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HOW MUCH FUEL DOES A HYBRID REALLY SAVE? A SAME-MODEL COMPARISON OF HYBRID AND GASOLINE CARS IN US FUEL ECONOMY DATA

Abstract: Hybrid cars are usually advertised as economical, but the saving depends on the car and on how it is driven. This study compares hybrid and conventional gasoline versions of the same model in the official US fuel economy database of the Environmental Protection Agency and the Department of Energy. A hybrid was paired with a conventional car when both had the same make, base model, model year and drive type, which gave 497 pairs covering about 60 models from 23 makes and model years 2003 to 2027. Before seeing any results, I predicted that hybrids save more fuel in the city than on the highway, and that mild hybrids with small batteries and heavy, powerful vehicles that are driven mostly on the highway save almost nothing. For the median pair, a hybrid was rated to use 36% less fuel in the city, 14% less on the highway and 28% less in combined driving. The city saving was larger than the highway saving in 494 of 497 pairs and for all 60 models, and the result held when only versions with the same engine were compared. Twenty-one pairs saved less than 5% in combined driving. All of them were SUVs or pickup trucks, and twenty carried the database label "Mild Hybrid". In the nine pairs where the hybrid was rated to use more fuel, the hybrid version also had a larger engine than every conventional version, although one mild hybrid Jeep Wrangler was also worse than a conventional Wrangler with the same engine. Pickup trucks saved little even without the mild hybrid label. These are official test ratings, not measurements in real traffic, but they suggest that the size and purpose of the vehicle matter at least as much for fuel saving as the type of hybrid system.

Keywords: hybrid electric vehicles; fuel economy; mild hybrids; city and highway driving; EPA fuel economy data

1. Introduction

I am interested in mechanical engineering and engines, and I chose this topic because hybrids are now one of the most common ways car makers reduce fuel consumption. A hybrid combines a gasoline engine with an electric motor and a battery. It can save fuel because the electric system can restart the engine after a stop, recover energy during braking, help the engine during acceleration and, in some hybrids, drive the car on electric power alone. Not all hybrids can do all of this. Hybrids are usually classified by their degree of hybridization into micro, mild, medium and full hybrids: a mild hybrid offers engine start-stop and regenerative braking, while medium and full hybrids can also drive the car with the electric motor [1]. A simulation of a 48-volt mild hybrid system added to a passenger car found that it reduced fuel consumption by 7.7% on the NEDC test cycle and by 1.7% on a real driving cycle [2].

The saving also depends on how the car is driven. In tests of one conventional gasoline car and its hybrid version, Wang and co-authors found that the hybrid's fuel consumption on the

Chinese CLTC test cycle was 20.23% lower than on the WLTC cycle, while for the conventional car it was 8.41% higher, and concluded that vehicle application scenarios must be considered to obtain better fuel efficiency [3]. Many hybrids also use engines that work on the Atkinson cycle instead of the usual Otto cycle [4].

The official US fuel economy database contains many models sold both as a hybrid and as a conventional car in the same year. This makes it possible to compare a hybrid with the same car without the hybrid system, which removes most differences in size, body and brand. This study asks three questions. How much fuel does a hybrid save compared with the same model on gasoline? Is the saving larger in the city than on the highway? And which hybrids save almost nothing?

2. Data and methods

2.1. Data

All data come from the vehicle file of the fueleconomy.gov website, administered by Oak Ridge National Laboratory for the US Department of Energy and the Environmental Protection Agency (EPA), which contains fuel economy information for model years 1984 to the present [5]. The file was downloaded on 29 September 2026 and contains 50,407 vehicles. For each vehicle, the database gives the EPA city, highway and combined fuel economy in miles per gallon (fields city08, highway08 and comb08), the engine displacement and description, the drive type and the EPA size class [5]. The city rating comes from a test that represents stop-and-go rush hour traffic with 23 stops and an average speed of 21.2 mph, and the highway rating from a test of free-flowing traffic with no stops and an average speed of 48.3 mph [6]. The database marks 1,899 vehicles as hybrids. A conventional vehicle was defined as one with no alternative fuel type and regular, midgrade or premium gasoline as its fuel.

