



# **Petronas vs Shell vs BHP vs Esso: Which petrol brand gives the lowest (best) fuel consumption?**

After more than one and a half years of measurements, I report [my latest results here](#).

Do petrol brands matter? Would filling up our cars' petrol tank with a particular petrol brand, for example, make any difference to our cars' fuel consumption (FC)? It pays to ask this question especially when fuel prices are on a persistent and upward trend.



Malaysia's own oil company, Petronas. Does it give the best car fuel consumption? (photo from [apiz927.blogspot.com](http://apiz927.blogspot.com))

I checked some local car forums on the net to determine what the Malaysian car enthusiasts are saying on this issue. It appears everyone there has an opinion or stance on the "best" petrol brand. Some say Shell - but an equal number of

people would instead swear on Esso, others on BHP, and yet others on Petronas. In other words, *take your pick*.

Judging from the typical long queue of cars at Shell and Petronas fuel pumps, it appears that Shell and Petronas are the two most popular petrol brands in Malaysia. In sharp contrast, Esso and BHP petrol stations often have lesser cars. So could it be that Malaysians have somehow worked out that Petronas and Shell are the two best (*i.e.*, most fuel efficient) petrol brands? Is this an example collective or crowd wisdom in action?

Ultimately, I was going to have my own car test to answer this question. For six months from Oct. 2010 to Mar 2011, I monitored my car's fuel consumption (FC) based on four major petrol brands in Malaysia: Shell, Petronas, Esso, and BHP. I did not pick Caltex because its stations were few and far between at my home and work place.

First: some background information on my little experiment:

- Test car: Nissan Grand Livina (year 2010) 1.6 Manual
- Car driven mostly by me (about 95% of the time and 5% by my wife)
- Car typically carrying one to three passengers (including driver)
- Car not modified in any way and no fuel additives were used during tests
- Petrol type RON95 was always used (never RON97)

At the end of the six months, my average car's FC was 7.95 L per 100 km (or equivalent to 12.67 km per L or 29.80 miles per gallon). At the current petrol price, this works out to 15 cents per kilometer. The average distance I travelled in my car was 94.63 km per day (which works out to RM14.24 spent per day on petrol).

Fig. 1 below shows the average FC based on the four petrol brands. Looking merely at the average values, Petronas had the lowest (*i.e.*, best) FC of 7.81 L per 100 km, followed by Shell (7.88 L per 100 km), BHP (8.03 km per 100 km), and lastly, the highest (*i.e.*, worst) FC was by Esso (8.07 km per 100 km).

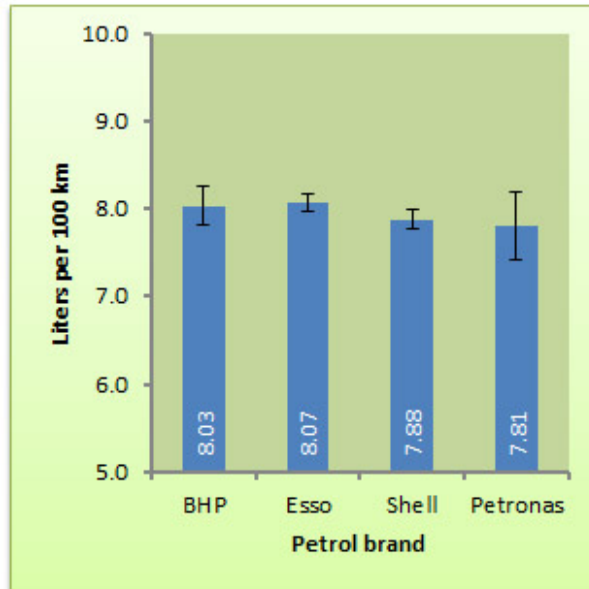


Fig. 1. Average fuel consumption (FC) based on four petrol brands

However, the standard error bars (those vertical lines on the top of each bar) tell a different story. Although Petronas had the lowest average, its standard error bar was the largest. In more technical terms, a long error bar denotes high variation (*e.g.*, greater uncertainty) in the readings. In contrast, a short error bar denotes the readings are more similar to one another. The standard error bars for the four petrol brands covered about the same range of FC values. Consequently, we can regard that the four petrol brands give more or less the same FC.

