**93**	**100**

Note: Combined emission scores are averages of the individual global warming and smog scores. The average for all vehicles from all eight manufacturers earns a score of 100. A blue box indicates the class leader.

Table B-4. MY2005 Sales* (by Automaker and Class)

Manufacturer	Honda	Toyota	Hyundai-Kia	Nissan	Volkswagen	Ford	GM	Daimler Chrysler	Top Eight Total
Small Cars	353,649 25%	525,351 23%	225,044 31%	143,500 13%	182,658 67%	553,914 19%	604,442 15%	376,091 14%	**2,964,649 19%**
Midsize Cars	475,963 34%	610,850 26%	184,269 25%	509,649 46%	38,077 14%	147,346 5%	621,846 16%	170,613 7%	**2,758,613 18%**
Large Cars	0 0%	86,626 4%	22,858 3%	0 0%	6,114 2%	467,226 16%	474,569 12%	169,585 6%	**1,226,978 8%**
Station Wagons	0 0%	140,115 6%	0 0%	0 0%	21,140 8%	60,030 2%	79,375 2%	4,559 0%	**305,219 2%**
Small Pickups	0 0%	151,776 7%	0 0%	62,799 6%	0 0%	163,049 6%	183,337 5%	113,602 4%	**674,563 4%**
Large Pickups	0 0%	116,585 5%	0 0%	77,628 7%	0 0%	528,093 18%	642,323 16%	261,979 10%	**1,626,608 11%**
Small Utilities	196,912 14%	82,037 4%	216,948 30%	55,179 5%	0 0%	331,100 12%	72,122 2%	344,890 13%	**1,299,188 9%**
Midsize Utilities	202,405 15%	360,356 16%	0 0%	187,171 17%	22,963 8%	376,830 13%	640,748 16%	433,361 17%	**2,223,834 15%**
Large Utilities	0 0%	63,093 3%	0 0%	47,469 4%	0 0%	125,479 4%	412,135 10%	114,455 4%	**762,631 5%**
Minivans	161,742 12%	172,999 7%	76,527 11%	35,913 3%	0 0%	98,295 3%	147,279 4%	620,601 24%	**1,313,356 9%**
Vans	0 0%	0 0%	0 0%	0 0%	0 0%	21,222 1%	70,628 2%	0 0%	**91,850 1%**
All Cars	**829,612 60%**	**1,362,942 59%**	**432,171 60%**	**653,149 58%**	**247,989 92%**	**1,228,516 43%**	**1,780,232 45%**	**720,848 28%**	**7,255,459 48%**
All Trucks	**561,059 40%**	**946,846 41%**	**293,475 40%**	**466,159 42%**	**22,963 8%**	**1,644,068 57%**	**2,168,572 55%**	**1,888,888 72%**	**7,992,030 52%**
All Vehicles	**1,390,671 100%**	**2,309,788 100%**	**725,646 100%**	**1,119,308 100%**	**270,952 100%**	**2,872,584 100%**	**3,948,804 100%**	**2,609,736 100%**	**15,247,489 100%**

* Percentages listed represent each automaker's sales in each class as a fraction of the total vehicles sold by that automaker.

Note: The eight manufacturers evaluated in this analysis accounted for 96 percent of all car and light truck sales in the United States in MY2005.