2.2. Pairs

A hybrid was paired with conventional cars of the same model year, make, base model and drive type. The base model was obtained by removing the words "Hybrid" and "HEV" and common trim and drive words from the model name, for example "Camry Hybrid LE" and "Camry LE" both become "camry". When several conventional versions matched, their median value was used. One false match was removed by hand: the 2016 Chevrolet Malibu Limited, the previous generation sold alongside the new Malibu, was not used as a conventional version. This gave 497 pairs. They cover 71 model names, which correspond to about 60 models (for example, six versions of the Jeep Wrangler name), from 23 makes and model years 2003 to 2027; some models have several hybrid versions in the same year, so the pairs fall into 440 different combinations of model year, make, model and drive type. Most hybrids in the database did not find a pair, either because no conventional version was sold or because the model names differ.

2.3. Measures

The fuel saved by a hybrid was calculated as $1 - \text{MPG}(\text{conventional}) / \text{MPG}(\text{hybrid})$. This is the share of fuel the hybrid saves over the same distance. For example, a conventional car rated at 30 MPG and a hybrid at 40 MPG give a saving of $1 - 30/40 = 25\%$. The saving was calculated separately for city, highway and combined ratings.

My predictions were recorded on 4 October 2026, before any results were calculated. The analysis plan was written on 7 October 2026 together with the first calculation; it specified the pairing rule, the three savings, the comparison of city and highway savings, and the list of pairs that save less than 5% in combined driving. On 13 October the pairing rule was corrected to remove false matches, such as the Mitsubishi Outlander paired with the Outlander Sport, which

reduced the number of pairs from 502 to 497. The following checks were also added after the first review of the paper: a comparison using one value per model, a comparison of only those versions that have the same engine (the same displacement, number of cylinders and turbocharger or supercharger), the grouping by vehicle class and by the database label "Mild Hybrid", and the Wilcoxon signed-rank test for the city and highway savings. Because the savings are not normally distributed, medians and interquartile ranges are reported.

3. Results

3.1. Saving in the city and on the highway

For the median pair, a hybrid was rated to use 35.7% less fuel than the same model on gasoline in the city, 13.5% less on the highway and 27.6% less in combined driving (Table 1). The city saving was larger than the highway saving in 494 of 497 pairs (Wilcoxon signed-rank test, $p < 0.001$). Because some models appear in many pairs, the comparison was repeated with one median value per model: the savings were 35.1% in the city, 13.5% on the highway and 28.5% combined, and the city saving was larger for all 60 models ($p < 0.001$). Figure 1 shows these 60 models: all of them lie above the line where the city and highway savings would be equal.

Some hybrid versions have a different engine from the conventional versions they were compared with. For 199 pairs (33 models) a conventional version with the same engine was available, meaning the same displacement, number of cylinders and turbocharging. Compared only with these, the hybrid saved 33.9% in the city, 9.7% on the highway and 25.0% combined, and the city saving was larger in 198 of 199 pairs. For example, the 2024 Toyota Camry hybrid saved 32-39% in combined driving compared with the conventional Camry with the same 2.5-liter engine, depending on the version. The 2024 Ford F-150 hybrid with four-wheel drive saved 27% in the city, but on the highway it saved nothing: both versions are rated at 24 MPG.

Table 1. Median fuel saved by the hybrid compared with the same model on gasoline, %

Group	Pairs	City	Highway	Combined
All pairs	497	35.7	13.5	27.6
Same engine	199	33.9	9.7	25.0
Cars and vans	204	40.0	20.3	32.9
SUVs	231	34.9	10.0	25.6
Pickup trucks	62	14.7	4.2	10.5
Labeled "Mild Hybrid"	50	11.8	4.2	10.5
Not labeled "Mild Hybrid"	447	37.0	15.6	29.3

Note: "Same engine" compares each hybrid only with conventional versions with the same displacement, number of cylinders and turbocharging. The interquartile range for all pairs is 25.0-41.4% in the city, 6.2-20.6% on the highway and 18.5-33.3% combined.