But what were causing these variations in FC readings? It is well known that FC is affected by many factors, two of which are the road conditions and road traffic. Fig. 2 below shows that the farther I travelled in a day, my car's FC would increasingly improve (*i.e.*, FC become increasingly lower).

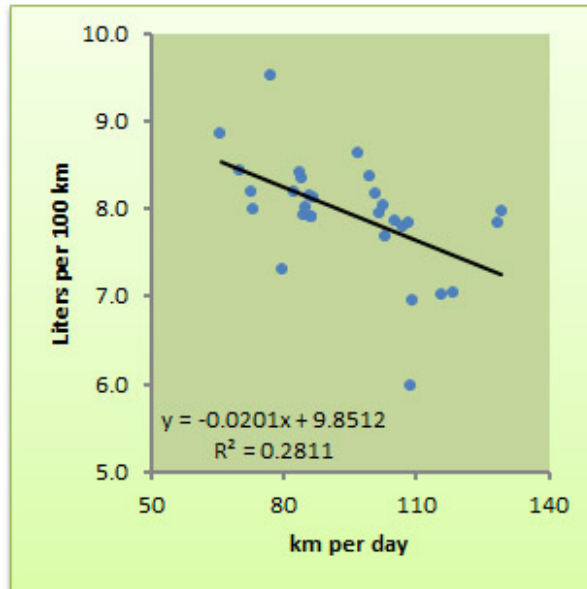


Fig. 2. Fuel consumption (FC) would decrease with increasing average distance travelled in a day

This trend in FC makes sense. The farther I travelled per day often meant I was driving more on the highway roads. Travelling on highway roads often lowers a car's FC because of the lesser road traffic and better road conditions. In contrast, travelling more on the so-called city roads would often increase a car's FC because of the increased road traffic and more tortuous (intricate) routes. Fig. 2 shows that for every 10 km more I travelled in a day, my car's FC would fall (improve) by about 0.2 L per 100 km.

Most interestingly, the following four charts (Fig. 3) show that there were some FC differences between the four petrol brands when they were plotted against the average daily distance travelled.

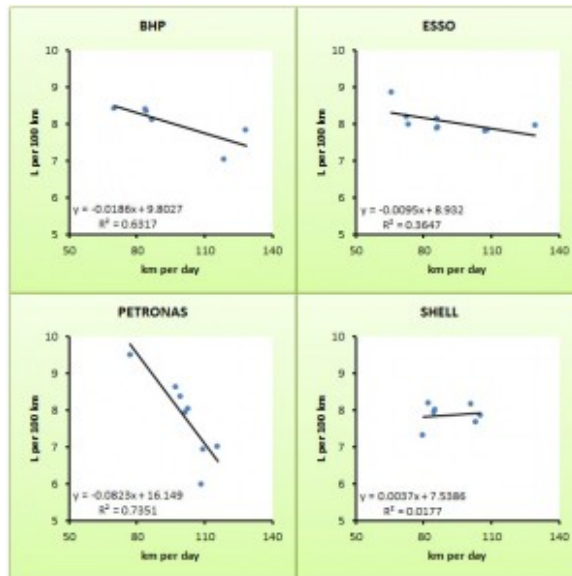


Fig. 3. How the fuel consumption (FC) of four petrol brands would decrease with increasing average distance travelled in a day

All petrol brands, except Shell, showed that the farther I travelled in a day, my car's FC would fall (improve). *But, crucially, how much my car's FC would fall with distance travelled would depend on the petrol brand.*

Combining all the four above charts (and removing the scatter points to improve chart clarity) into one chart improves interpretation.