Table B-5. Best MY2005 Models on Global Warming Performance

	Model	Engine	Drive System	Global Warming Score	Sales
Small Car					
Honda	Honda Insight	3-cylinder	front-wheel	36	591
Toyota	Toyota Echo	4-cylinder	front-wheel	58	10,540
Hyundai-Kia	Hyundai Accent	4-cylinder	front-wheel	71	51,121
Nissan	Nissan Sentra	4-cylinder	front-wheel	71	116,354
Volkswagen	Volkswagen Golf	4-cylinder	front-wheel	73	7,957
Ford	Ford Focus	4-cylinder	front-wheel	75	224,240
GM	Chevrolet Aveo	4-cylinder	front-wheel	73	64,250
DaimlerChrysler	Dodge Neon	4-cylinder	front-wheel	76	154,231
Midsize Car					
Honda	Honda Accord Hybrid	6-cylinder	front-wheel	66	19,254
Toyota	Toyota Prius	4-cylinder	front-wheel	38	121,020
Hyundai-Kia	Kia Spectra	4-cylinder	front-wheel	77	53,027
Nissan	Nissan Altima	4-cylinder	front-wheel	82	311,400
Volkswagen	Volkswagen Passat	4-cylinder	front-wheel	83	20,438
Ford	Mazda 6	4-cylinder	front-wheel	84	44,656
GM	Chevrolet Malibu	4-cylinder	front-wheel	75	51,615
DaimlerChrysler	Mercedes-Benz E320 CDI	6-cylinder	rear-wheel	79	6,510
Large Car					
Honda					
Toyota	Toyota Avalon	6-cylinder	front-wheel	85	57,577
Hyundai-Kia	Kia Amanti	6-cylinder	front-wheel	107	22,858
Nissan					
Volkswagen	Audi A8 / A8 L	8-cylinder	four-wheel	106	5,102
Ford	Mercury Montego	6-cylinder	front-wheel	88	19,087
GM	Chevrolet Malibu Maxx	6-cylinder	front-wheel	83	48,578
DaimlerChrysler	Chrysler 300C	6-cylinder	rear-wheel	94	98,606
Station Wagon					
Honda					
Toyota	Toyota Scion XB	4-cylinder	front-wheel	65	67,396
Hyundai-Kia					
Nissan					
Volkswagen	Volkswagen Jetta Wagon	4-cylinder	front-wheel	68	5,221
Ford	Ford Focus Station Wagon	4-cylinder	front-wheel	75	21,540
GM	Pontiac Vibe	4-cylinder	front-wheel	68	64,221
DaimlerChrysler	Mercedes-Benz E320 Wagon	6-cylinder	rear-wheel	94	445
Small Pickup					
Honda					
Toyota	Toyota Tacoma	4-cylinder	rear-wheel	92	32,293
Hyundai-Kia					
Nissan	Nissan Frontier	4-cylinder	rear-wheel	97	7,390
Volkswagen					
Ford	Mazda B2300	4-cylinder	rear-wheel	86	3,030
GM	GMC Canyon	4-cylinder	rear-wheel	99	6,896
DaimlerChrysler	Dodge Dakota	6-cylinder	rear-wheel	117	33,553

Table B-5 (cont'd)

	Model	Engine	Drive System	Global Warming Score	Sales
Large Pickup					
Honda					
Toyota	Toyota Tundra	6-cylinder	rear-wheel	108	14,194
Hyundai-Kia					
Nissan	Nissan Titan	8-cylinder	rear-wheel	134	43,945
Volkswagen					
Ford	Ford F150	6-cylinder	rear-wheel	123	48,548
GM	Chevrolet Silverado 15, GMC Sierra 15	8-cylinder	rear-wheel	116	748
DaimlerChrysler	Dodge Ram 1500	6-cylinder	rear-wheel	116	22,638
Small Utility					
Honda	Honda CR-V	4-cylinder	rear-wheel	83	30,679
Toyota	Toyota RAV4	4-cylinder	front-wheel	80	40,533
Hyundai-Kia	Kia Sportage	4-cylinder	rear-wheel	88	4,361
Nissan	Nissan Xterra	6-cylinder	rear-wheel	116	25,779
Volkswagen					
Ford	Ford Escape Hybrid	4-cylinder	front-wheel	63	4,202
GM	Saturn Vue	4-cylinder	front-wheel	86	29,889
DaimlerChrysler	Chrysler PT Cruiser	4-cylinder	front-wheel	90	97,074
Midsize Utility					
Honda	Acura MDX	6-cylinder	four-wheel	112	60,287
Toyota	Toyota Highlander	4-cylinder	front-wheel	88	22,058
Hyundai-Kia					
Nissan	Nissan Murano	6-cylinder	front-wheel	96	32,109
Volkswagen	Audi Allroad	6-cylinder	four-wheel	114	2,889
Ford	Ford Freestyle	6-cylinder	front-wheel	94	39,420
GM	Pontiac Aztek	6-cylinder	front-wheel	94	8,043
DaimlerChrysler	Dodge Magnum	6-cylinder	rear-wheel	104	47,823
Large Utility					
Honda					
Toyota	Toyota Sequoia	8-cylinder	rear-wheel	128	26,507
Hyundai-Kia					
Nissan	Nissan Armada	8-cylinder	rear-wheel	137	19,191
Volkswagen					
Ford	Ford Expedition	8-cylinder	rear-wheel	137	55,860
GM	Chevrolet Tahoe 1500	8-cylinder	rear-wheel	125	70,701
DaimlerChrysler	Dodge Durango	6-cylinder	rear-wheel	119	7,255
Minivan					
Honda	Honda Odyssey	6-cylinder	front-wheel	95	161,742
Toyota	Toyota Sienna	6-cylinder	front-wheel	99	148,802
Hyundai-Kia	Kia Sedona	6-cylinder	front-wheel	116	76,527
Nissan	Nissan Quest	6-cylinder	front-wheel	100	35,913
Volkswagen					
Ford	Mazda MPV	6-cylinder	front-wheel	105	18,902
GM	Chevrolet Venture	6-cylinder	front-wheel	94	25,341
DaimlerChrysler	Dodge Caravan	4-cylinder	front-wheel	96	20,370