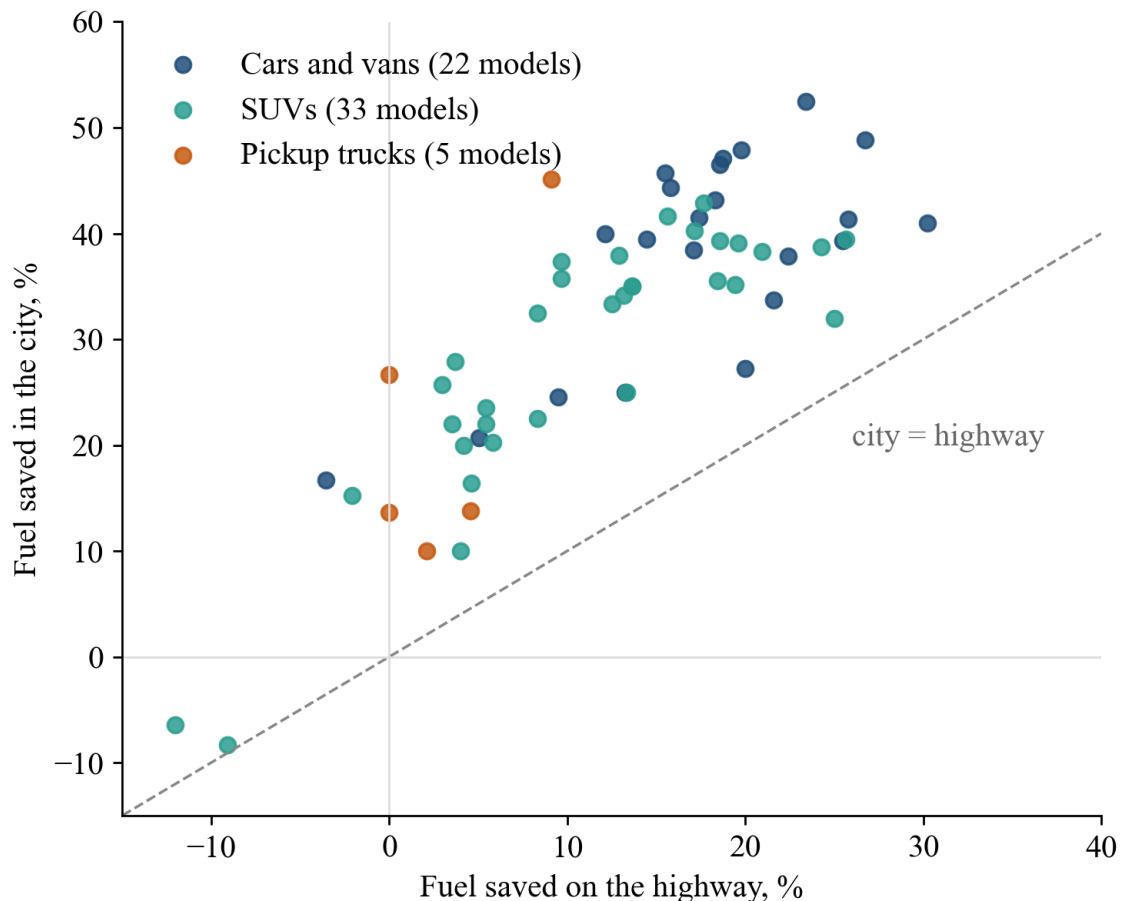


Figure 1. Median fuel saved by the hybrid in the city and on the highway for 60 models. Points above the dashed line save more in the city.

3.2. Hybrids that save almost nothing

Twenty-one pairs saved less than 5% of fuel in combined driving, and in nine of them the hybrid version was rated as using more fuel than the conventional one. All twenty-one were SUVs or pickup trucks (versions of the Audi Q7, Jeep Wrangler, Jeep Wagoneer and Ram 1500), and twenty of them carry the label "Mild Hybrid" in the engine description of the database; the remaining one, a 2027 Ram 1500 with two-wheel drive, is labeled "Hybrid". In all nine pairs where the hybrid was rated to use more fuel, the hybrid version also had a larger engine than every conventional version it was compared with: a 3.0-liter engine against 2.0 liters in the Audi Q7, and a 5.7-liter V8 against 3.0 liters in the Jeep Wagoneer and Ram 1500. Where a conventional version with the same engine existed, as for the Jeep Wrangler and the 2027 Ram 1500, the low-saving hybrids saved between -9.5% and 10.5% compared with it; the 2020 Jeep Wrangler 4WD with a 2.0-liter turbo engine was 9.5% worse than the conventional Wrangler with the same engine.