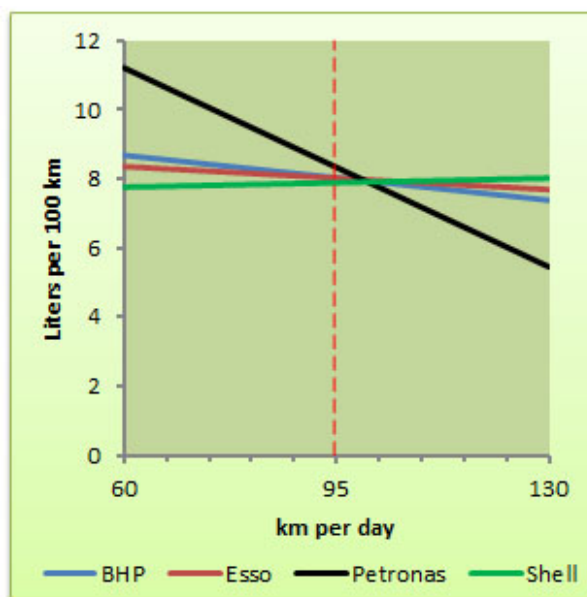


Fig. 4. Summary of the fuel consumption (FC) of four petrol

## brands

Fig.4 reveals two petrol brands have contrasting trends on my car's FC: Shell and Petronas. Unlike the other three petrol brands, Shell (green line) showed a near horizontal (flat) line. This means that travelling using Shell would not improve my car's FC regardless whether I travelled far or near in a day, remaining rather constant at 7.88 km per 100 km. Petronas (black line) had the steepest slope which meant that Petronas had the largest effect on my car's FC depending on average distance travelled per day.

For short travelling distances (about less than 100 km per day), Shell had the lowest (best) average FC compared to the other three petrol brands. In contrast, Petronas (black line) had the highest (worst) average FC for short travelling distances.

However, for large travelling distances (about more than 100 km per day), Petronas had now the lowest (best) average FC. In contrast, Shell would instead have the highest (worst) average FC for large travelling distances.

Esso (red line) and BHP (blue line) are of less interest here since their trends are between that for Shell and Petronas.

Fig. 4 confirms that there were differences between the petrol brands on my car's FC. However, in the long run, these differences did not matter. As mentioned earlier, the average distance I travelled in a day was 94.63 km. This average distance is shown in Fig. 4 as the vertical dashed red line. Observe that this dashed red line intersects the four petrol brand lines at nearly the same point or location. This means that for the average distance I travelled in a day (over a period of six months), there was little differences between the four petrol brands on my car's FC. In other words, in the long run, it did not matter what petrol brand I used; my car's FC would not be affected by the petrol brands.

## Conclusion

The results from my 'experiment' did confirm my initial belief that there is little differences between petrol brands. For the distance I normally travel in a day (about 95 km per day), this belief is verified. At this distance, there is little difference between petrol brands.

However, unexpectedly, different petrol brands would give a different FC depending on the distance travelled. The results showed that for the lowest FC, Shell is most suitable for city driving (*e.g.*, roads with heavy traffic) but Petronas is most suited for highway driving (*e.g.*, outstation driving).

So perhaps Malaysians do have it right on the best petrol brands (Shell and Petronas) to use for their cars.

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## **Caveat**

I am under no illusion that my “experiment” is any way a rigorous scientific experiment. To qualify as one, I would need, among others, more than just one car (at least twelve Nissan Grand Livinas!) and more than one driver (and the drivers would have to be kept from knowing what petrol brand they are using).

Nonetheless, I believe there is some legitimacy in my “experimental” results. Using another car model (other than Nissan Grand Livina) or travelling on other routes would of course obtain a different set of FC values by the four petrol brands. However, I believe the trend as observed in this “experiment” would remain stable: that Shell is the best petrol for city driving and Petronas for highway driving.