Note: Ranking based on average performance of the model and configuration listed, which were the cleanest offered by the automaker in MY2005.

Table B-6. Best MY2005 Models on Smog Performance

	Model	Engine	Drive System	Smog Score	Sales
Small Car					
Honda	Acura RSX / TSX	4-cylinder	front-wheel	57	54,971
Toyota	Toyota Solara	4-cylinder, 6-cylinder	front-wheel	55	31,082
Hyundai-Kia	Hyundai Elantra	4-cylinder	front-wheel	43	132,495
Nissan	Nissan 350Z	6-cylinder	rear-wheel	57	27,146
Volkswagen	Volkswagen Jetta	5-cylinder	front-wheel	52	43,869
Ford	Ford Focus	4-cylinder	front-wheel	50	224,240
GM	Pontiac G6 / Grand Am	6-cylinder	front-wheel	57	117,070
DaimlerChrysler	Mercedes-Benz CL500 / CLK500 / SL500	8-cylinder	rear-wheel	55	17,047
Midsize Car					
Honda	Honda Accord	4-cylinder	front-wheel	46	253,255
Toyota	Toyota Prius	4-cylinder	front-wheel	26	121,020
Hyundai-Kia	Kia Spectra	4-cylinder	front-wheel	40	53,027
Nissan	Nissan Maxima	6-cylinder	front-wheel	55	73,931
Volkswagen	Volkswagen Passat, Audi A6, Bentley Arnage	6-cylinder, 8-cylinder	front-wheel, rear-wheel	140	17,639
Ford	Volvo S80, Mazda 6	5-cylinder, 6-cylinder	front-wheel, four-wheel	55	29,588
GM	Chevrolet Malibu, Cadillac CTS / STS	6-cylinder	front-wheel, rear-wheel	57	190,069
DaimlerChrysler	Mercedes-Benz E500	8-cylinder	rear-wheel, four-wheel	55	9,920
Large Car					
Honda					
Toyota	Toyota Avalon	6-cylinder	front-wheel	55	57,577
Hyundai-Kia	Kia Amanti	6-cylinder	front-wheel	140	22,858
Nissan					
Volkswagen	Volkswagen Phaeton	12 cylinder	four-wheel	57	28
Ford	Ford Five Hundred, Mercury Montego / Grand Marquis, Jaguar XJ8 / VDP	6-cylinder	front-wheel,four-wheel	57	202,906
GM	Buick LeSabre, Chevrolet Malibu Maxx, Pontiac Bonneville	6-cylinder	front-wheel	57	171,985
DaimlerChrysler	Mercedes-Benz S430 / S500	8-cylinder	rear-wheel, four-wheel	55	9,734
Station Wagon					
Honda					
Toyota	Toyota Matrix	4-cylinder	front-wheel	60	62,421
Hyundai-Kia					
Nissan					
Volkswagen	Audi A4 Avant	4-cylinder	four-wheel	90	2,012
Ford	Ford Focus Station Wagon	4-cylinder	front-wheel	49	21,540
GM	Pontiac Vibe	4-cylinder	front-wheel	58	64,221
DaimlerChrysler	Mercedes-Benz E500 4Matic Wagon	8-cylinder	four-wheel	55	1,034
Small Pickup					
Honda					
Toyota	Toyota Tacoma	6-cylinder	rear-wheel, four-wheel	57	110,796
Hyundai-Kia					
Nissan	Nissan Frontier	4-cylinder	rear-wheel	56	7,390
Volkswagen					
Ford	Ford Ranger, Mazda B2300	4-cylinder	rear-wheel	117	24,269
GM	Chevrolet SSR	8-cylinder	rear-wheel	128	7,194
DaimlerChrysler	Dodge Dakota	6-cylinder	rear-wheel	272	33,553

