

Role of Fuel Economy in Automobiles towards Conservation of Energy & Environment

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INTRODUCTION

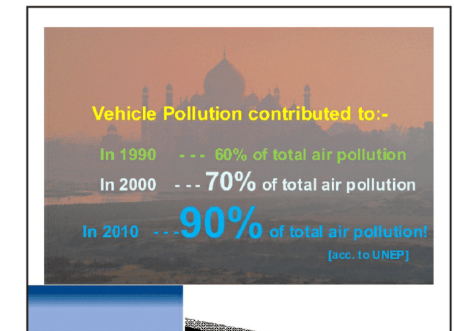
Terrorism and Global warming are the two major threats in today's world. The two are independent of each other and therefore need to be dealt separately. Global warming is directly related to environment that is directly connected with energy and its utilization.

Energy is required for creation, sustenance and growth of everything that we see around us. Major sources of energy today are coal and products made out of petroleum crude (fossil fuels). It is also being obtained from solar, nuclear, hydrostatic and wind sources. Bio Fuel, CNG, LPG and Hydrogen are some other sources of energy. Requirement of energy is going up at a very high rate. No development or advancement is possible without availability of energy.

Environment is affected by production and utilization of energy in most cases. Global warming and contamination of air and water are directly affected by the rate of utilization of energy. While solar, nuclear, hydrostatic, electrical, wind sources, Bio Fuel, CNG, LPG and Hydrogen sources (also called 'clean energy') hardly cause harm to the environment, Coal and fossil fuels are extremely harmful for the environment. Efforts are being made to produce more & more clean energy not only to help the environment but also because the reserves of coal and fossil fuels are limited. However, there is a tough competition between ever growing requirement of energy and production of clean energy. We are still largely dependent on coal and fossil fuels to meet our energy requirements. Also, there are practical difficulties/limitations in production and utilization of clean energies.

Some of the alarming statistics pertaining to India about use of fossil fuels is as following:-

- India is 5th largest emitter of CO₂ in the world after USA (5800MT), China (4732 MT), Russia (1529MT) & Japan (1215 MT).
- 70% of Diesel & 99.6% of petrol is used by transport industry.
- 90 % of total pollution is caused by automobiles.



- Most of the automobile pollution is at breathing level.



- In spite of Bio diesel, CNG, LPG, Hydrogen coming up as alternative fuels and use of electric vehicles as well as increase in public transport

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specially in the form of electric trains, the dependence on diesel & petrol driven vehicles continues. It is mainly due to ever increasing need of transportation by road.

- India consumes petroleum products worth Rs 4 lakh Crores per annum!!!
- Both diesel and petrol are major source of pollution. Diesel as compared to petrol is quantitatively less harmful but it is more harmful qualitatively.
- There are continuous efforts to cut down the harmful effects of vehicle exhaust by improving the design of vehicles.
- Consumption of fuel by vehicles is almost directly proportional to the quantum of pollution being spread by them.
- Reduction of 2 - 2.5 % in the fuel consumption of automobiles would result into a saving of Rs. 8,000 10,000 crores per year!!!

This article is aimed at bringing out ways by which the consumption of fuel in automobiles can be reduced. Improved driving, vehicle maintenance and allied considerations are the major efforts for cutting down fuel consumption. Reduction in fuel consumption will not only result in saving precious foreign exchange but will also help in conservation of environment.

There are some design constraints which cannot be overcome e.g. fuel consumption of an Ambassador car cannot be improved to compete with a Maruti 800 cc Car. Similarly, Bullet 350cc Motorcycle cannot match Hero Honda 100 cc. However, it is possible to improve fuel efficiency of every vehicle to its optimum level by various measures which are given in succeeding paragraphs.

Driving style has direct bearing on fuel economy. It has been found that if 100 drivers run a vehicle under identical conditions and their fuel consumptions are recorded in an ascending order, the average consumption of first five will be 10% lower than that of remaining 95. Appendix "A" shows the percentage of drivers in whom various driving flaws were observed before training. It is important to note that most of the flaws by themselves may have limited effect but their cumulative effect becomes significant. Economic driving calls for anticipation and concentration. Anticipation is the key to economical driving. If you anticipate a green signal turning red before you reach it, ease the pressure on accelerator pedal and

gently roll your vehicle to halt, instead of slamming brakes at the last minute.

