Special Issue on Energy Conservation

Consumer Info

[Quarterly Newsletter of Consumer Rights Education & Awareness Trust (CREAT)]

No.1/2011 January - 2011

ALL YOU WANTED TO KNOW ABOUT FUEL EFFICIENCY

1. Introduction

India is now probably world's 7th largest auto market that produced 2.3 million passenger vehicles, 0.56 million LCV's, 0.25 million heavy trucks and buses, 0.6 million three wheelers and 10.5 million two wheelers. (Source SIAM 2009-10). But the consistent growth of 12% in automobile sector is not complemented by the potential fuel efficiency measures, thus putting more & more pressure on the non-renewable energy resources besides increasing levels of CO_2address these serious issues, certain Fuel Efficiency measures are urgently required to be adopted to conserve the precious fuel and strengthen national energy security.

Auto companies are also taking fuel efficiency (FE)and pollution control very seriously because everyone knows that automobiles are the largest consumer of liquid fuels and consequently among the largest contributors to global pollution and global warming. New technologies are progressing rapidly with introduction of clean burning engines; that not only consume less fuel but are also less polluting. Unfortunately they cost more to make and auto makers who, having to watch their profits, need the enactment of legislation to ensure that consistent efficiency improvements take place within defined time lines.

2. Alternate fuels for Automobiles

CNG (compressed natural gas) and LPG (liquid petroleum gas) are emerging as popular automotive fuels. Because they are less polluting than conventional fuels, the government prices them much lower than petrol or diesel but there is an initial cost of the conversion kit that can only be fitted to petrol engines. Therefore these are only economical for vehicles like taxis that have to cover long distances. Users also suffer a small loss of power but the engines are also quieter. CNG, being a pure gas cannot be compressed so it has to be piped in at high pressure from the refineries and thus is only available in Mumbai and Delhi areas. LPG is however a liquid that can be stored at low pressure and transported, like other fuels, by tankers to any town.

Electric vehicles, that produce zero pollution, are very slowly gaining popularity but are a bit expensive. They also suffer from a limited driving range of roughly 80 Kms. They are however fun to drive as they accelerate quickly and make almost no noise. Like other cars they are heavily taxed so the central and state governments must give them a complete tax holiday until they become popular.

3. Homologation

All domestic Indian vehicles have to pass a process of homologation or conformity before they are allowed to be sold. The Government test centers like ARAI (Automotive Research Association of India) not only check to confirm their specifications, engine power etc., but also the fuel consumption under standard test condition. These results are for ideal conditions and do not take into account factors like traffic, excessive heat, aggressive driving, bad roads, etc. In real traffic situations, the fuel consumption would be roughly 20 to 25% higher than the test results.

4. Difference between Fuel Efficiency & Fuel Consumption:

Also the exhaust emissions tend to correspond with the fuel consumption though some engines are a little cleaner than others. Technologies are improving very rapidly as customers worldwide are getting aware of fuel efficiency. They concentrate on better burning of fuel with MPFI (Multi Point Fuel Injection), multi valves, variable valve timing, etc., as well as better scrubbing of the exhaust gases with catalytic converters, etc.

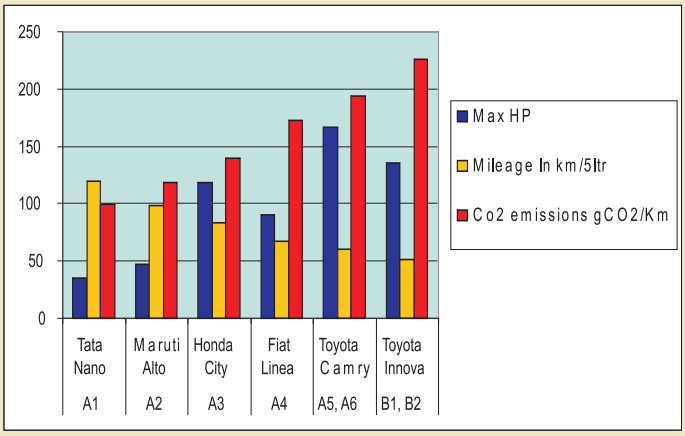
In India SIAM (Society of Indian Automobile Manufacturers), by following international custom, classifies vehicles in different size categories according to their length:

A1 are cars of less than 3.5 Meters (m),
A2 are cars between 3.5 & 4m,
A3 are between 4 and 4.5m,
A5 are between 4.5 to 4.7 m,
A6 are over 5m.

Utility and multi utility vehicles are similarly classified as B1, B2, etc.

Presently, the excise tax on most of the passenger cars is between 20-24% depending upon category. But if the FE labeling program to be made successful, govt. is expected to consider further reducing the excise duty as fiscal incentives to the buyers to encourage sale of fuel efficient cars particularly entry level small family cars that still continue to dominate the market among all the segments. This would largely help mitigate climate change by reduction of CO_2 emissions.