Table B-6 (cont'd)

	Model	Engine	Drive System	Smog Score	Sales
Large Pickup					
Honda					
Toyota	Toyota Tundra	6-cylinder	rear-wheel	57	14,194
Hyundai-Kia					
Nissan	Nissan Titan	8-cylinder	four-wheel	128	33,683
Volkswagen					
Ford	Ford F150	6-cylinder	rear-wheel	128	48,548
GM	Chevrolet Silverado 15, GMC Sierra 15, Cadillac Escalade EXT	8-cylinder	rear-wheel, four-wheel	128	10,096
DaimlerChrysler	Dodge Ram 1500	8-cylinder	four-wheel	179	114,534
Small Utility					
Honda	Honda CR-V / Element	4-cylinder	rear-wheel, four-wheel	57	196,912
Toyota	Toyota RAV4	4-cylinder	front-wheel, four-wheel	138	82,037
Hyundai-Kia	Hyundai Santa Fe / Tucson, Kia Sorento / Sportage	6-cylinder	front-wheel, rear-wheel, four-wheel	57	196,323
Nissan	Nissan Xterra	6-cylinder	rear-wheel, four-wheel	57	55,179
Volkswagen					
Ford	Ford Escape Hybrid	4-cylinder	front-wheel, four-wheel	34	10,680
GM	Saturn Vue	6-cylinder	front-wheel, four-wheel	55	33,467
DaimlerChrysler	Jeep Liberty / TJ	4-cylinder, 6-cylinder	front-wheel, four-wheel	57	167,485
Midsize Utility					
Honda	Honda Pilot, Acura MDX	6-cylinder	four-wheel	55	202,405
Toyota	Toyota Highlander / 4Runner, Lexus RX330	6-cylinder, 8-cylinder	front-wheel, rear-wheel, four-wheel	55	207,006
Hyundai-Kia					
Nissan	Nissan Murano / Pathfinder, Infiniti FX35	6-cylinder	front-wheel, rear-wheel, four-wheel	57	185,321
Volkswagen	Volkswagen Touareg	6-cylinder	four-wheel	57	12,314
Ford	Volvo XC 90	5-cylinder, 8-cylinder	four-wheel	55	24,101
GM	Chevrolet Equinox, Buick Rainier, Cadillac SRX	6-cylinder	front-wheel, rear-wheel, four-wheel	57	211,939
DaimlerChrysler	Jeep Grand Cherokee	6-cylinder	rear-wheel, four-wheel	57	112,414
Large Utility					
Honda					
Toyota	Toyota Sequoia	8-cylinder	rear-wheel, four-wheel	112	50,900
Hyundai-Kia					
Nissan	Nissan Armada, Infiniti QX56	8-cylinder	rear-wheel, four-wheel	128	47,469
Volkswagen					
Ford	Ford Expedition, Lincoln Navigator	8-cylinder	rear-wheel, four-wheel	128	117,267
GM	Cadillac Escalade / Escalade ESV	8-cylinder	rear-wheel, four-wheel	128	45,633
DaimlerChrysler	Dodge Durango	8-cylinder	rear-wheel, four-wheel	128	107,200
Minivan					
Honda	Honda Odyssey	6-cylinder	front-wheel	55	161,742
Toyota	Toyota Sienna	6-cylinder	front-wheel, four-wheel	55	172,999
Hyundai-Kia	Kia Sedona	6-cylinder	front-wheel	57	76,527
Nissan	Nissan Quest	6-cylinder	front-wheel	55	35,913
Volkswagen					
Ford	Ford Freestar, Mercury Monterey	6-cylinder	front-wheel	117	79,393
GM	Buick Terraza, Chevrolet Uplander, Saturn Relay, Pontiac Montana	6-cylinder	front-wheel, four-wheel	57	91,699
DaimlerChrysler	Dodge Caravan	6-cylinder	front-wheel	94	347,069