Fuel consumption of a vehicle is very high when it is moved from stand still. Frequent braking means frequent starting. One sudden application of brakes results in loss of 650 meters of vehicle movement at 60 kmph. Braking should be done sparingly. Driving in correct gear will reduce frequent braking. Your first pressure on brake pedal should be light but continue with increasing firmness so that that the vehicle slows down gradually. Shifting into lower gear while braking helps in reducing braking distance and it also reduces marching time after the vehicle has retarded/stopped. Every vehicle has a cruising speed for which the fuel consumption is least. For most of the vehicles it is between 45 & 55 Kmph. This speed can be around 65 Kmph when the vehicle is moving in overdrive. High-speed driving increases fuel consumption & increases chances of accident. It really does not save much time as felt by some people. For same amount of fuel, distance covered at 40 kmph is about 40 % more than that at 80 kmph. Braking distance at 60 kmph is nearly 4 times that at 30 kmph, which indicates that chances of accident go up almost exponentially with increase in speed. Single foremost quality of a good driver is minimum application of brakes.

Shifting into higher gear as soon as possible results in fuel economy. However, driving in high gear below a certain vehicle speed can cause stalling and becomes harmful for engine. Driving in wrong gear can increase fuel bill by 20%. It pays to maintain speed than frequent accelerations. Recently introduced 'Driver information System (DIS)' in upper segment cars are step in that direction only. Tachometer (RPM meter) helps in fuel economy by running the engine at fuel efficient speed. However, it would need understanding & practice.

While driving up hill use low gear. This increases mechanical advantage, makes acceleration smoother and hence low fuel consumption. Gear for going down hill should be same as for going up hill for safety reasons.

Climbing up hill from stand still should be done with the help of hand brakes which should be released gradually with simultaneous increase in throttle opening to avoid excessive opening of latter thus reducing fuel wastage.

Vehicle Maintenance Aspects

Spark Plug Condition indicates the combustion

efficiency, which has a direct bearing on fuel consumption. Always use spark plug as specified by manufacturers unless otherwise advised by an expert.

Self-Starter and Battery. Do not use starter in short bursts and also do not keep it engaged for long. Give a gap of about 45 sec between starts. If engine does not start in three attempts, find out what is wrong. A weak battery may increase fuel consumption due to repeated cranking for starting engine. In case a vehicle has not been used for some time, try to crank the engine without starting it for proper lubrication of engine. Battery should be maintained as per instructions of manufacturers.

Clutch. There should be no slippages of clutch due to less free play in clutch pedal, inferior quality/worn-out clutch liner, warp age in the metallic frame of clutch plate and inadequate pressure being exerted by pressure plate. When the vehicle speed does not increase with increase in engine speed, it indicates a poor clutch performance, which will increase fuel consumption. Clutch riding wastes fuel besides damaging clutch disc & linkages.

Carburetor choke should be fully open when the knob on the dashboard is pushed in completely. When required, pull out the choke at the start and return it progressively as the engine warms up. Never use choke in a warm engine. Set slow running only when the engine has warmed up. However, Carburetors are left in old model vehicles only. Presently, MPFI system is used in most of petrol vehicles. It is marginally fuel efficient, maintenance free and more environment friendly.

Fuel System Cleaning or changing of fuel filters should be done as specified. Choked air filters will not only increase fuel consumption but will create highly toxic exhaust. Leakage of fuel if existing can cause a lot of wastage of fuel.

Brakes. The brakes should be free of dirt, which on accumulation increases the rolling resistance. Hand brakes should also be checked for any sticking tendency specifically in old vehicles.

Wheels and Tyres. Radial tyres have less rolling resistance than cross ply tyres and are good for fuel economy (3 % to 7%). Little over inflated tyres in a fully loaded vehicle will reduce fuel consumption. Wheel alignment should be correct to avoid extra rolling resistance. It is easier to adjust air pressure in cold tyres as the readings tend to vary in tyres after

vehicle has moved some distance.