Graph below is a list of typical vehicles on the Indian roads showing the fuel consumption and other parameters of some selected (**petrol engine**) cars under ARAI ideal test conditions:

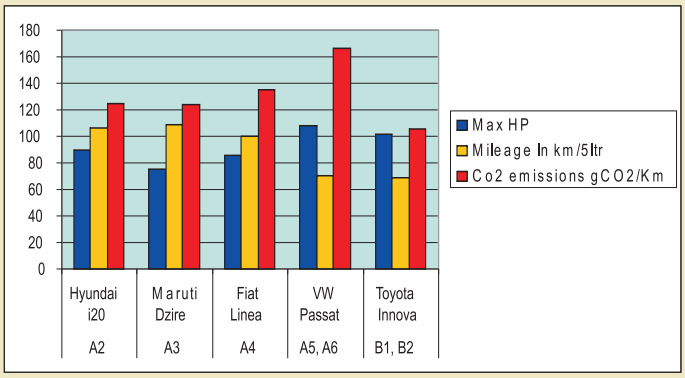


Graphs showing relative difference between HP, Mileage and CO2 emission: Petrol Engines

The close correlation between vehicle weight and HP with fuel consumption and emissions is very clear from this graph.

5. Are latest Diesel engines most fuel efficient & least polluting?

Till quite recently, diesel engines were usually noisy, sluggish and polluting but since the advent of high pressure common rail fuel injection they are now comparable to petrol engines in terms of power and exhaust emissions though superior in fuel efficiency. A characteristic of diesel engines is that they deliver power (torque) at lower engine speeds enabling the vehicle to drive at lower engine speeds (RPM) leading to better fuel consumption. Apart from carbon, diesel engines used to also produce more smoke (particulate matter) but these too have been greatly improved. In fact, modern diesel vehicles are more than double as fuel efficient and half as polluting as compared toten year old diesel vehicles to say nothing of all the older vehicles. But on the other hand, Diesel is more polluting in terms of NOX and particulate matter, unless EURO VI is available. Even top luxury brands like Audi, BMW and Mercedes are making diesel vehicles that are as quiet as their petrol models.



Graphs showing relative difference between HP, Mileage and CO2 emission: Diesel Engines

6. Upcoming innovation to help consistent improvement in efficiency:

Improved engine technologies are the main element in improving fuel consumption but there are many other factors as well. The impact of some recent innovations like variable valve timing, petrol direct injection, high pressure Diesel injection, digital valve activation; 5/6 speed gear box and other various factors would further enhance the fuel efficiency in the coming years.

Though cars having new technologies are expensive but most fuel efficient cars are going to be more economical in their operational cost as they will give much higher mileage (over 30% of the current/old ones), therefore about 30% saving is achievable. This would save you Rs. 935 (17 litres) per month or RS. 11200 (204 litres) per year if you are using your car for about 600 km a month. Thus cars incorporated with new technologies are most fuel efficient in the long run and conserve fuel & national resources. The cost has been calculated based on 10 km/liter of mileage of an average car under city driving situations/conditions. The above details indicate billions of gallons of fuel and foreign exchange can be saved every year on using fuel efficient car.

7. Measures that improve the Fuel Efficiency:

Since the FE labeling of cars is yet to become a reality in India, but there are certain measures that can tangibly improve the efficiency of the vehicles. This is above and beyond the labeling of the cars as the fuel efficiency measures would have to be followed to get higher mileage and conserve fuel to achieve the objectives of conservation of non-renewable energy resources & climate change.

Almost any car can give you anything from 5 Kmpl to 25 Kmpl depending on the category, how it is driven and the road & traffic conditions. Listed below are some of the main fuel consumption killers that drivers can largely control themselves:

1.Cold engines. If your car does a 5-minute trip to the market and then goes on a series of short trips to the bank, school, friends, etc., your engine never gets warm enough to achieve thermal efficiency and your fuel consumption may go by up to 50%. So if you have to do short trips do not expect good fuel efficiency.

2.Driving at high engine speeds. If you like to rev up your engine and drive at high engine speeds in each gear, you will get the thrill of fast driving but will have to pay a price for it. Conversely if you drive like a proverbial old woman and keep the engine at minimum speeds your fuel consumption will be very much better but driving in too low speeds will also cause knocking and shorten engine life. So do not overdo it and drive at a steady speed to get higher mileage.

3. To many stops and starts. Driving in traffic with long periods of idling at red signals or when stuck at traffic is a fuel efficiency killer. If you spend 10 minutes idling on a 30-minute road trip, your fuel consumption may double. Hence switch-off your engines at red signals. If not, switch-off your AC to reduce fuel consumption.

1.Bad Roads. These can combine the impact of too many stops with the need to use high engine speeds in low gears to keep your vehicle moving so it can play havoc with your fuel consumption.