Note: Ranking based on average performance of the model and configuration listed, which were the cleanest offered by the automaker in MY2005.

Table B-7. Best MY2005 Models on Combined Environmental Performance

	Model	Engine	Drive	Combined Score	Sales
Small Car					
Honda	Honda Insight	3-cylinder	front-wheel	61	591
Toyota	Toyota Corolla	4-cylinder	front-wheel	61	368,744
Hyundai-Kia	Hyundai Elantra	4-cylinder	front-wheel	60	132,495
Nissan	Nissan Sentra	4-cylinder	front-wheel	70	116,354
Volkswagen	Volkswagen Jetta	5-cylinder	front-wheel	69	43,869
Ford	Ford Focus	4-cylinder	front-wheel	62	224,240
GM	Saturn Ion	4-cylinder	front-wheel	67	71,021
DaimlerChrysler	Chrysler Sebring Convertible	4-cylinder	front-wheel	70	4,245
Midsize Car					
Honda	Honda Accord Hybrid	6-cylinder	front-wheel	60	19,254
Toyota	Toyota Prius	4-cylinder	front-wheel	32	121,020
Hyundai-Kia	Kia Spectra	4-cylinder	front-wheel	58	53,027
Nissan	Nissan Altima	4-cylinder	front-wheel	68	311,400
Volkswagen	Volkswagen Passat	6-cylinder	front-wheel	118	1,856
Ford	Volvo S80	5-cylinder	front-wheel	71	6,671
GM	Chevrolet Malibu	6-cylinder	front-wheel	70	112,207
DaimlerChrysler	Dodge Stratus	4-cylinder	front-wheel	70	54,448
Large Car					
Honda					
Toyota	Toyota Avalon	6-cylinder	front-wheel	70	57,577
Hyundai-Kia	Kia Amanti	6-cylinder	front-wheel	124	22,858
Nissan					
Volkswagen	Volkswagen Phaeton	12-cylinder	four-wheel	102	28
Ford	Mercury Montego	6-cylinder	front-wheel	73	19,087
GM	Chevrolet Malibu Maxx	6-cylinder	front-wheel	70	48,578
DaimlerChrysler	Mercedes-Benz S430	8-cylinder	rear-wheel	79	2,920
Station Wagon					
Honda					
Toyota	Toyota Matrix	4-cylinder	front-wheel	64	62,421
Hyundai-Kia					
Nissan					
Volkswagen	Audi A4 Avant	4-cylinder	four-wheel	89	2,012
Ford	Ford Focus Station Wagon	4-cylinder	front-wheel	62	21,540
GM	Pontiac Vibe	4-cylinder	front-wheel	63	64,221
DaimlerChrysler	Mercedes-Benz E320 Wagon	6-cylinder	rear-wheel	75	445
Small Pickup					
Honda					
Toyota	Toyota Tacoma	6-cylinder	rear-wheel	82	57,329
Hyundai-Kia					
Nissan	Nissan Frontier	4-cylinder	rear-wheel	76	7,390
Volkswagen					
Ford	Mazda B2300	4-cylinder	rear-wheel	101	3,030
GM	GMC Canyon	4-cylinder	rear-wheel	120	6,896
DaimlerChrysler	Dodge Dakota	6-cylinder	rear-wheel	195	33,553