Aerodynamics of a vehicle should not be disturbed by fitting a roof rack which will disturb air flow over the vehicle, increase the drag and adversely affect the stability of vehicle also. Whenever rack is used, the luggage should be carefully selected and properly stowed. A badly packed roof rack can increase the fuel consumption significantly. When not in use, roof rack should be taken off because an empty roof rack alone can increase fuel consumption by 5%. Open windows create wind turbulence. On long fast drives, it is economical to roll up the windows and switch on A/c.

Fitment of Additional Gadgets. All such gadgets will not only increase fuel consumption on account of current drawn (electrical gadgets only) but also due to increase in total weight of vehicle. Point to be clearly understood in petrol/diesel is the only of energy in an automobiles and any extra energy spent will demand more fuel.

Turbochargers are being fitted in most of diesel vehicles these days. It is important that after starting, engine should idle for approx. 1 min before accelerating it. Similarly, idling should continue for 1 min before switching off the engine. This will save turbocharger from sudden damage and will also avoid wastage of additional fuel supplied by FIP to turbocharged engines.

Other Considerations

- (a) Engine overhaul should not be unduly delayed. Poor acceleration, black smoke and noisy tappets should be rectified whenever noticed.
- (b) Clutch pedal should be pressed while starting engine in cold weather.
- (c) Vehicle should be marched smoothly using lowest gear. Avoid idle running of engine for warming up. Instead, move off in lower gear.
- (d) Idle running of engine should be avoided as far as possible. At a red lights, switch off engine if the waiting is more than 30 sec. Delhi alone burns petrol/diesel worth Rs. 994 Crores per annum at traffic red lights. Hundreds of vehicles in stalling condition can be seen at all the busy crossings wasting fuel and creating unnecessary air pollution and noise pollution. Idling costs 2 ltrs per hour and long idling may damage engine also due to low oil pressure. Instead, switch off engine & start again. Slow running should be adjusted only after the engine has warmed up.

- (e) Avoid city rush-hour traffic, which can increase your fuel bill by 100%. In most cases, a long route through a main road may prove to be economical as well as time saving.
- (f) Vehicle should be parked in the shade wherever possible.
- (g) 'Users hand book' should be read carefully before operating any vehicle/equipment to know its full potential, peculiarities and other useful information. It should also be consulted in case of any difficulty before going for repairs.
- (h) 'Cleaning of parts with costly petrol/diesel' should not be done. Instead inexpensive solvents should be utilized. Boiling hot water can also be used for cleaning of motor parts.
- (i) Quality and Quantity of fuel: Both are very important for fuel economy. In the present era of high fuel cost and enforcement not being what it should be, lack of quality and quantity are quite common. Fuel should normally be purchased from selected outlets only after ascertaining their genuineness. It is better to learn from other's experience.
- (j) Wasteful driving not only increases cost to owner in terms of fuel, repairs and maintenance but also causes congestion, pollution and accidents of vehicles affecting entire society.
- (k) Car pooling and use of public transport can cut down the fuel consumption in a big way. Vehicles running on non conventional sources of energy should also be used as much as possible. Bicycle is a very good substitute for motor vehicles in certain places/occasions. It has large number of benefits and should be encouraged..

CONCLUSION

Vehicle owners themselves can apply most of the measures mentioned above. However, some of them may need an expert for diagnosing as well as for rectification. There is no doubt that every vehicle can be brought to its optimum performance by these measures. Fuel consumption claimed by manufacturers under 'Ideal conditions' should not be mistaken as under 'heavenly conditions' and therefore not achievable at all.

REFERENCES

- Literature published by Petroleum Conservation Research Association (PCRA), New Delhi.
- EME regulations published by Corps of Electronics and Mechanical Engineers (EME) of Indian Army.
- MICO publications.
- User's Handbooks & operators manuals.

Appendix 'A'

Percentage of Drivers in whom various Flaws were noticed before Training

1. Over speeding	42
2. Rash & Rough driving	39
3. Sudden acceleration	30
4. Jack Rabbit starting	12
5. Violent & sudden braking due to poor anticipation	37
6. Gear change without double declutching - Diesel vehicle only	39
7. Improper gear selection	30
8. Use of clutch to hold the vehicle on a gradient	123
9. Clutch riding	27
10. Unnecessary idling	12