Hybrids labeled "Mild Hybrid" saved a median of 10.5% in combined driving, compared with 29.3% for the other hybrids. This label appears in the database only from model year 2018. It is carried by 841 hybrids in the database, but only 50 of them, from Audi, Jeep and Ram, could be paired. In 16 of these 50 pairs the hybrid had a smaller engine than some of the conventional versions, which raises its saving; compared only with versions with the same engine, the 20 mild hybrid pairs saved 8.8% in combined driving. Vehicle class mattered as well. Pickup trucks saved a median of 10.5% , compared with 32.9% for cars and vans, and even

pickup trucks without the mild hybrid label, such as the Toyota Tundra and Tacoma hybrids and the Ford F-150 hybrid, saved a median of only 9.1% (33 pairs).

4. Discussion

My first prediction was that hybrids save more fuel in the city. The data support it clearly, for all pairs, for each model and for versions with the same engine. I explain this by how a hybrid works. In the city the car constantly accelerates and brakes, and the EPA city test includes 23 stops [6]. During braking, regenerative braking returns energy to the battery, and at low speed a full hybrid can move on electric power alone. On the highway the speed is steady, these advantages almost disappear, and most of the work is done by the gasoline engine. This agrees with the finding that the fuel consumption of a hybrid depends strongly on the driving cycle [3].

But the highway saving is not zero: the median pair still saves about 14% on the highway, where there is little braking to recover energy from. In my opinion, the reason is the engine itself. In many hybrids the gasoline engine works on the Atkinson cycle [4], and, in my view, this cycle gives higher efficiency at constant speed than the usual Otto cycle. In addition, the electric motor takes the peak loads during overtaking or climbing, so the engine can stay in its most efficient range and does not have to enrich the mixture or run at inefficient speeds. Wang and co-authors explained the much lower NO_x emissions of the hybrid they tested by lower engine load and less fuel enrichment [3], which agrees with the idea that the hybrid's engine works in a more favorable range. The data in this study do not test this explanation directly; they only show that the highway saving is positive for most pairs.

My second prediction was that mild hybrids with small batteries and heavy, powerful vehicles driven mostly on the highway save almost nothing. The data support it partly. The hybrids that saved least were all SUVs and pickup trucks, almost all of them with modern mild hybrid systems, and a simulated 48-volt mild hybrid system saved only 1.7-7.7% of fuel [2]. But two other things were also important. First, in most pairs where the hybrid was worse, it also had a much larger engine, so in these cases the hybrid version is in effect a more powerful car, not just the same car with a hybrid system; the one exception is the 2020 Jeep Wrangler with the same 2.0-liter turbo engine. Second, pickup trucks saved little even without the mild hybrid label. The size and purpose of the vehicle therefore seem to matter at least as much as the type of hybrid. My explanation was that the extra weight of the hybrid system increases fuel consumption, but the database does not contain vehicle weight, so this could not be checked. My own first look at three pairs on the fueleconomy.gov website showed the same pattern before I saw the full data: the Toyota RAV4 hybrid saved much more in the city than on the highway, and the Chevrolet Corvette E-Ray, a powerful sports car, was rated almost the same as the conventional Corvette. These quick comparisons did not follow the pairing rule of this study exactly.

For a buyer, this means that a hybrid badge alone does not guarantee a real saving. A hybrid car used mostly in the city saves the most. An SUV or pickup truck with a hybrid system, especially a mild one, may save very little.