Table B-7 (cont'd)

Large Pickup					
Honda					
Toyota	Toyota Tundra	6-cylinder	rear-wheel	83	14,194
Hyundai-Kia					
Nissan	Nissan Titan	8-cylinder	four-wheel	133	33,683
Volkswagen					
Ford	Ford F150	6-cylinder	rear-wheel	126	48,548
GM	Chevrolet Silverado 15, GMC Sierra 15	8-cylinder	rear-wheel	122	748
DaimlerChrysler	Dodge Ram 1500	8-cylinder	four-wheel	162	114,534
Small Utility					
Honda	Honda CR-V	4-cylinder	rear-wheel	70	30,679
Toyota	Toyota RAV4	4-cylinder	front-wheel	109	40,533
Hyundai-Kia	Hyundai Tucson	6-cylinder	front-wheel	77	26,006
Nissan	Nissan Xterra	6-cylinder	rear-wheel	87	25,779
Volkswagen					
Ford	Ford Escape Hybrid	4-cylinder	front-wheel	49	4,202
GM	Saturn Vue	6-cylinder	front-wheel	74	18,807
DaimlerChrysler	Jeep Liberty	4-cylinder	rear-wheel	75	880
Midsize Utility					
Honda	Acura MDX	6-cylinder	four-wheel	84	60,287
Toyota	Lexus RX 330	6-cylinder	front-wheel	77	38,128
Hyundai-Kia					
Nissan	Nissan Murano	6-cylinder	front-wheel	77	32,109
Volkswagen	Volkswagen Touareg	6-cylinder	four-wheel	87	12,314
Ford	Ford Freestyle	6-cylinder	front-wheel	75	39,420
GM	Chevrolet Equinox	6-cylinder	four-wheel	79	104,641
DaimlerChrysler	Jeep Grand Cherokee	6-cylinder	rear-wheel	85	32,852
Large Utility					
Honda					
Toyota	Toyota Sequoia	8-cylinder	rear-wheel	120	26,507
Hyundai-Kia					
Nissan	Nissan Armada	8-cylinder	rear-wheel	132	19,191
Volkswagen					
Ford	Ford Expedition	8-cylinder	rear-wheel	132	55,860
GM	Cadillac Escalade	8-cylinder	rear-wheel	129	8,162
DaimlerChrysler	Dodge Durango	8-cylinder	rear-wheel	134	33,308
Minivan					
Honda	Honda Odyssey	6-cylinder	front-wheel	75	161,742
Toyota	Toyota Sienna	6-cylinder	front-wheel	77	148,802
Hyundai-Kia	Kia Sedona	6-cylinder	front-wheel	87	76,527
Nissan	Nissan Quest	6-cylinder	front-wheel	78	35,913
Volkswagen					
Ford	Ford Freestar	6-cylinder	front-wheel	111	72,690
GM	Buick Terraza, Chevrolet Uplander, Saturn Relay	6-cylinder	front-wheel	81	83,844
DaimlerChrysler	Dodge Caravan	6-cylinder	front-wheel	98	347,069

Note: Ranking based on average performance of the model and configuration listed, which were the cleanest offered by the automaker in MY2005.

Automaker Rankings 2007

The Environmental Performance of Car Companies

The product planning decisions of a handful of powerful companies have an immense influence on the environmental health of both America and the world. This report, now in its fourth edition, analyzes the bottom-line environmental performance of eight automakers, which together account for 96 percent of cars and trucks sold in the United States—the world's largest vehicle market.

Using government data, we evaluate the average emissions of smog and global warming pollution from the vehicles each automaker actually sells, both within individual classes and across its entire fleet. This quantitative analysis helps consumers determine whether an automaker's green marketing claims translate to truly greener vehicle choices.

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