2.The weight of the car. Most modern cars must meet current crash safety requirements and are heavier than earlier models and they therefore eat more fuel. But this is a small price to pay for safety. Consider that over 108,000 people were killed on Indian roads last year so a bit more fuel is a small price for lesser deaths or injuries. Also if no necessity, never go for bigger cars as they are heavier and least fuel efficient.

3.The load that you carry This weight factor is naturally increased if your car is overloaded with six people and loads of luggage. If you carry baggage on a roof rack than you will also have the impact air resistance. Thus adjust your baggage, smallest in the front & largest in the rear, tightly tie & cover to minimize air resistance.

4.Engine tuning and timing. Most modern engines with MPFI and other electronic engine management systems need very little tuning unlike the old carburetors but the nozzles and injectors do need to be cleaned especially with dirty or adulterated fuel that are sometimes encountered. So do not neglect your regular servicing to get better efficiency from your cars.

5.Air, oil and fuel filters. Choked filters can play havoc with fuel consumption & also efficiency so ensure that these are regularly serviced and changed when they are dirty or clogged.

6.Tyre pressure. Increasing tyre pressure will reduce rolling resistance and fuel consumption but it will make your ride hard and your handling unsafe as the smaller footprint touching the road will reduce the road grip and braking efficiency. Conversely low pressure is fuel consuming. So be careful to maintain the correct pressure recommended by every car maker to expect your car to be more fuel efficient.

7.Evaporation losses. All vehicles suffer from a little evaporation loss especially in the hot summer months. This loss will be higher in many cars that stand idle for any length of time so the fuel consumption may seem high in any vehicle that is unused for some time.

8. Hybrid cars with electric motors working in tandem with petrol engines are being promoted by many auto makers to demonstrate their concern for the environment. Their performance is now very acceptable but they are still so expensive that they will not be popular for a long time. Many car makers are also making Hydrogen fueled cars as well as cars fueled by fuel cells but these too are for the future.

9. Two wheelers, the largest selling Indian vehicles:

These factors apply not only to cars but to motorcycles, and all two wheelers. Under the pressure of legislation, the noisy and polluting 2 stroke engines have now been replaced by 4 stroke engines while severe competition has made them much more consumer and environment friendly. A few models now have twin spark plugs for better combustion and fuel injection will be available soon.

The older version of two wheelers of two stroke engines had been the least fuel efficient & most

polluting but the current generation bikes are able to give the mileage of over 70 kms in practical usage situations hence saving of over 55% of fuel on each two wheelers. In this case also, billions of gallons of fuel and foreign exchange can be saved every year on using fuel efficient two wheelers

10. Fuel Consumption of vehicles

The fuel consumption of all vehicles depends on their laden weight as well as the number of

Kms it plies. Typically most personal cars drive about 600 Kms a month so a medium sized car at 10 Km per liter, it may consume 60 liters per month. By contrast a heavy truck or bus that has a big 100 to 400 HP engine may consume 4 KMPL on 5000 Kms of driving every month so it would consume about 2,000 liters… or 33 times as much fuel as a car.

11. Commercial & Public Transport Vehicles Consume and Pollute the most:

What makes India's trucks and buses especially polluting is the fact that the bulk of India's huge fleet (of some 4 million trucks and 3 million buses) consist of very

inefficient old vehicles. Thus majority of the fuel consumption in the automobile sector takes place for the commercial vehicles and public transports.

Once fuel efficiency labeling standard for cars are implemented and workable, the next category of the vehicles for fuel efficiency labeling to be commercial and public transport vehicles that would further enable conservation of fuel.

.12. Fuel Efficiency and Labeling of Cars from 2011?

The auto makers are apprehensive with the Govern ments proposal for them to carry labels (as in the case of air-conditioners) showing the fuel efficiencies from 5 star as most efficient to 1 star as least efficient. They all respect the ARAI test system but feel that there are so many other factors as enumerated above and correctly fear that customers who have so many choices today will shun any brand that is given low fuel efficiency ratings. The threat of such legislation will however probably be sufficient to make all auto makers take the extra effort because customers are becoming very conscious of fuel consumption and pollution. The FE labeling initially for the cars is being finalized in consultations with all the key stake holders including concerned ministries and expected that BEE is

association with PCRA, will implement the FE labeling program in 2011.

References: SIAM, PCRA, ICCT, ARAI, MoF, ET&TOI, GPF .

This material is made possible by the support of the Climate Works Foundation & I.C.C.T of US on climate change mitigation The study is also supported by Shakti Sustainable Energy Foundation (SSEF)of India . The contents are the responsibility of VOICE and do not necessarily reflect the views of any of the other organizations

Upcoming event :

The Consumer Rights Education & Awareness Trust(CREAT) in collaboration with bureau of Energy Efficiency (BEE) and Voluntary Organization in interest of consumer Education (VOICE), New Delhi will be organizing a workshop on Promotion of Star Labeled Products during February 2011

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