5. Limitations

The results are based on official EPA test ratings, not on measurements in real traffic, and the ratings are rounded to whole miles per gallon, so a difference of one mile per gallon can change a small saving by several percentage points. The pairs were formed by model name, so a hybrid and a conventional version of the same model can still differ in engine, power or equipment; the same-engine comparison reduces but does not remove this problem. Only some of the hybrids in the database could be paired, so the results describe these models, not all

hybrids. The label "Mild Hybrid" appears only from model year 2018 and only 50 of the 841 labeled hybrids could be paired: older hybrids that Xue and co-authors list as examples of mild or medium hybrids, such as the Saturn Vue, Chevrolet Malibu and Honda Civic [1], carry no such label and are included in the other group. The database does not separate all-wheel and four-wheel drive in the same way for all years, which may affect the matching by drive type. Finally, the data describe cars sold in the United States, which are not the same as the cars sold in Kazakhstan.

6. Conclusion

In 497 pairs of hybrid and conventional gasoline versions of the same model, the hybrid was rated to use a median of 36% less fuel in the city, 14% less on the highway and 28% less in combined driving, and the city saving was larger for every one of the 60 models. All hybrids that saved less than 5% were SUVs and pickup trucks, almost all with mild hybrid systems, and almost all of those rated worse than the conventional version also had larger engines. A hybrid saves the most when it is a car driven in the city, and the least when it is a large, powerful vehicle with a small hybrid system or a bigger engine than the conventional version.

Data availability

All data are publicly available from fueleconomy.gov [5]. The list of pairs and the scripts that calculate every number in this paper are available from the author on request.

AI and tools disclosure

I chose the research question, wrote my predictions before seeing the results for the whole database, compared the first three pairs on the fueleconomy.gov website, found the study by Wang and co-authors, and wrote, in Russian, the explanation of why hybrids save fuel on the highway. My mentor downloaded the full database, wrote the code for the calculations with the help of generative AI tools and prepared the figure. The English text was drafted by my mentor with the help of generative AI tools, based on the results and on my own written answers, and I reviewed and approved it. No data, results or citations were generated by AI: all numbers come from the fueleconomy.gov database, and all cited sources were checked against the originals. I take full responsibility for the final manuscript.

Conflicts of interest

The author declares no conflicts of interest.

References:

1. Xue Q., Zhang X., Teng T., Zhang J., Feng Z., Lv Q. A comprehensive review on classification, energy management strategy, and control algorithm for hybrid electric vehicles // *Energies*. 2020. Vol. 13, No. 20. Art. 5355. DOI: 10.3390/en13205355.
2. Abidin S.F.Z., Khalid A., Zanalli S., Zahari I., Jalal R.I.A., Abas M.A., Koteen H. The effect of 48V mild hybrid technology on fuel consumption of a passenger car by using simulation cycle // *Case Studies in Thermal Engineering*. 2021. Vol. 28. Art. 101492. DOI: 10.1016/j.csite.2021.101492.
3. Wang Y., Hao C., Ge Y., Hao L., Tan J., Wang X., Zhang P., Wang Y., Tian W., Lin Z., Li J. Fuel consumption and emission performance from light-duty conventional/hybrid-electric vehicles over different cycles and real driving tests // *Fuel*. 2020. Vol. 278. Art. 118340. DOI: 10.1016/j.fuel.2020.118340.

4. León R., Montaleza C., Maldonado J.L., Tostado-Véliz M., Jurado F. Hybrid electric vehicles: a review of existing configurations and thermodynamic cycles // Thermo. 2021. Vol. 1, No. 2. P. 134-150. DOI: 10.3390/thermo1020010.

5. U.S. Department of Energy, U.S. Environmental Protection Agency. fueleconomy.gov web services: vehicle data file and data description, model years 1984-2027 [Electronic resource]. URL: <https://www.fueleconomy.gov/feg/ws/index.shtml> (data downloaded: 29.09.2026; accessed: 13.10.2026).

6. U.S. Department of Energy, U.S. Environmental Protection Agency. Detailed test information: fuel economy test schedules [Electronic resource]. URL: https://www.fueleconomy.gov/feg/fe_test_schedules.shtml (accessed: 13.10.2026).

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ШЕКАРАСЫЗ ФИЗИКА: ӘР ЕЛДЕГІ ФИЗИКАЛЫҚ БІЛІМДІ САЛЫСТЫРУ 347